Meter-to-Cash Operational Assessment

Prepared by West Monroe Partners for the
City of San Diego Public Utilities Department

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Background

The City of San Diego Public Utilities Department (SDPUD) received numerous, highly-public complaints of high bills and overcharged customers in the beginning of 2018. An internal SDPUD review found:

- A pattern of misread water meters in parts of Northern San Diego; after reviewing over 3,000 meters in the identified area, 343 were found to be misread by a singular meter reader in an isolated event
- Five customer meters were installed with incorrect registers, resulting in high bills from incorrect meter/register configuration

Other potential contributions to customer high bill complaints included a 6.9% water rate increase in August of 2017 and an extended bill period in late 2017.

In January of 2018, the City Auditor initiated an audit of SDPUD's billing procedures and smart meter technology to determine potential causes of billing inaccuracies. SDPUD contracted West Monroe Partners (West Monroe) in March of 2018 to perform a detailed root cause analysis of alleged high bills, as well as a comprehensive operational assessment in order to restore customer confidence.

Methodology

To complete this assessment, West Monroe conducted a detailed data analysis, observed office staff and field personnel, conducted discovery interviews, and compared SDPUD operations to industry peers over an eight-week period.

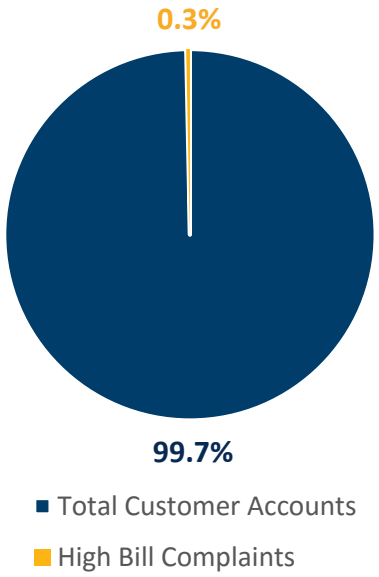
- **Macro data analysis (i.e., aggregated customer accounts):** West Monroe analyzed cost of service study data from 2012 through the first quarter of 2018. This consisted of nearly 10.3M meter readings across 448,000 customer accounts. West Monroe applied filters to isolate single-family residences that had at least 18 meter readings on the account. This resulted in a dataset of 7.4M meter readings across 216,000 accounts in 36 zip codes. From this dataset, West Monroe calculated average water consumption, normalized consumption based on days in the bill period, and identified the standard deviation of an individual customer's meter readings versus their historical consumption. Additionally, West Monroe reviewed historic meter reading data to determine if read falsification is a pervasive issue.
- **Micro data analysis (i.e., individual customer accounts):** West Monroe reviewed PUD's case log of 900 high bill complaints, and randomly selected 85 individual accounts for an independent and detailed review.
- **Office observations:** West Monroe shadowed representatives in the call center and billing to observe their day-to-day operations, policies, and technology.
- **Field observations:** West Monroe shadowed personnel performing meter tests, replacing meters, reading meters, and conducting field investigations.
- **Discovery interviews:** West Monroe facilitated interviews with SDPUD executive leadership, as well as management and front-line personnel in the meter shop, meter reading, field service investigation, billing, customer service/call center, training, special projects (including management of the advanced metering infrastructure project), and technology.

- **Peer analysis:** West Monroe compared SDPUD policies, operations, and technology to peer utilities based on documents provided by California Urban Water Agencies (CUWA), as well as West Monroe's experience in the water utility industry.

Executive Summary

Initially, approximately 900 customers logged a case with SDPUD regarding a high bill in late 2017 and early 2018, representing just over 0.3% of SDPUD's total customer base. The log was developed based on customer high-bill inquires into the call center, at townhall meetings, with City Council and with other SDPUD divisions. The 900 cases were assigned to team members for further analysis and resolution with the customer. The volume of high bill complaints relative to total customer accounts is illustrated in Figure 1.

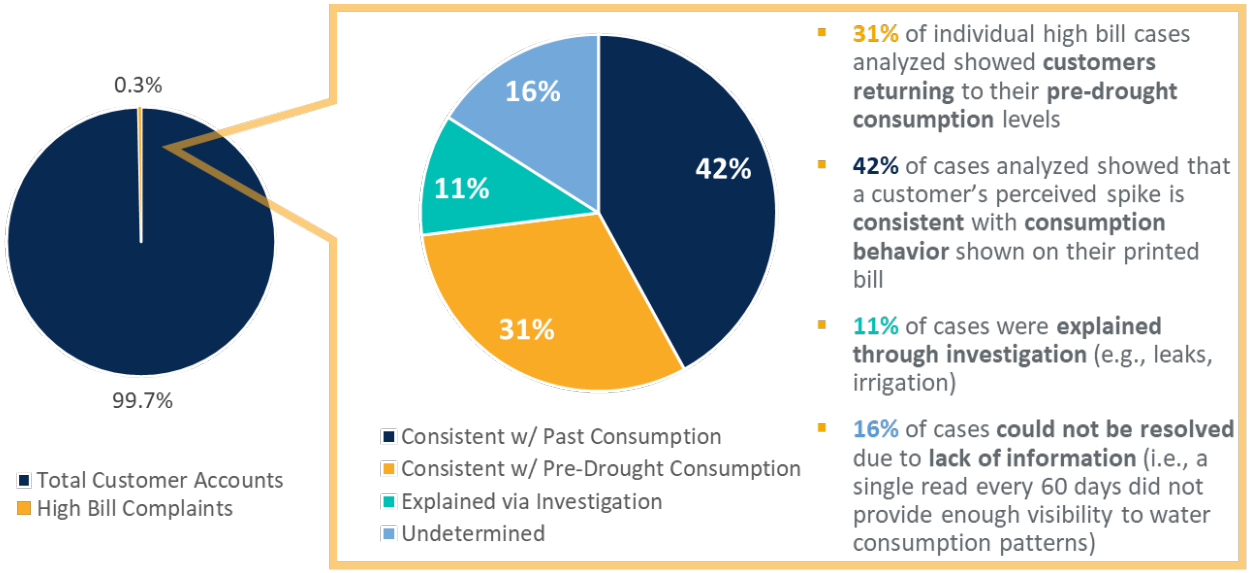
Figure 1: *High Bill Complaints vs. Total Customer Accounts*



West Monroe independently reviewed the high bill case log and selected a sample of 85 accounts for individual review. This review was performed using all available data, including complete customer consumption history, estimated and actual meter reads, call center interaction notes, field investigation notes, and Itron Analytics (if advanced metering infrastructure is installed at the property).

This review identified that 31% of individual high bill cases showed customers returning to their pre-drought water consumption levels. 42% of cases analyzed showed that a customer's perceived spike is consistent with consumption behavior shown on their printed bill. 11% of cases were explained through investigation (e.g., leaks, irrigation). 16% of cases could not be resolved due to lack of information (i.e., a single read every 60 days did not provide enough visibility to water consumption patterns). SDPUD confirmed that the findings of this sample analysis are consistent with what SDPUD has identified while working all 900 complaints. The following figure shows findings of the high bill case log review.

***Figure 2**: Results of High Bill Complaint Review*



Key Findings and Recommendations

Key findings of the meter to cash operational assessment are below and are based on the detailed macro/micro data analysis, observations with office and field staff, discovery interviews, and comparison of SDPUD's operations to peer utilities. Recommendations are made to mitigate the risk of future high bills, improve operational efficiency, and restore customer confidence in SDPUD. Findings are described in greater detail throughout the remainder of this report.

***Table 1:** Key Findings and Recommendations*

ID	Finding	Recommendation
1	Similar to other utilities, common operational problems persist (e.g., unworked meter replacements, misreads, rudimentary bill estimation, inconsistent high bill messaging)	**Improve Internal Operations** • Work backlog of meter replacements and aged meters • Close out worked/cancelled/duplicate service orders • Increase decommissioned meter testing • Follow-up on generated work-orders • Transition to electronic service orders • Resume and expand cross-team meetings

ID	Finding	Recommendation
2	Meter reading quality assurance and control, particularly in handheld reading devices, is insufficient to properly identify misreads or falsified reads at the onset	**Enhance Meter Reading Controls** • Revise handheld audit flags to more accurately identify misreads • Update Itron handhelds to require that the meter serial number be entered following an audit flag • Determine the meter reading complexity of each route (Low, Medium, High) and estimate a range of normal/expected duration; improve route allocation within the meter reading team • Improve meter reading accountability via shadowing and ongoing quality audits
3	While this initiative does not directly relate to a root cause of billing issues, it addresses issues that exacerbated high billing complaints and customer dissatisfaction.	**Be a Customer-Centric Utility** • Increase customer satisfaction surveys by automating opt in/out at the beginning of every call • Use existing technology within the call center to improve customer service—e.g., Customer Relationship Management (CRM), skills-based routing, workforce management, call disposition codes (wrap-up) • Provide an email of new meter reads to customers, rather than a paper door hanger • Proceed with MyWaterEasy customer portal upgrade
4	There is a lack of accessible data, quality information and collaboration across groups, which is necessary to achieve SDPUD's objectives (i.e., deliver timely, accurate bills to customers)	**Become a Data-Driven Utility** • Create management dashboards that display key operational information by group (e.g., percent of estimated bills, backlog of meter replacements, daily call volume and types, average days between meter reads) • Transition to electronic work orders, and use reports and dashboards to confirm orders are being worked • Resume cross-team meetings to address challenges and handoffs between groups, and key information that needs to be shared
5	Higher rates, an extended bill period, and ending mandatory conservation rules, combined with a historically dry season, led many customers to believe they were being overcharged	**Enhance conservation messaging** • Inform customers that deviating from conservation behavior will result in higher bills • Expand conservation messaging, particularly as SDPUD approaches peak consumption timeframe in hot/dry summer months • Share projected bills and dollar amount based on city-wide average prior to implementing rate increases • Continue to educate customers on how to conserve water and reduce bill cost
6	PUD customer bills can be misleading, as graphs do not account for days of service, weather patterns, and/or conservation years	**Revise Bill Presentment** • Enhance the customer bill to display weather data (e.g., temperature, rainfall) • Revise the graph on the customer bill to show a normal baseline year, rather than displaying a year with a conservation mandate • Display all customer consumption history when sending ancillary graphs to customers (rather than graphing only to 2015)

