

ADB



Knowledge Sharing Seminar

Overview of Taiwan Water Corporation's Water Loss Management and Smart Water Management

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Overview

I. About TWC

II. Water Loss Management

III. Smart Water Management



I. About TWC

■ History of Taiwan Water Corporation (TWC)

- Before 1974, most cities, counties or towns in Taiwan had their own water treatment plants
- In 1974, TWC was set up by merging 128 water treatment plants for increasing overall operational efficiency, and became a public enterprise
- In 1999, TWC has become a state-owned enterprise set up under Ministry of Economic Affairs (MoEA)



I. About TWC

■ Statistics

by the end of 2017

Water Supply Systems

144

Water Supply Capacity

11.82 million CMD

Average Daily Water Supply

8.79 million CMD

Percentage of Population Served

92.76%

Customers

6.98 million

Pipe Length

61,458 kilometers

Average Water Tariff of Taiwan
(surveyed by IWA, 2016)

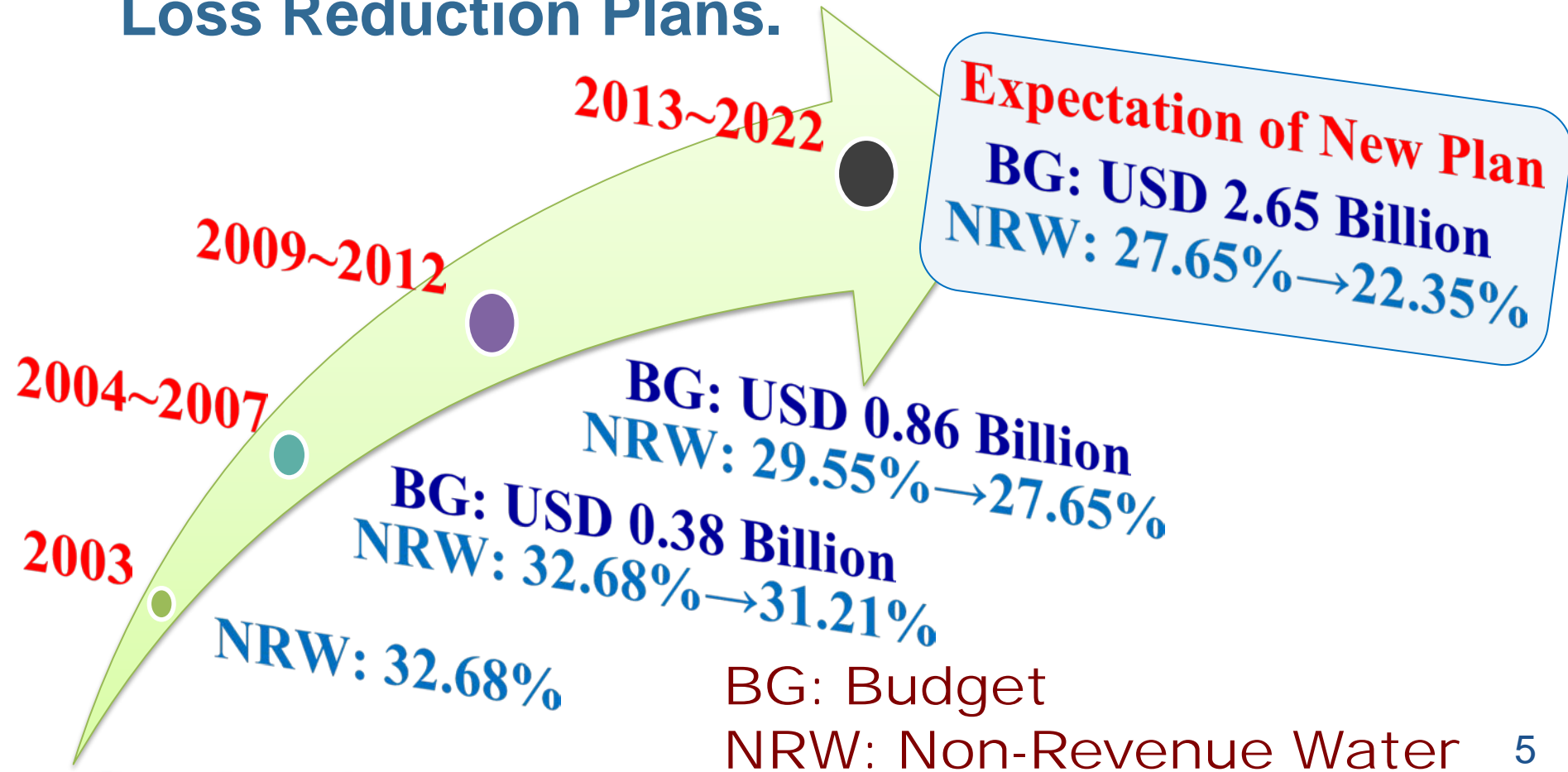
USD 0.308/M³
(one of the lowest
in the world)



I. About TWC

■ Water Loss Reduction Plan

- Since 2004, we have been implementing Water Loss Reduction Plans.

