



## Advanced Meter Infrastructure Development

### Summary:

#### ▪ Water Meter Project Development

- UCSF Meter Project
- Mechanical vs. Electronic Meters
- Control Wiring vs. Wireless Communication

#### ▪ Meter Analysis to Develop Efficiency Financing

- Equipment replacement business case

#### ▪ Dashboard Development for Data Analysis

- Utility Meter Historical Trend Analysis
- Building Utility Sub-meter Analytics

# University of California San Francisco Meter Project

## ▪ Meter Project Budget

- \$250,000 annual
- Meter installation and control connection to building management system

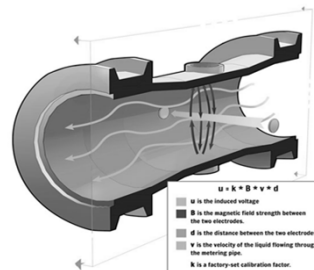
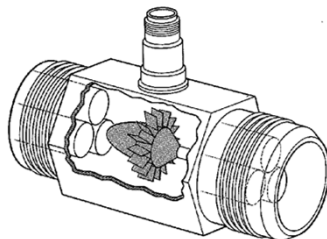
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## Water Meter Comparison

### Mechanical vs. Electronic

- |   |  |
|---|--|
| ▪ Mechanical Meters<br>(Turbine/Disc)     | ▪ Electronic Meters (Magnetic<br>Inductive/Ultrasonic) |
| ▪ Components wear down over<br>time       | ▪ No moving parts                                      |
| ▪ Lower Accuracy (especially low<br>flow) | ▪ Higher Accuracy & Turndown<br>Ratio                  |



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## Data Output to Building Management System

- **Hard-wired control connection from meter to BMS**
- Higher first cost
- Ability to set high frequency data intervals
- Permanent
- **Wireless transmitter communicates with Water Dashboard**
- Inexpensive
- Data intervals set to 1 hour
- Does not communicate to BMS
- Battery life of 10 years

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## Equipment Meter Analysis to Develop Efficiency Project Business Case

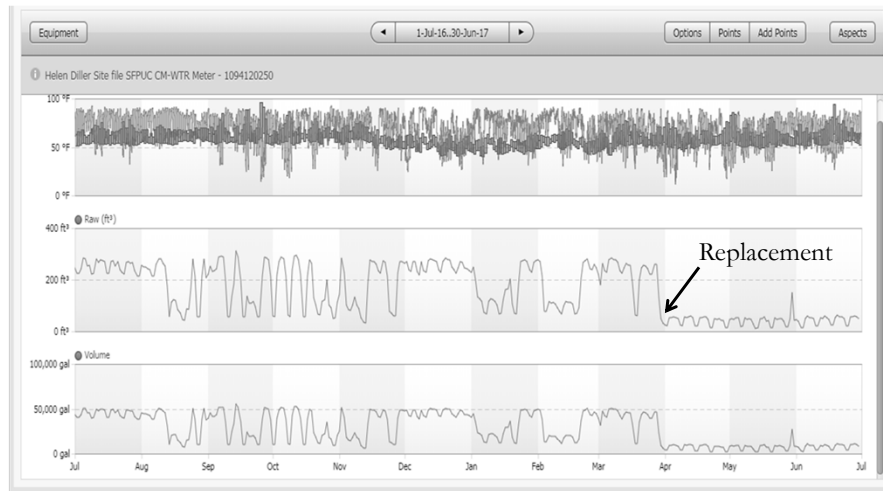
- Meter readings taken from equipment meters on two Bulk Sterilizers and building meter
- Water Consumption:  
**10-12,000,000** gallons per year
- Business case developed to fund equipment replacement through sinking fund budget
- *Equipment was breaking down and impacting research*
- Project Cost: **\$1.8M**
- Annual Utility Savings: **\$325,000**
- Payback **5.5** years



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# Building Water Consumption Before/After Bulk Sterilizer Project