ID	Finding	Recommendation
7	PUD's current manual meter reading process does not provide sufficient granularity to troubleshoot high bill concerns	**Accelerate AMI Deployment** • Revise and formalize AMI deployment plan and timeline • Conduct robust AMI education & outreach • Increase use of AMI endpoints/ERTs • Improve the efficiency of AMI deployment (e.g., conduct one-trip AMI installation, working the meter replacement and ERT installation at the same time, provide opt-out path)
8	While this initiative does not directly relate to a root cause of billing issues, it addresses issues that exacerbated high billing complaints and customer dissatisfaction.	**Be a Great Place to Work** • Recognize employees who demonstrate troubleshooting, analytical, de-escalation, and first contact resolution skills (thereby improving customer service and avoiding service calls "truck rolls") • Affirm safety priorities and culture; reiterate safety norms and expectations with staff, and confirm all staff are using personal protective equipment (PPE) and empowered to make safe choices • Resume cross-team meetings to address challenges and handoffs between group, and key information that needs to be shared • Replace door hangers with an automated process (e.g., email meter read to customer)

Root Cause Analysis

This assessment identified six primary causes of high bill complaints as outlined below.

Finding 1 of 6: *Similar to other utilities, common operational problems persist (e.g., unworked meter replacements, misreads, rudimentary bill estimation, inconsistent high bill messaging)*

Table 2: *Operational Issues at SDPUD*

Meter Shop

- As of May 2018, there was a backlog of over 7,300 unworked meter replacements for broken registers, buried meters, etc., which directly contributes to estimated and/or inaccurate bills (note: SDPUD has been working to reduce this backlog with 335 meters remaining as of Jul 2018).
- SDPUD is not keeping up with the replacement of aged Single Family Residential (SFR) meters in the ground that have exceeded their useful life, and many are likely under-registering.
- Customers who had an aged and under-registering meter will notice higher bills once their meter is replaced with a new meter and begins measuring water use more accurately.

	Meter Reading	• SDPUD's handheld devices have a wide range of acceptable meter reading values, preventing real-time checks of read accuracy. • Meter reading supervisors are not using daily reports to oversee staff, hold them accountable, or to investigate high/low bills.[1]
	Billing	• Unworked meter replacements result in billing repeatedly reviewing/estimating an account and result in customers receiving estimated bills. • Bills are estimated using consumption in the same month last year (i.e., during a skewed year based on the conservation mandate), resulting in low estimations and eventual high bills when the account trues-up.
	Field Investigation	• Field investigations are a secondary priority to meter reading, even though these investigations are critical to validate reads/identify needed meter replacements/issue accurate bills. • Investigations are paper-based and provide no trending/reporting on common findings, meaning issues in meter reading could persist and continue to generate inaccurate/high bills.
	Call Center	• CSRs demonstrate inconsistent knowledge and skills, resulting in inconsistency in answering customer questions, unnecessary truck rolls, and increased customer suspicion of inaccurate/high bills. • There is not a regular frequency/schedule for call audits. Supervisors are hesitant to audit calls and provide feedback/coaching to customer service representatives; customers receive inconsistent high bill messaging.

Recap - Finding 1 of 6: *Similar to other utilities, common operational problems persist (e.g., unworked meter replacements, misreads, rudimentary bill estimation, inconsistent high bill messaging)*

Recommendation: Improve Internal Operations

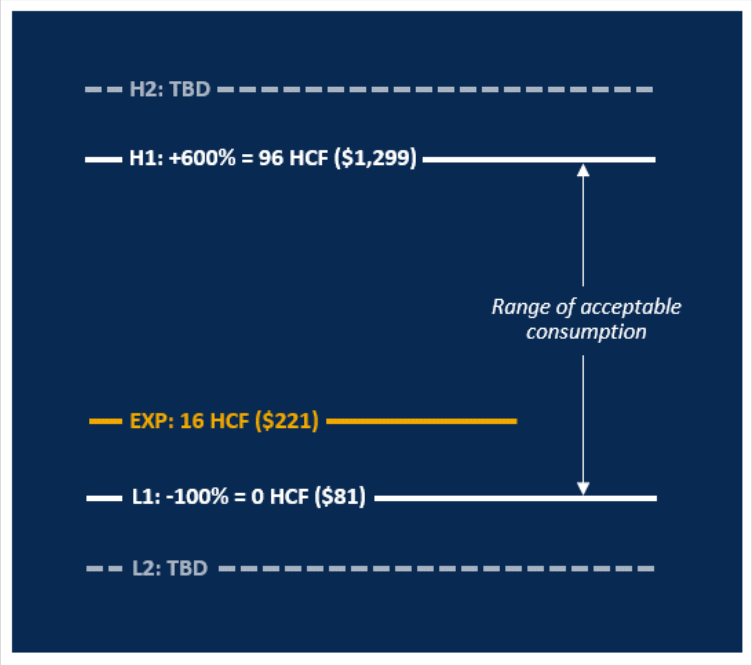
- Work backlog of meter replacements and aged meters
- Close out worked/cancelled/duplicate service orders
- Increase decommissioned meter testing
- Follow-up on generated work-orders
- Transition to electronic service orders
- Resume and expand cross-team meetings

[1] This was identified during the course of the high bill review. Supervisors/management are now starting to use these reports.

Finding 2 of 6: *Meter reading quality control, particularly in handheld reading devices, is insufficient to properly identify misreads or falsified reads (such as the prior employee who falsified reads in December 2017)*

The current handheld audit thresholds (programmed in the customer information system) are insufficient at identifying misreads and falsified reads at the onset. Audit thresholds are translated to meter readers' handheld devices based on expected consumption. Based on the current configuration, a meter reader can misread or falsify a read up to six times an average customer's expected consumption without receiving an audit flag -- which can result in up to $1,000 in overcharges (Note: Billing reviews invoices in excess of $1,200). Furthermore, meter readers can currently bypass meter serial number verification checks in handheld devices.

Figure 3: *Meter Reading Audit Thresholds*



In early 2018, SDPUD identified an isolated incident of misread water meters in concentrated areas due to human error that resulted in more than 300 customers being incorrectly overcharged for their water usage. This incident happened on December 26, 2017.

On this date, over 6,000 SFR accounts were read by 13 meter readers. Meter Reader 7 had an unusually high number of reads with an elapsed read time of under five seconds, and an unusually high audit count (i.e., handheld meter reading entries were above the estimated high audit band). The average read time across all readers is approximately 30 seconds, and the average high/low audit count is approximately 140.

134 of Meter Reader 7's meter reads resulted in usage greater than two times the customer's maximum usage over past year (28% of total reads). Meter Reader 7 had unusually high repeat meter readings, particularly the values of 85 and 86. 50% of the 134 high reads were associated with a reading of "85" or "86." No other meter reader on this date exhibited similar behavior.

Figure 4: *Individual Meter Reading Analysis – Reads Under 5 Seconds and Audit Counts*

