Predictive Maintenance For Water Waste Management

A lot of revenue is lost per annum due to water leaks which can be avoided by

* Early prediction
* Swift detection of water leak

This way savings of multi million dollars can be realized

In order to experience this, following data needs to be collected

* Flow rate in the pipes (m3/hour)
    * At the consumer's residence
    * In the firm's network
* Age of the pipes (or date of last maintenance) (year)
    * At the consumer's residence
    * In the firm's network
* Pressure in the pipes (bar)
    * At the consumer's residence
    * In the firm's network
* Location (geographical coordinate)
   * Of the devices
    * Of the consumer's residence

water flow	pH meter	Date	PLC Position
1500	6.5	23/3/20 15:00	PLC.123
1499	6.9	23/3/20 15:30	PLC.123
1550	6.5	25/3/20 13:00	PLC.123
800	6.73	25/3/20 13:30	PLC.123
0	8	25/3/20 13:45	PLC.123
1625	8.1	26/3/20 13:30	PLC.123
1506	7.6	26/3/20 14:00	PLC.129
1355	7.9	26/3/20 14:30	PLC.130

Data Definition, Source & Usage

Predictive analytics is the methodology which can be utilized to assess the data and making a shift from passive/reactive inefficient maintenance methodology to a proactive, cost cutting and improved methodology.

Advantages

* Reduction of pump maintenance cost
* Savings in electricity usage through efficient operations.
* Targeted maintenance can be utilized to decrease pollution incidents, around 30% of which are due to pump failure.
* Risk hotspots of wastewater network can be highlighted, allowing operators to recognize potential negative results caused by improper procedures.
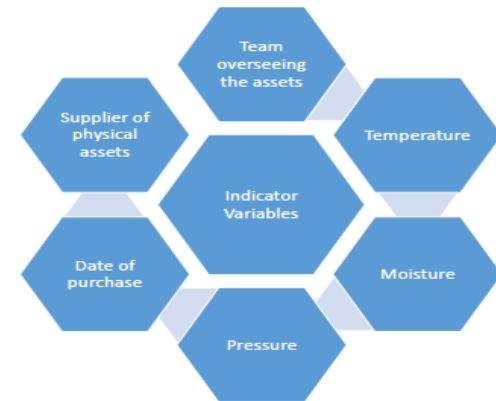
Data Collection

One way to collect the data is the offer customer devices that are equipped and connected to our systems. They can be connected will allow them to track their consumption and reduce it.

DATA	DEVICE	LOCATION	PROCEDURE	SIGNIFICANCE
Flow Rate	Connected Flow meter	• At the consumer's residence • In our network		5/5 (unavoidable to identify the leaks)
Age of Pipes	Declarative Data		Ask the customer when creating the contract Ask the workers when fixing something	4/5 (unavoidable to predict the leaks)
Date of Leaks	Declarative Data		Ask the workers when fixing something	4/5 (unavoidable to predict the leaks)
Pressure	Connected Manometer	• At the consumer's residence • In our network		1/5 (the Flow rate could be used as well)
Location	GPS Beacon	• At the consumer's residence • In our network		5/5 (unavoidable to locate the leaks)

Data Usage

Data: Flow rate, location and pressure

- Usage For Company: Quick detection of water leaks in the network and alert the customer if needed
- Gain for the Company: Green Branding, Reduction in water loss and pay as you consume for the customer contracts.
- Usage for Client: Knowledge of exact consumption for better management.
- Gain for the Client: Reduction in waste and excessive consumption

Data: Date of leaks and location & Age of pipes

- Usage For Company: Predict leaks and prioritize maintenance
- Gain for Company: Reduction in Leakage
- Usage for Client: Knowledge of pipe replacement to avoid leaks
- Gain for Client: Leakages avoided

Action and Road Map

* Action : New Contracts
  * Data Required: Pressure, Flow rate & location from consumer residence
  * Ease of Data Collection: Customer consent, data confidentiality (2/5)
  * Actions Required: Ask in house counsel for feasibility study.
* Action : Prediction of Leakage
  * Data Required: Location and date of leakage, age of pipes
  * Ease of Data Collection: Purchase of connected devices, Data platform (3/5)
  * Actions Required: Define data model, buy connected devices & equip the network
* Action : Detection and Alert time for Leakage
  * Data Required: Pressure, Flow rate & location from consumer residence
  * Ease of Data Collection: Purchase of connected devices, Data platform (3/5)
  * Actions Required: Data model definition using predictive analysis tool, model enhancement, purchase of connected devices and upgrade network