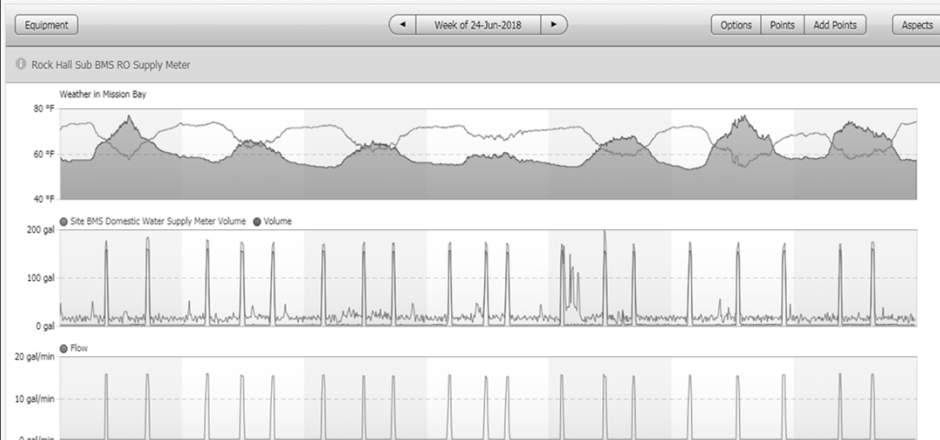


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# Dashboard Development: Power of Data

## EX: Rock Hall Building Water overlay with Reverse Osmosis Production



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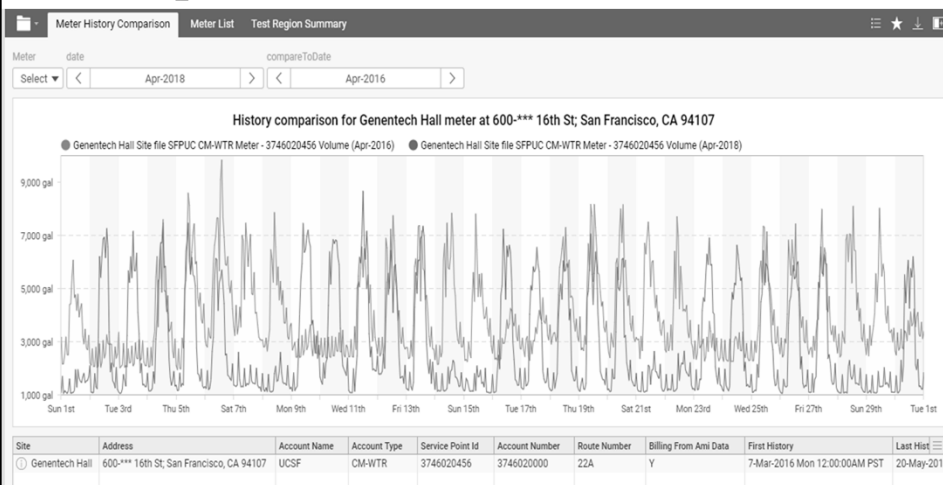
## Utility Meter Historical Trend Analysis

- **Question:** Why has utility consumption in Building X increased/decreased?
- *Difficult to answer without good data and analytical tools*
- San Francisco Water Department started sending weekly 1 hour interval spreadsheets of all utility water meters in March 2016
- Historical time period comparison is now set up for all building utilities

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## Water Consumption Time Period Comparison



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## Next Step: Comprehensive Building Utility Sub-Meter Analytics

### ▪ Building System Sub-metering:

- *Chilled water, Heating hot water, Domestic/Industrial water & RO/DI water, Steam and Condensate return, Electric, Gas*
  - Meter installations for all utilities at building level
  - Sub-meter building systems and major loads
  - Program analytics to verify system performance and identify problems
  - Prioritize sub-metering of Renewal Program Buildings
    - Buildings renewed over 10 years with \$25M budget