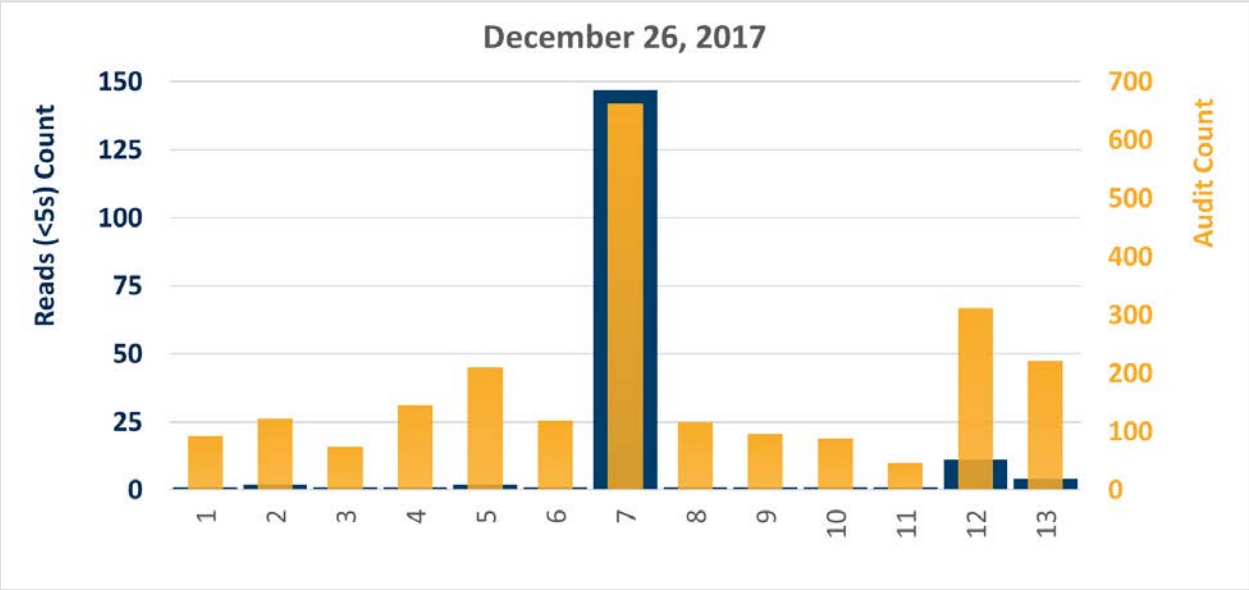
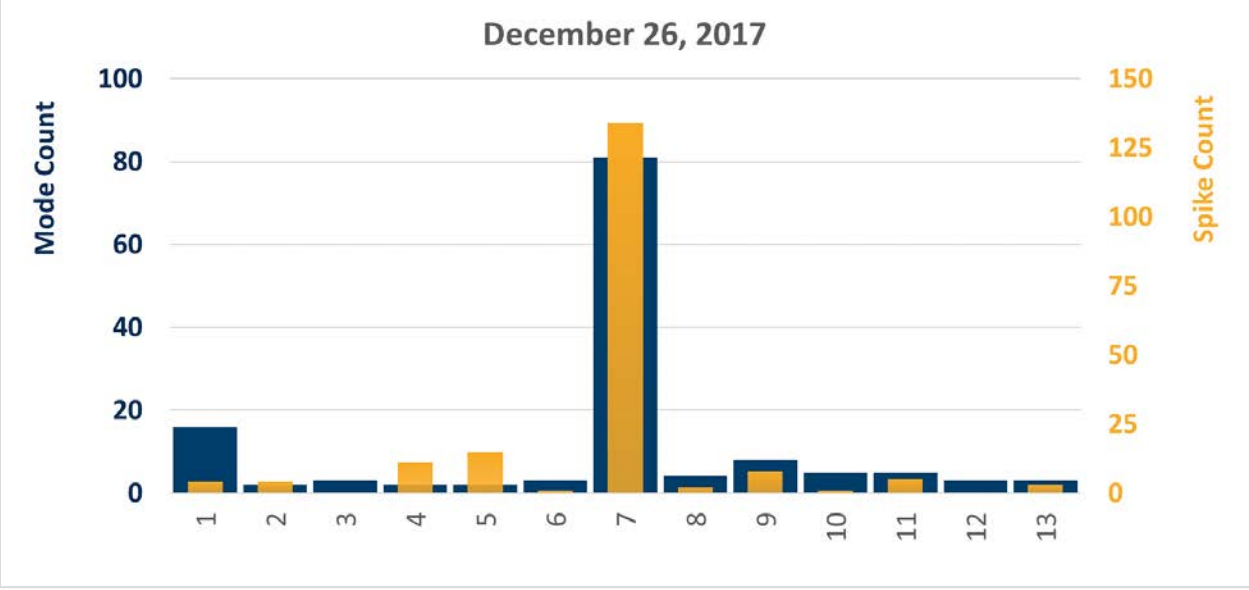


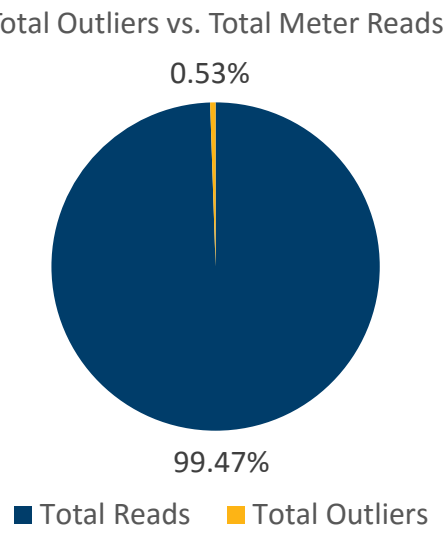
Figure 5: *Individual Meter Reading Analysis - Repeat Reads and High Bill Counts*



Across all meter readers, the ratio of reads to outliers does not indicate there is a pervasive issue with read falsification. Meter reading routes have 350 – 500 meters, meaning a meter reader, on average, has less than 3 outliers per day (note: outliers account for leaks, atypical irrigation, as well as misreads

and falsified reads). On average, based on data from 2015 – 2017, meter readers have less than 5.5 outlier readers per 1,000 meter reads. For an average customer who uses 16 HCF per bill period, consumption 24 HCF and higher is considered an outlier (based on an individual customers average water use and standard deviation).

Figure 6: *Total Outliers vs. Total Meter Reads*



Recap - Finding 2 of 6: *Meter reading quality control, particularly in handheld reading devices, is insufficient to properly identify misreads or falsified reads (such as the prior employee who falsified reads in December 2017)*

Recommendation: Enhance Meter Reading Controls

- Revise handheld audit flags to more accurately identify misreads
- Update Itron handhelds to require the meter serial number be entered following an audit flag
- Determine the meter reading complexity of each route (Low, Medium, High) and estimate a range of normal/expected duration; improve route allocation within the meter reading team
- Improve meter reading accountability via shadowing and ongoing quality audits

Finding 3 of 6: *There is a lack of accessible data, quality information and collaboration across groups, which is necessary to achieve SDPUD's objectives (i.e., deliver timely, accurate bills to customers)*

At SDPUD, customer service and operations groups have limited visibility into work backlog, staff performance, and trending. Reports can be exported from key systems, but compiling data into a usable format is cumbersome, and reports provide little trending data. Generally, groups do not have defined key performance indicators that are measured/tracked, making it difficult to hold staff accountable to productivity and accuracy goals.

For example:

- Trouble codes entered by meter readers are not consistently generated into work orders
- Work orders generated by billing go into an unworked queue; escalated requests are emailed to managers and assigned to field crews
- This process has resulted in over 7,300 open/unworked service requests for meter repair/replacement, directly contributing to missed meter reads, estimated bills, and inaccurate bills (note: SDPUD has been working to reduce this backlog with 335 meters remaining as of July 2018)

Figure 7: *Example Management Indicators*

Recap - Finding 3 of 6: *There is a lack of accessible data, quality information and collaboration across groups, which is necessary to achieve SDPUD's objectives (i.e., deliver timely, accurate bills to customers)*

Recommendation: Become a Data-Driven Utility

- Create management dashboards that display key operational information by group (e.g., percent of estimated bills, backlog of meter replacements, daily call volume and types, average days between meter reads)
- Transition to electronic work orders, and use reports and dashboards to confirm orders are being worked
- Resume cross-team meetings to address challenges and handoffs between groups, and key information that needs to be shared

Finding 4 of 6: *Higher rates, an extended bill period, and ending mandatory conservation rules, combined with a historically dry season, led many customers to believe they were being overcharged.*

Overall bill cost has increased 18%–30% since 2013 (including water and wastewater services). Higher usage customers notice the greatest impact, as rates have a tiered structure. Note: water service costs have roughly doubled (80%–120%) since 2008 for San Diego residents; wastewater services costs have increased 15%.

In addition to higher bill costs, SDPUD made a one-time change to the billing calendar in the fourth quarter of 2017, resulting in a 70-day bill. Typically bills consist of approximately 60-days of usage. Without any change in consumption behavior, customers experienced a 13%–15% increase in their fourth quarter 2017 bills based on this one-time change to the billing calendar. A high usage customer (averaging 40 HCF per bill period) observed an increase of nearly $75 for the one-time extended billing period.