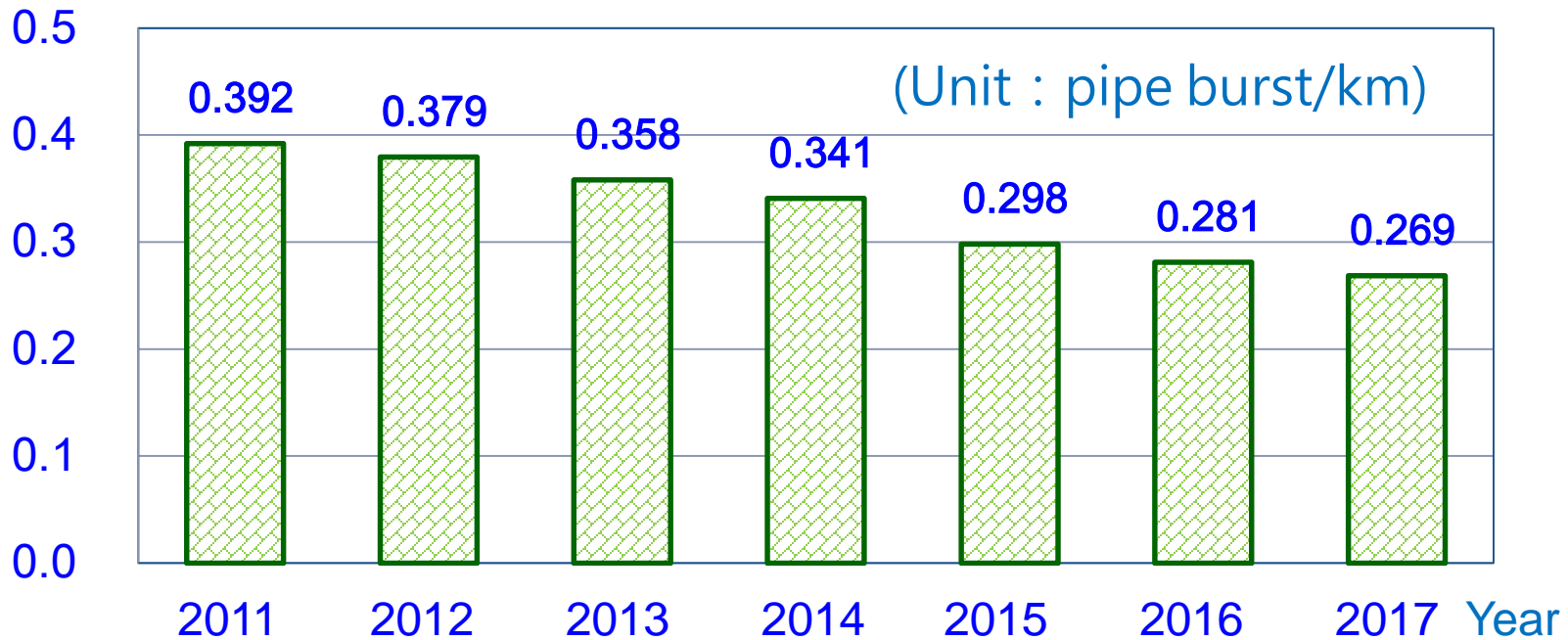




I. About TWC

■ Achievement

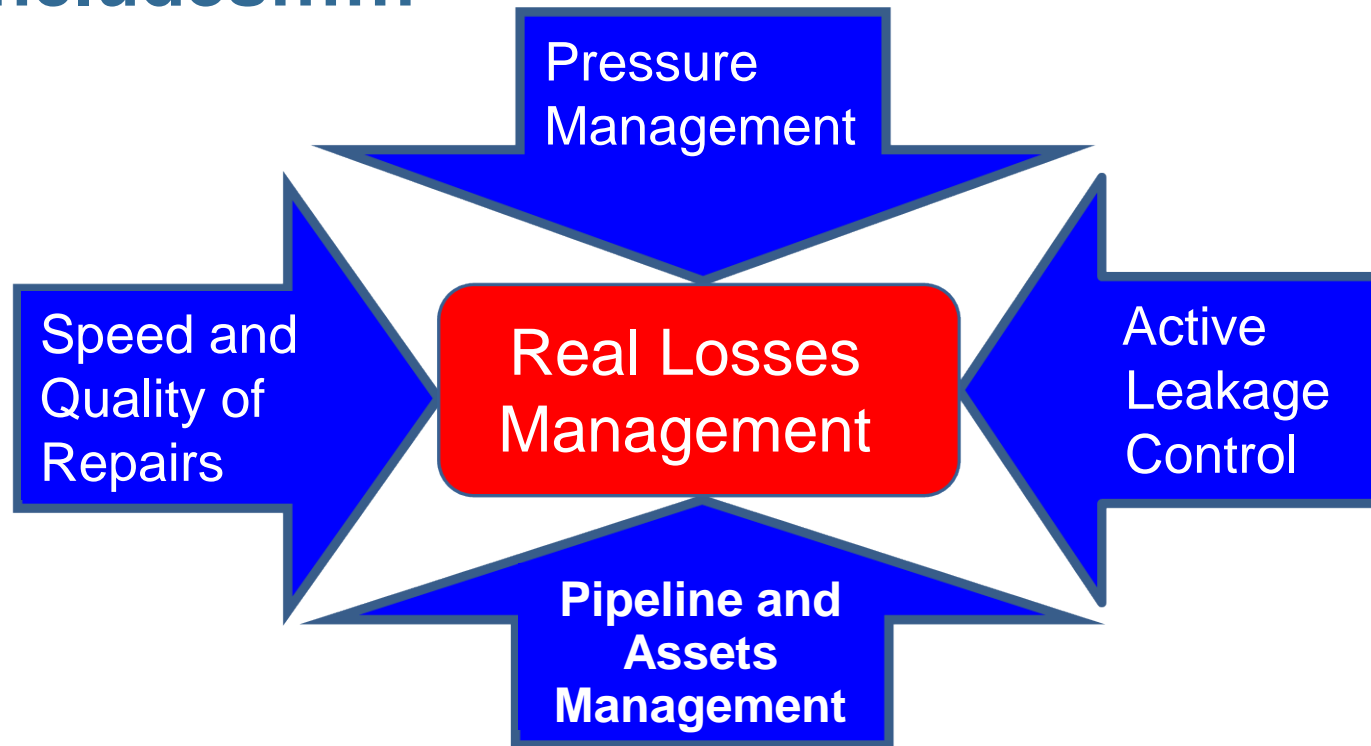
- The NRW has come down from 32.68% (2004) to 23.59% (2017).
- Pipe burst frequency has come down from 0.392(2011) to 0.269(2017).



I. About TWC

■ Real Losses Management Strategies

- We follow best practice in the Water Loss Reduction Plan.