Figure 8: *Total Bill Cost Increase - 2013 vs. 2018*

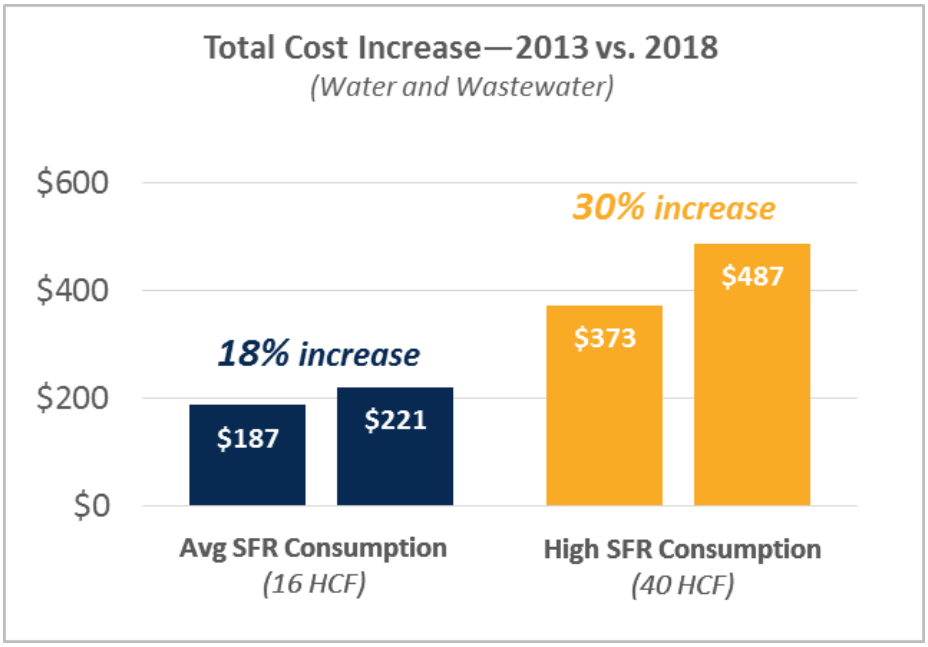
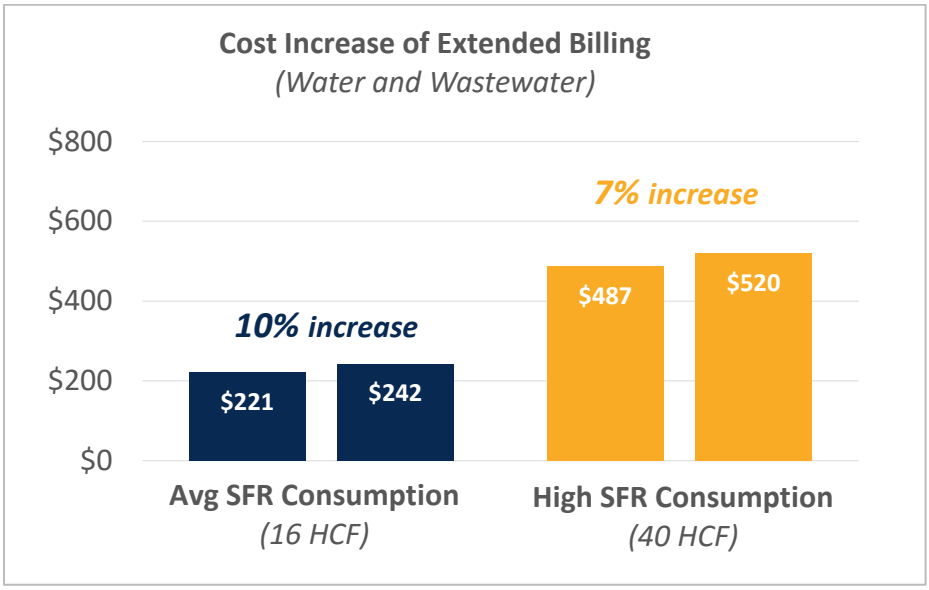


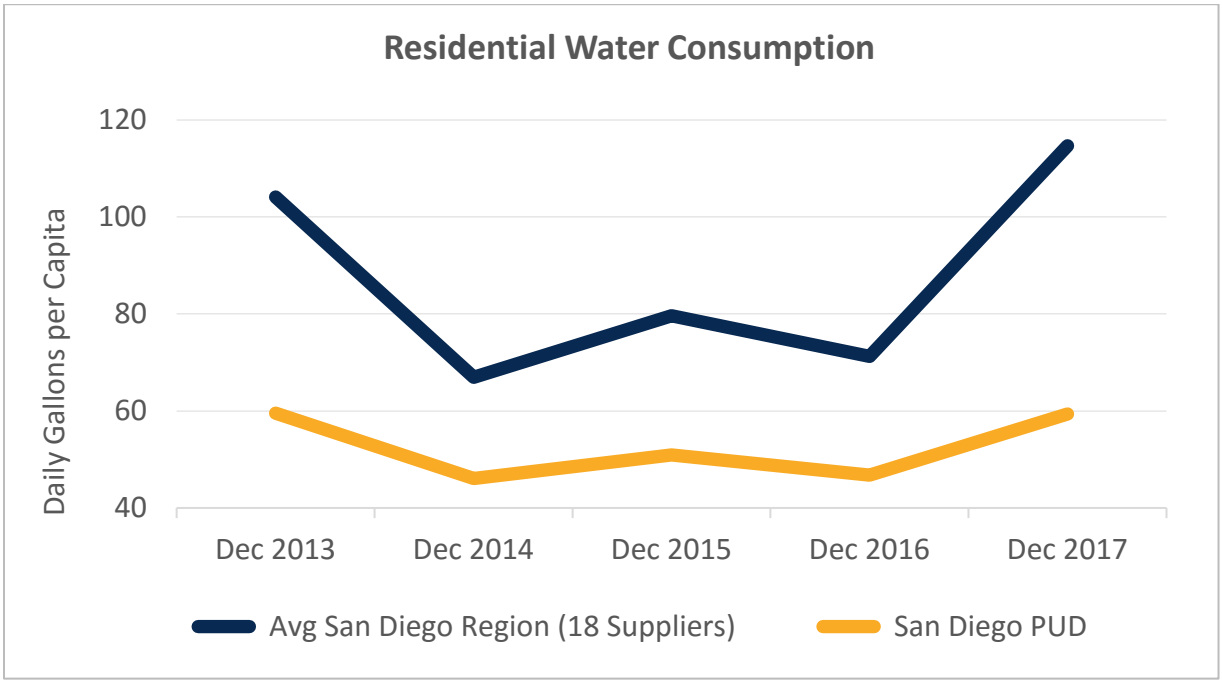
Figure 9: *Cost Increase of Extended Billing*



Furthermore, on top of rate increases and the one-time 70-day bill, customers of the City of San Diego are using more water than in recent years. [2] This is consistent with other regional suppliers; on a per capita basis, the majority of water suppliers in the region have surpassed pre-drought consumption levels.

San Diego PUD residential consumption in December 2017 was 30% higher than in 2016, however, is consistent with water consumption levels in 2013. This data is based on reports submitted to the State Water Resource Control Board by 18 water suppliers in the San Diego hydrologic region; data was aggregated by San Diego Coast Keeper.

Figure 10: *Residential Water Consumption for San Diego Suppliers*

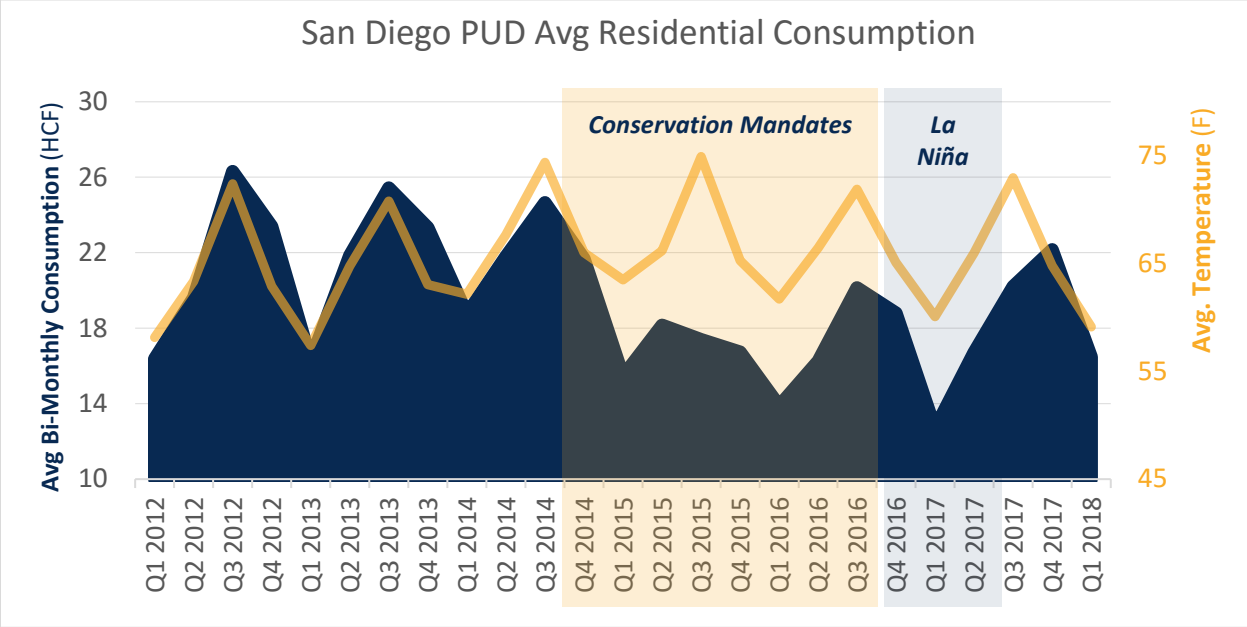


Water consumption is highly correlated with temperature, and water consumption behavior in recent years was impacted by conservation mandates. Residential consumption in 2012 – 2014 was relatively consistent and highly correlated with temperature. During the drought years of 2015 and 2016, customers used approximately 20% less water.

In the first quarter of 2017, high precipitation ("La Niña") resulted in lower than usual residential water consumption. From the third quarter of 2017 on, residential consumption begins increasing to be comparable to previous consumption levels.

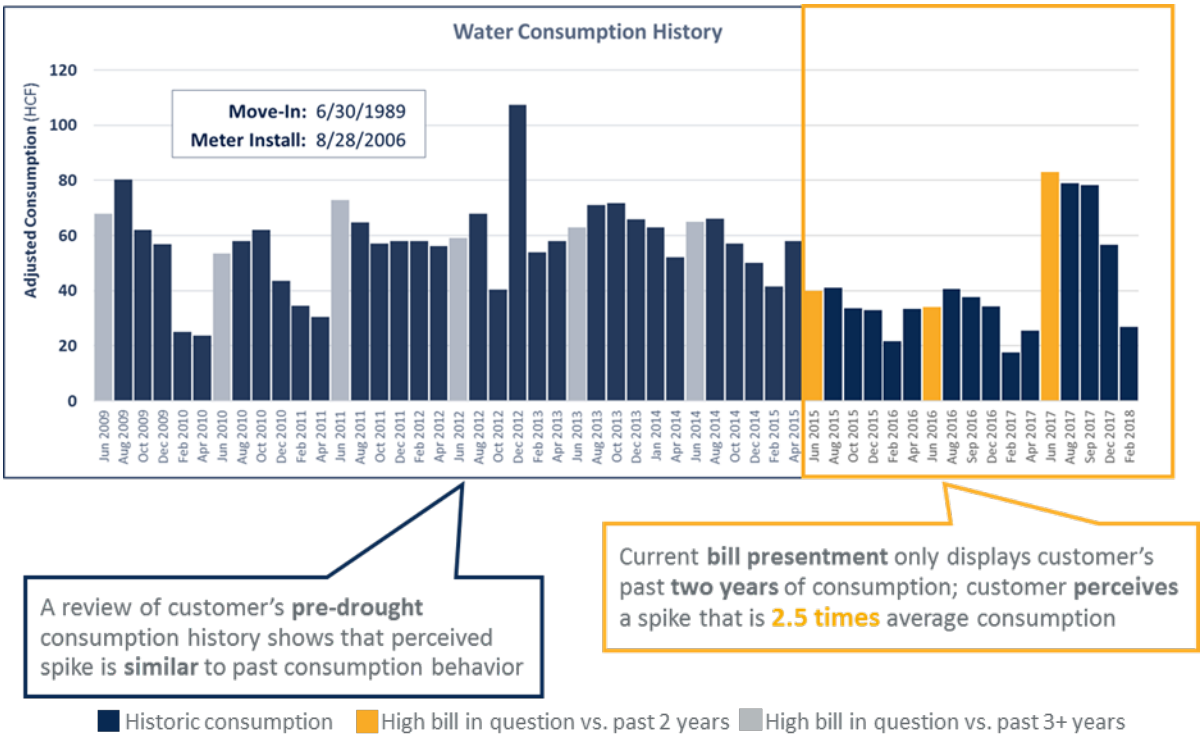
[2] Residential consumption volume based on actual production volumes reported to the State Water Resources Control Board, multiplied by a residential factor (currently 53.9% of overall production)

Figure 11: *San Diego SDPUD Average Residential Consumption (Single Family Residential)*



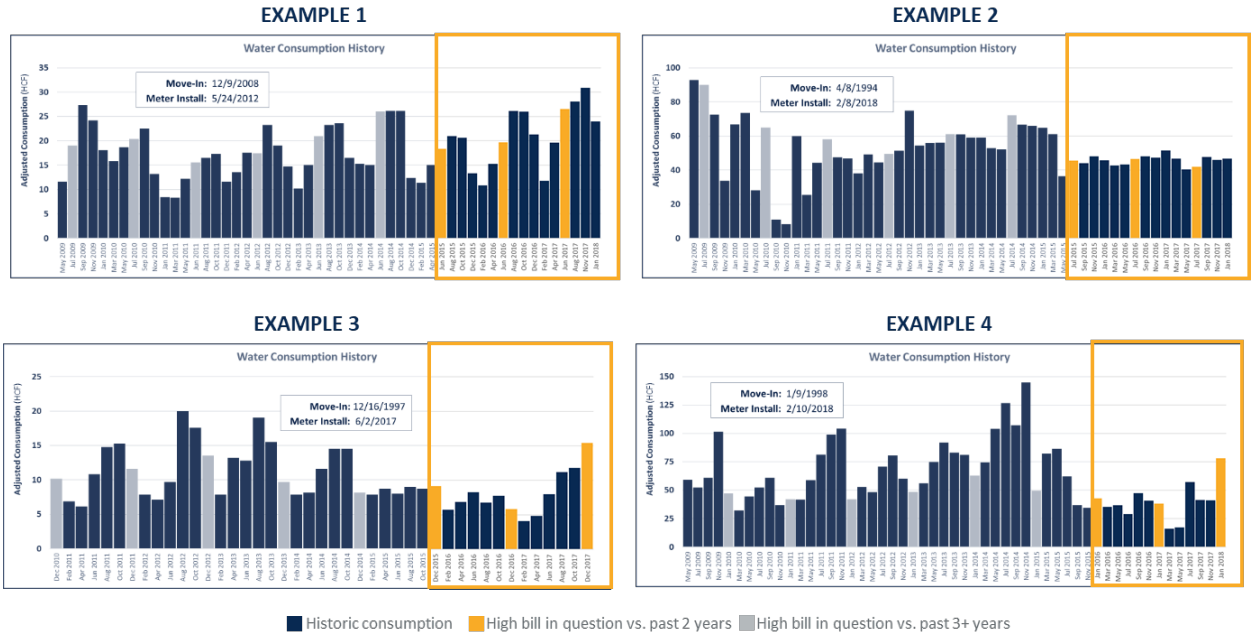
On an individual level, in nearly 75% of customer cases investigated, the high bill in question was consistent with the customer's prior water consumption history.

Figure 12: *Water Consumption History - Representative High Bill Complaint*



42% of cases analyzed showed that a customer's perceived spike is consistent with consumption behavior shown on their bill (examples 1 and 2 below). 31% of individual high bill cases analyzed showed customers increasing usage consistent with their previous consumption (examples 3 and 4 below). 11% of the cases were spike(s) explained through investigation (e.g., leaks), and the remaining 16% of cases could not be resolved due to lack of information.

Figure 13: *Additional Examples - Representative High Bill Complaints*



Recap - Finding 4 of 6: *Higher rates, an extended bill period, and ending mandatory conservation rules, combined with a historically dry season, led many customers to believe they were being overcharged.*

Recommendation: Enhance conservation messaging

- Inform customers that deviating from conservation behavior will result in higher bills
- Expand conservation messaging, particularly as SDPUD approaches peak consumption timeframe in hot/dry summer months
- Share projected bills and dollar amount based on city-wide average prior to implementing rate increases
- Continue to educate customers on how to conserve water and reduce bill cost
- Note: SDPUD does not intend to change the billing schedule going forward, so no recommendations are made related to the one-time extended billing period

Finding 5 of 6: *SDPUD customer bills can be misleading, as graphs do not account for days of service, weather patterns, and/or conservation years*

PUD's current bill presentment (figure 14) only displays two years of customer consumption history. With this limited information on the water bill, a customer is misled to believe their usage has tripled. Expanding the consumption history reveals similar water consumption behavior prior to the conservation mandate (figure 15).

Figure 14: *Current Bill Presentment*

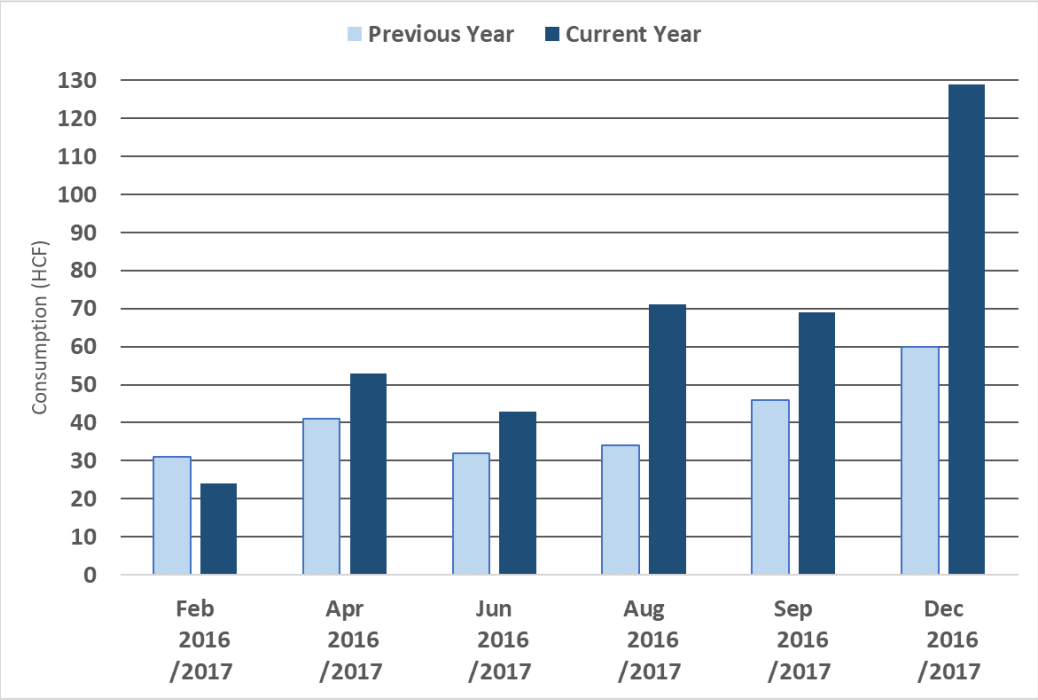
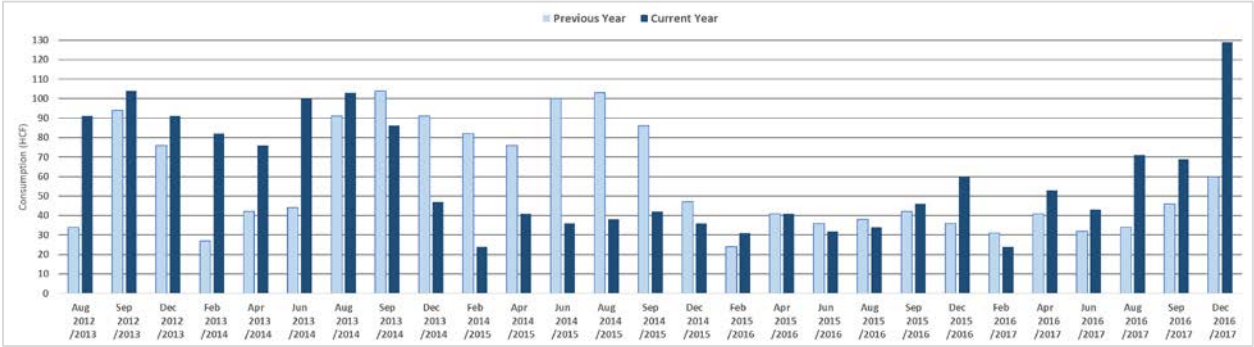