- It includes.....



II. Water Loss Management

Water Pressure Management

➤ Our Strategies include...

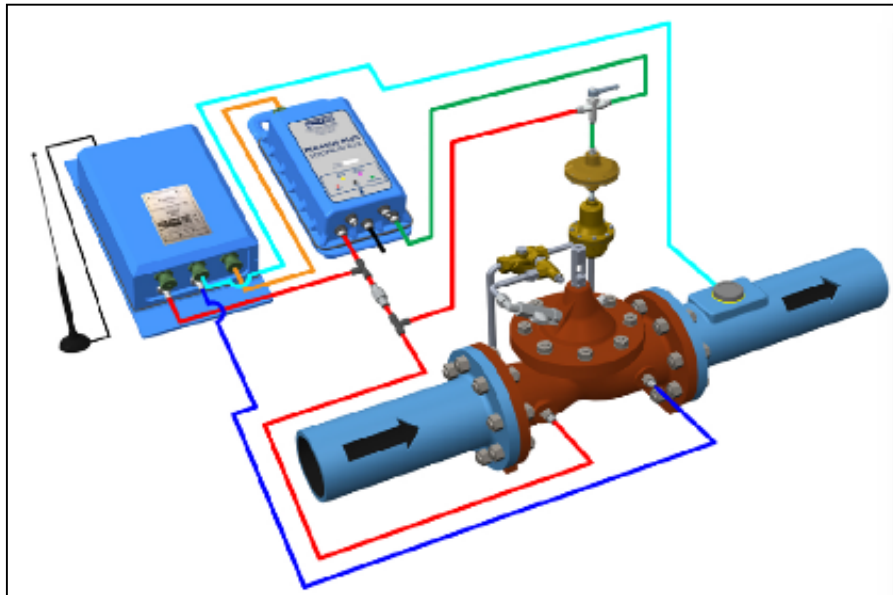
- installing Variable-frequency Drives in water treatment plants and pumping stations
- establishing water pressure monitoring stations
- installing pressure reducing valves (PRV)