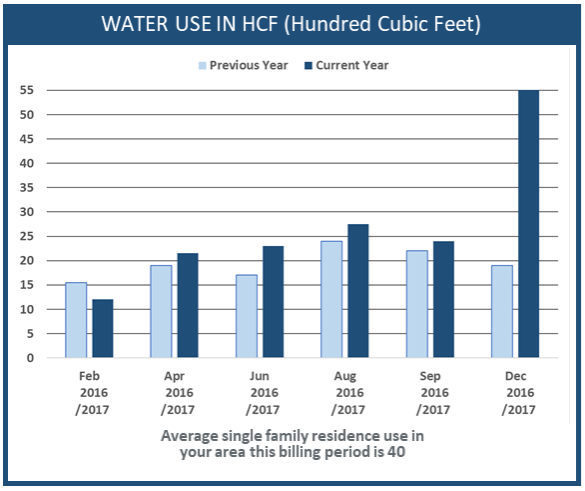
Figure 15: *Extended Bill History*



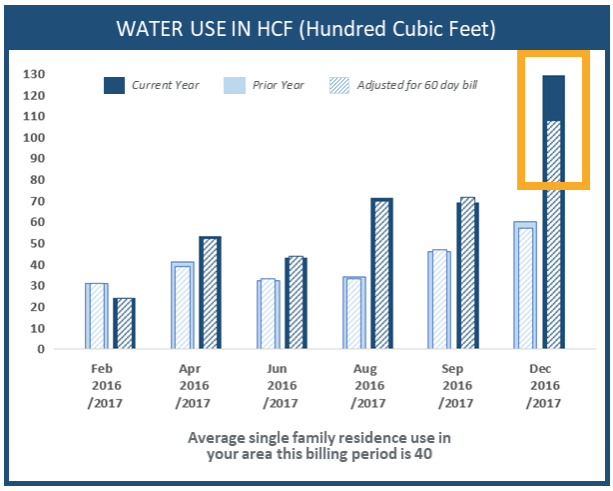
Additionally, SDPUD's current bill presentment does not normalize usage for the number of service days included in the bill. For this customer, we observe a 17% increase in usage (~$80) based on the extended bill period in the fourth quarter of 2017.

Figure 16: *Current Bill Presentment vs. Adjusted Presentment*[3]

Current Bill Presentment



Adjusted Presentment (60 Day Period)



Recap - Finding 5 of 6: SDPUD *customer bills can be misleading, as graphs do not account for days of service, weather patterns, and/or conservation years*

Recommendation: Revise Bill Presentment

- Enhance the customer bill to display weather data (e.g., temperature, rainfall)
- Revise the graph on the customer bill to show a normal baseline year, rather than displaying a year with a conservation mandate
- Display all customer consumption history when sending ancillary graphs to customers (rather than graphing only to 2015)

[3] Adjusted presentment graphic is a mock-up created by West Monroe; this is not something currently provided to PUD customers.

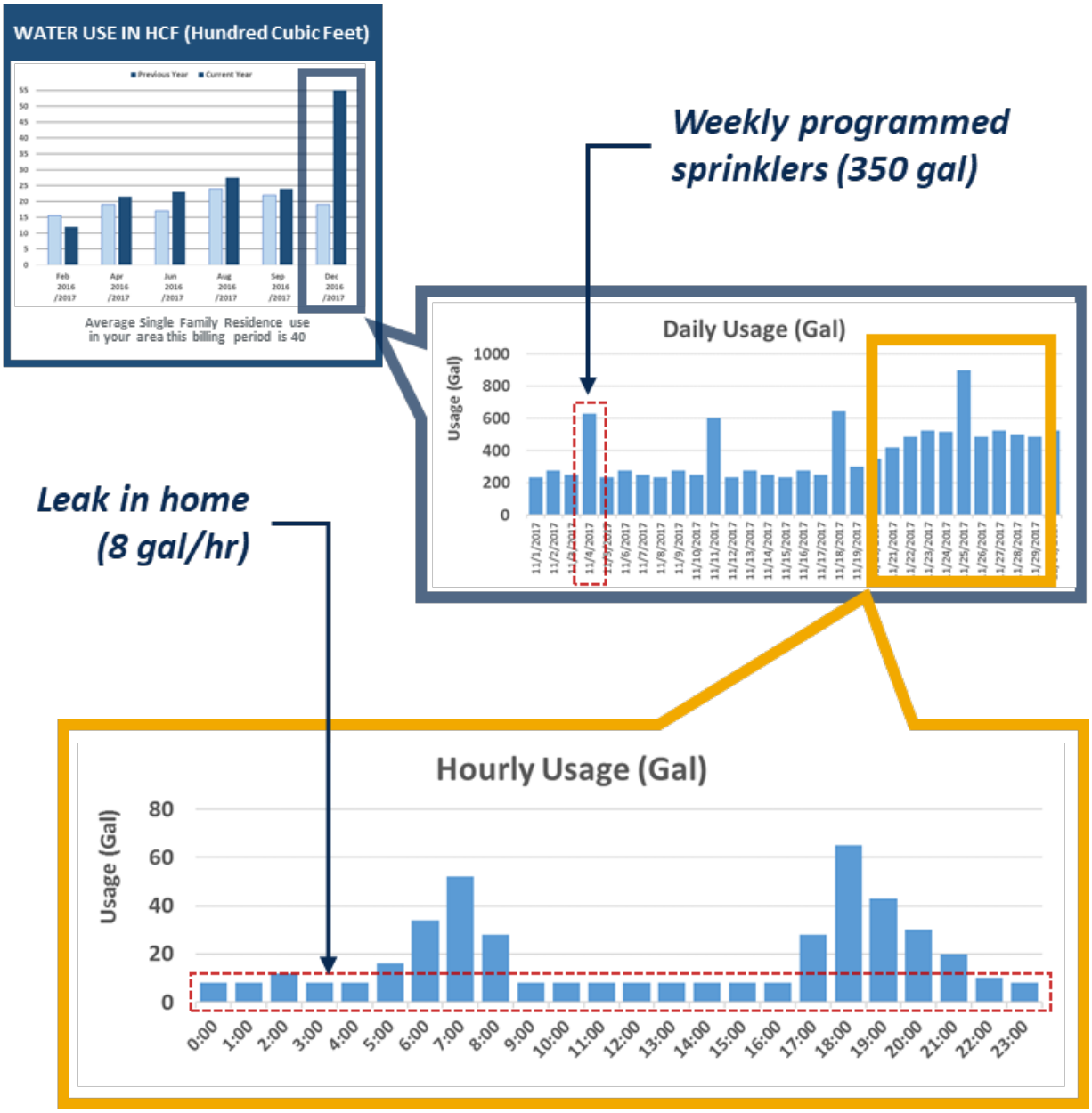
***Finding 6 of 6: SDPUD**'s current manual meter reading process does not provide sufficient granularity to troubleshoot high bill concerns*

PUD has completed phase one of an advanced metering infrastructure (AMI) program, which includes installation of AMI devices for 15,578 customers. AMI has numerous benefits, including:

- Obtaining consumption data multiple times per day, with hourly interval information that can be used to troubleshoot high-bill questions while on the phone with customers (see left image)
- Increasing accuracy of meter reading by reducing estimates & manual entry errors
- Reducing truck rolls associated with meter misreads and investigations
- Identifying water leaks proactively, before they become large and costly to fix
- Providing customers complete access to their interval consumption—increasing consumption awareness and customer confidence in the utility
- Increasing operational efficiency of meter reading

Expanding the use of AMI will assist SDPUD customers and SDPUD staff in identifying and troubleshooting high bills, such as the example presented in figure 17 below.