II. Water Loss Management

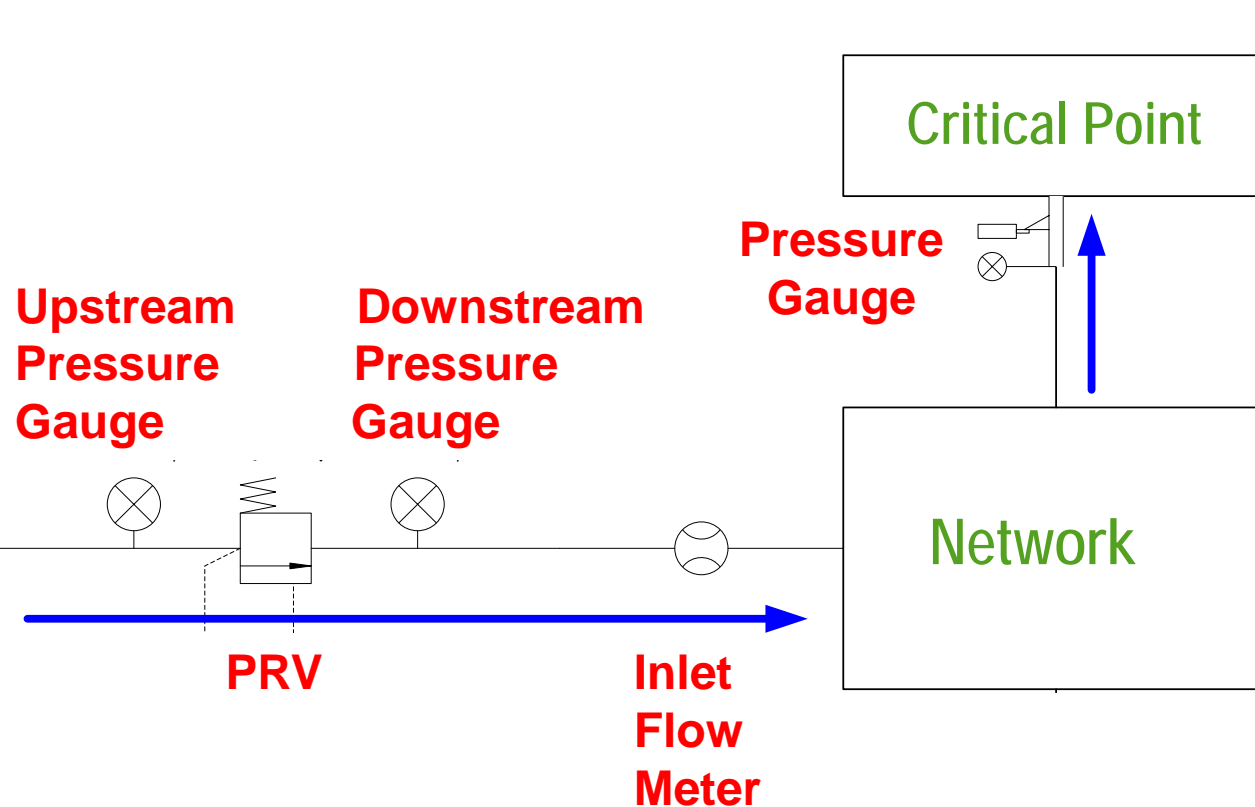
- installing Advanced Water Pressure Control System

- It means installing an advanced water pressure controller on the pressure reducing valve (PRV) to adjust outlet pressure for meeting critical point customer's need.