Figure 17: *Consumption Analysis Using AMI Data*



Recap - Finding 6 of 6: *SDPUD's current manual meter reading process does not provide sufficient granularity to troubleshoot high bill concerns*

Recommendation: Accelerate AMI Deployment

- Revise and formalize AMI deployment plan and timeline
- Conduct robust AMI education & outreach
- Increase use of AMI endpoints/ERTs
- Improve the efficiency of AMI deployment (e.g., conduct one-trip AMI installation, working the meter replacement and ERT installation at the same time, provide opt-out path)

Peer Analysis

West Monroe benchmarked key operational topics at SDPUD against municipal water utilities in the region. Documentation was provided by SDPUD via membership in the non-profit corporation CUWA (California Urban Water Agencies).

Table 3: *Peer Analysis Benchmarks*

Topic	Benchmark	SDPUD Performance
Meter Reading Reporting Structure	• Most utilities have meter reading aligned to customer service (rather than construction/maintenance) • A few utilities have meter repair/replacement report to customer service	• SDPUD's meter readers report through customer service; meter repair and replacement reports through construction/maintenance
Real-Time High Bill Checks (During Meter Reading)	• Nearly all utilities have a pre-billing check of high/low consumption, conducted at the end of the day via reports • Most utilities notify customers of high consumption via a door-hanger • Some utilities conduct a real-time check in the field for low/no usage, and capture photo evidence	• SDPUD does not follow-up on pre-billing high/low alerts • SDPUD does not inform customers real-time of high usage • SDPUD audit bands on meter reading devices are too large to accurately flag abnormal consumption
Leak Adjustments	• Excluding SDPUD, five of six benchmarked utilities provide leak adjustments on customer appliances (e.g., toilet, water heater)	• SDPUD provides underground leak adjustments (no irrigation), and one-time exceptional high consumption adjustments – which incentivize customers to withhold information, as acknowledging an appliance leak will prevent a customer from receiving an adjustment
Meter Reading Salary	• Excluding SDPUD, meter reading/utility service representative hourly wages range from $20.88 – $44.61 • At five out of six utilities, meter reader starting pay is at or above $25/hour	• Meter readers at SDPUD are paid below industry benchmarks, with hourly pay ranging from $15.40 - $18.71

Implementation Roadmap

This roadmap represents all recommended initiatives and a proposed timeline based on SDPUD's priorities and constraints.

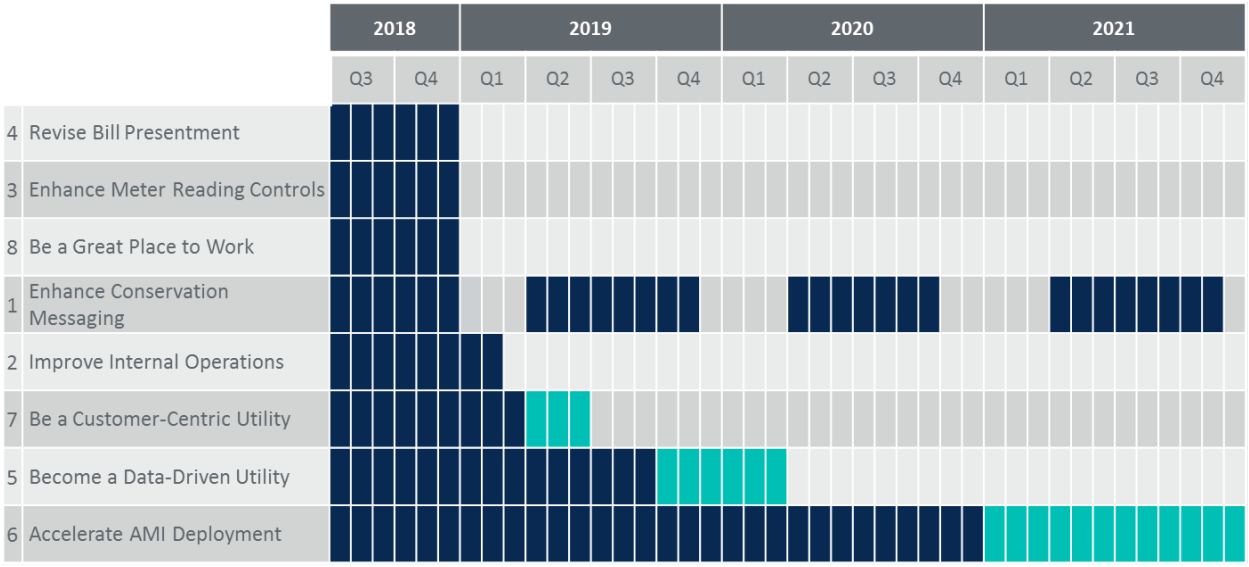


Figure 18: *Proposed Implementation Roadmap*

About West Monroe Partners

West Monroe Partners is a business and technology consulting firm headquartered in Chicago, Illinois, with a local office in Los Angeles, California. West Monroe is a firm of 950 consultants with a dedicated energy and utilities practice. We help water utilities respond to changing regulations, business evolution, and growing customer expectations. Our dedicated team of 80-plus utility industry professionals is a blend of engineering expertise, technology specialists, and industry experience.

Resumes of West Monroe Partners Personnel

Mike Wayman—AMI and Meter-to-Cash Subject Matter Specialist

Senior Director, Energy and Utilities Practice

Mike Wayman is a Senior Director in West Monroe Partners' Energy and Utilities practice based in Los Angeles. He is an accomplished industry leader and consultant with diverse expertise in smart meter/grid disciplines and deep experience in water/electric utility operations, regulatory compliance, financial management, and project management. His more than 25 years of experience includes leading numerous large AMI, business process, system implementation, and change management programs.

Since 2008, Mike has worked exclusively within the water and electric smart meter industry, serving in leadership roles for municipal utility clients, as well as small and large investor-owned utilities. Mike joined West Monroe Partners in 2010 following several years as an independent consultant to Southern California Edison (SCE), where he served in both strategic and tactical roles within the business integration area of SCE's smart meter implementation.

Since 2010, Mike has served in execution and leadership roles on the following AMI and Customer Service Assessment projects: California American Water, City of Fresno, Glendale Water and Power, Missouri American Water, Golden State Water, Tucson Electric Power, ComEd, Seattle City Light and Liberty Utilities. Mike's areas of focus on these projects include customer service assessments (billing, call center, field operations), AMI deployment planning/execution, vendor selections, change management, business process re-engineering and executive reporting/advisory services.

Core Capabilities & Experience:

- Smart meter/grid implementations
- Organizational strategy
- Customer service assessments
- Change management
- Regulator / City Council presentations
- Project leadership
- Business process re-engineering
- Internal communications / training

Industry Experience:

- Water and electric utilities
- Smart meter technology
- Business process redesign
- Benchmarking
- Program management
- Utility operations
- Information technology
- Management advisory

Functional Experience:

- Performed customer service assessments at two California water municipalities utilizing industry benchmarks and best practices
- Led water AMI business case and road map development for two California IOUs
- Led business process workshops for a large California IOUs meter-to-cash processes
- Executive sponsor for Missouri American Water AMI implementation planning project

Sam Uyeno—Project Manager and Meter-to-Cash Subject Matter Specialist
Senior Manager, Energy and Utilities Practice

Sam Uyeno is a Senior Manager in the Energy & Utilities practice at West Monroe Partners operating out of Southern California and focused on west coast utilities. He has over 13 years of experience within the electric and water utility, nuclear power and military contingency construction industries and is experienced in creating and delivering effective solutions across a wide breadth of problems.

Sam's unique blend of engineering, military operations and business experience provide a well-rounded platform for approaching a broad range of assignments and enable him to examine complex problems from various perspectives. Sam has performed comprehensive organizational and business process assessments, detailed business case analysis, statistical analysis and strategic planning for electric and water utilities.

Sam Joined West Monroe Partners in 2015 from Southern California Edison, an investor owned electric utility company. He led the finance and project controls team for the company's largest capital transmission and substation projects, responsible for ensuring successful project development & execution, accurate financial forecasting and cost recovery through state and federal regulatory commissions. Prior to Southern California Edison, Sam served in the US Navy as a submarine officer and civil engineering officer.

Core Capabilities & Experience:
- Meter-to-Cash Operations
- Benchmarking
- Business Process Optimization
- Project Management Office (PMO)
- Business Case Analysis
- Strategic Roadmap
- Financial Planning & Budgeting

Industry Experience:
- Water Utilities
- Electric Utilities
- Gas Utilities
- Nuclear Power
- Military

Functional Experience:
- Midwest Water Utility—Troubled meter and billing operational assessment
- Southwest Water Utility—Meter-to-Case operational assessment and improvement roadmap
- Northern California Municipal Water Utility – Customer service organization operational assessment
- Large water equipment manufacturer – Market study and analysis for prospective acquisition
- Eastern electric and gas IOU – Customer Engagement Plan regulatory filing

Tricia Anklan, PMP—Meter-to-Cash Subject Matter Specialist
Manager, Energy and Utilities Practice

Tricia has six years of consulting experience focused on improving business processes and effectively leveraging technology for water utilities. Her experiences include IT strategy development and implementation, requirements gathering, system and user acceptance testing, process design and optimization, and AMI strategy development through implementation.

Tricia has project management experience on both strategic initiatives and technology-driven solutions. In 2017, Tricia led the water AMI projects at Golden State Water Company, California American Water, and Liberty Utilities. Previously, Tricia spent two years implementing billing and collections process improvements and technology enhancements at a large Midwest municipal water utility.

Throughout Tricia's time at West Monroe, she has supported a customer information system (CIS) implementation, as well as dedicated process improvements and technology changes in billing, collections, field services, customer service, and technology. This experience contributes to Tricia's deep understanding of the meter-to-cash process and supporting technology. Tricia's project experience equips her to deliver high-quality solutions, maximize available data and technology, and align customer needs to efficient internal operations at water utilities.

Tricia graduated magna cum laude from Bradley University with a double major in economics and Spanish, and a psychology minor. Tricia is a certified Project Management Professional (PMP), Lean Six Sigma Green Belt, and earned her ITIL Foundation Certificate in IT Service Management.

Core Capabilities & Experience:
- Meter-to-cash process optimization (Lean Six Sigma Green Belt)
- Business and IT alignment / IT strategy
- AMI business case, strategy, and planning
- Program and project mgmt. (certified PMP)
- Customer information system implementation
- Technology roadmaps and roadmap execution
- Change mgmt. and communication strategy
- Requirements gathering, system testing, and user acceptance testing

Industry Experience:
- Water Utilities
- Mergers & Acquisitions
- Distribution / Transportation
- Healthcare

Functional Experience:
- Project management
- Risk and issue management
- Business process optimization
- Benchmarking
- Requirements gathering and analysis
- System and user acceptance testing
- Training content creation and facilitation
- Change management
- Stakeholder communication

Jim McClanahan—AMI Subject Matter Specialist
Senior Principal, Energy and Utilities Practice

Jim joined West Monroe in 2013, bringing 30 years of experience planning, designing, and delivering utility solutions related to SCADA, metering, telecommunications, distribution automation, distributed energy resources, and other areas. He has extensive experience in both the water/electric utility industry and the telecom industry including the strategic overlap between them. He possesses a unique combination of experience, technical competence, and business acumen holding both a B.S.E.E. and an M.B.A.

In 2017, Jim performed the AMI telecommunications feasibility assessments for Golden State Water Company and Liberty Utilities. Additionally, Jim consulted to ComEd (Chicago-based electric utility) in assessing the technical and regulatory feasibility of utilizing their electric AMI network to receive and send water AMI billing data for municipalities within their service territory.

Prior to joining West Monroe Partners, Jim was with S&C Electric in several positions of increasing responsibility including Director of Smart Grid Services. Prior to that, Jim spent a number of years with telecom vendors including Motorola and Nortel. Because of his utility background he was involved in efforts by these companies to focus on the utility market supporting solutions related to SCADA, Distribution Automation, AMI, and video surveillance.

Before that, Jim was a SCADA systems engineer and project manager in the Hydropower Division of the US Army Corps of Engineers and held a number of leadership roles including Meter Superintendent and Director of Network Solutions for subsidiaries of Central and Southwest (now part of American Electric Power).

Core Capabilities & Experience:
- Leading teams responsible for evaluating and planning smart grid initiatives
- Evaluating opportunities to leverage existing telecom and AMI infrastructure for new applications and revenue streams
- Telecom assessment, planning, and strategy including analog circuit replacement
- Metering equipment testing and evaluation
- Distributed Generation and Distributed Energy Resources evaluation and evolution

Industry Experience:
- Electric Utilities and Water Utilities
- SCADA and Metering
- Telecom Solution Providers
- Smart Grid Solution Providers
- Distributed Generation Vendor

Functional Experience:
- Advanced meter infrastructure selection and planning
- Telecom assessment and plan
- Solution evaluation and testing
- Analog circuit replacement
- Electric and water metering
- Wireless network design
- Distributed generation and distributed energy resource evaluation

Appendix: Gap Analysis and Recommendation Detail

Based on West Monroe's experience and industry best practices, the following recommendations are designed to improve SDPUD's customer service, enhance operational efficiency, and mitigate the risk of future high bill complaints.

ID	Gap	Recommendation & Objectives	Impacts
1	Similar to other utilities, common operational problems persist (e.g., unworked meter replacements, misreads, rudimentary bill estimation, inconsistent high bill messaging)	**Improve Internal Operations** • Work backlog of meter replacements and aged meters • Close out worked/cancelled/duplicate service orders • Increase decommissioned meter testing • Follow-up on generated work-orders • Transition to electronic service orders • Resume and expand cross-team meetings	• Field assets that are conducive to obtaining reads • Accurate service order queues & backlog • Visibility to aged metering accuracy • Effective handoffs between departments and resolution of internal/external work order requests • Improved teamwork, collaboration, and responsiveness to customer and internal issues
2	Meter reading quality assurance and control, particularly in handheld reading devices, is insufficient to properly identify misreads or falsified reads at the onset	**Enhance Meter Reading Controls** • Revise handheld audit flags to more accurately identify misreads • Update Itron handhelds to require that the meter serial number be entered following an audit flag • Determine the meter reading complexity of each route (Low/Medium/High) and estimate a range of normal/expected duration; improve route allocation within the meter reading team Improve meter reading accountability via shadowing and ongoing quality audits	• Handheld devices that more accurately identify misreads • Improved accuracy of meter reading • Balance of route length & complexity among team, so each reader's routes are achievable • Same-day accuracy checks to quickly identify if read falsification is occurring

3	While this initiative does not directly relate to a root cause of billing issues, it addresses issues that exacerbated high billing complaints and customer dissatisfaction.	**Be a Customer-Centric Utility** • Increase customer satisfaction surveys by automating opt in/out at the beginning of every call • Use existing technology within the call center to improve customer service (e.g., CRM, skills-based routing, workforce management, wrap-up codes) • Provide an email of new meter reads to customers, rather than a paper door hanger • Proceed with MyWaterEasy customer portal upgrade	• Automating customer satisfaction surveys will increase the quantity of surveys performed, reduce bias, and enable SDPUD to take action based on valid survey results • Call center technology will assist SDPUD in answering calls quickly, effectively, and with the right staff • Emailing meter reads will improve customer confidence, and enable customers to check their read/meter/bill • The new portal will increase transparency and allow customers to manage consumption/subscribe to usage alerts
4	There is a lack of accessible data, quality information and collaboration across groups, which is necessary to achieve SDPUD's objectives (i.e., deliver timely, accurate bills to customers)	**Become a Data-Driven Utility** • Create management dashboards that display key operational information by group (e.g., percent of estimated bills, backlog of meter replacements, daily call volume and types, average days between meter reads) • Transition to electronic work orders, and use reports and dashboards to confirm orders are being worked • Resume cross-team meetings to address challenges and handoffs between groups, and key information that needs to be shared	• Management dashboards will improve visibility to handoffs and key metrics across customer service – enabling SDPUD to proactively address issues, and confirm handoffs between departments get worked • Using electronic investigations will improve the timeliness and accuracy of this process by reducing handoffs and manual data entry
5	Higher rates, an extended bill period, and ending mandatory conservation rules, combined with a historically dry season, led many customers to believe	**Enhance conservation messaging** • Inform customers that deviating from conservation behavior will result in higher bills • Expand conservation messaging, particularly as SDPUD approaches peak consumption timeframe in hot/dry summer months	• Customer visibility to upcoming hot/dry season • Increased and proactive water conservation measures • Fewer instances of unexpected high bills • Improved water resources sustainability

	they were being overcharged	• Share projected bills and dollar amount based on city-wide average • Continue to educate customers on how to conserve water and reduce bill cost	
6	PUD customer bills can be misleading, as graphs do not account for days of service, weather patterns, and/or conservation years	**Revise Bill Presentment** • Enhance the customer bill to display weather data (e.g., temperature, rainfall) • Revise the graph on the customer bill to show a normal baseline year, rather than displaying a year with a conservation mandate • Display all customer consumption history when sending ancillary graphs to customers (rather than graphing only to 2015)	• Weather data will provide customers perspective on their water use, and help them understand overall consumption • Graphs will display an accurate and comparable baseline, helping customers understand normal consumption patterns
7	PUD's current manual meter reading process does not provide sufficient granularity to troubleshoot high bill concerns	**Accelerate AMI Deployment** • Revise and formalize AMI deployment plan and timeline • Conduct robust AMI education & outreach • Increase use of AMI endpoints/ERTs • Improve the efficiency of AMI deployment (e.g., conduct one-trip AMI installation, working the meter replacement and ERT installation at the same time, provide opt-out path)	• Relying on advanced metering infrastructure (AMI) in lieu of manual meter reading will provide hundreds of reads per month, vs. the singular bi-monthly read that is provided today; detailed consumption data can be used to answer questions and troubleshoot billing issues • Providing AMI data to customers is the best way to ensure meter reading accuracy
8	While this initiative does not directly relate to a root cause of billing issues, it addresses issues that exacerbated high billing complaints and customer dissatisfaction.	**Be a Great Place to Work** • Recognize employees who demonstrate troubleshooting, analytical, de-escalation, and first contact resolution skills (thereby improving customer service and avoiding truck rolls) • Affirm safety priorities and culture; reiterate safety norms and expectations with staff, and confirm all staff	• Engaged workforce that is recognized and rewarded for high-performance – and thereby more likely to provide excellent customer service • Safer operations in the field and fewer workplace injuries

		are using personal protective equipment (PPE) and empowered to make safe choices • Resume cross-team meetings to address challenges and handoffs between group, and key information that needs to be shared • Replace door hangers with an automated process	• Improved communication & relationships between teams • Replacement of a low-value, time-consuming activity with an automated process that better addresses customer needs