II. Water Loss Management

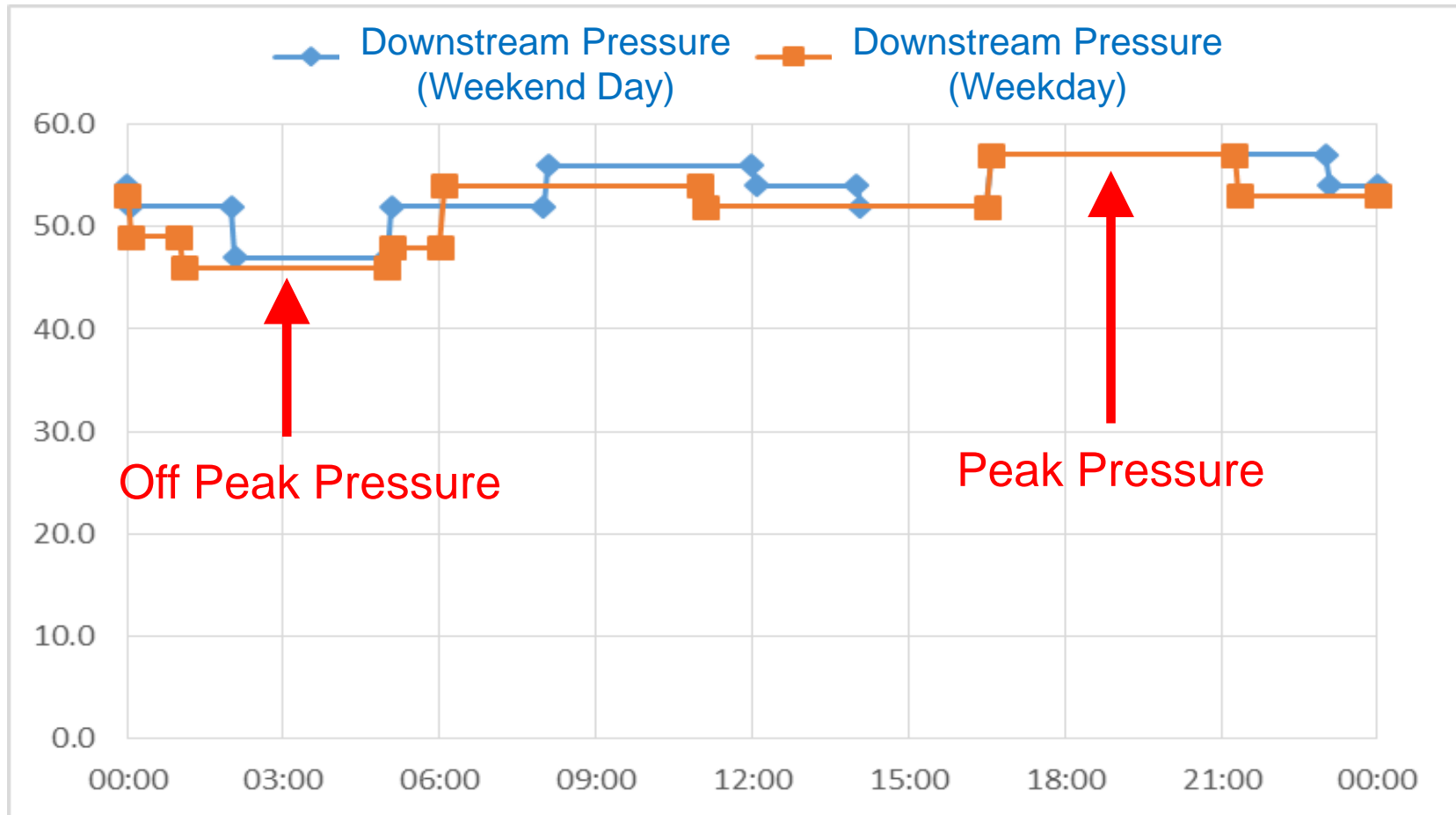
Case Study: Gong-guan DMA, Miaoli County, Taiwan



- Isolated small zone
- Gravity water supply
- $\phi 300\text{m/m}$ PRV installed
- Upstream pressure 8~9 kg/cm^2
- Downstream pressure 6 kg/cm^2
- 3,500 customers
- Water supply 3,000 CMD
- Elevation of critical point is higher than PRV

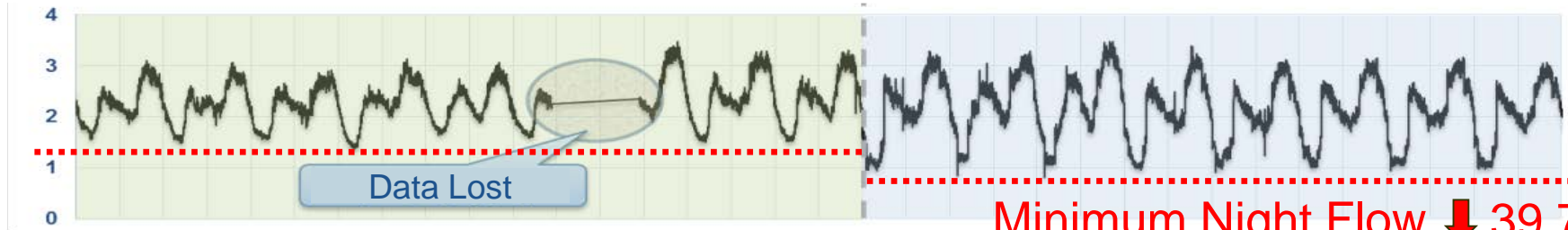
II. Water Loss Management

We adopted time-based modulation setting of this advanced water pressure controller ...



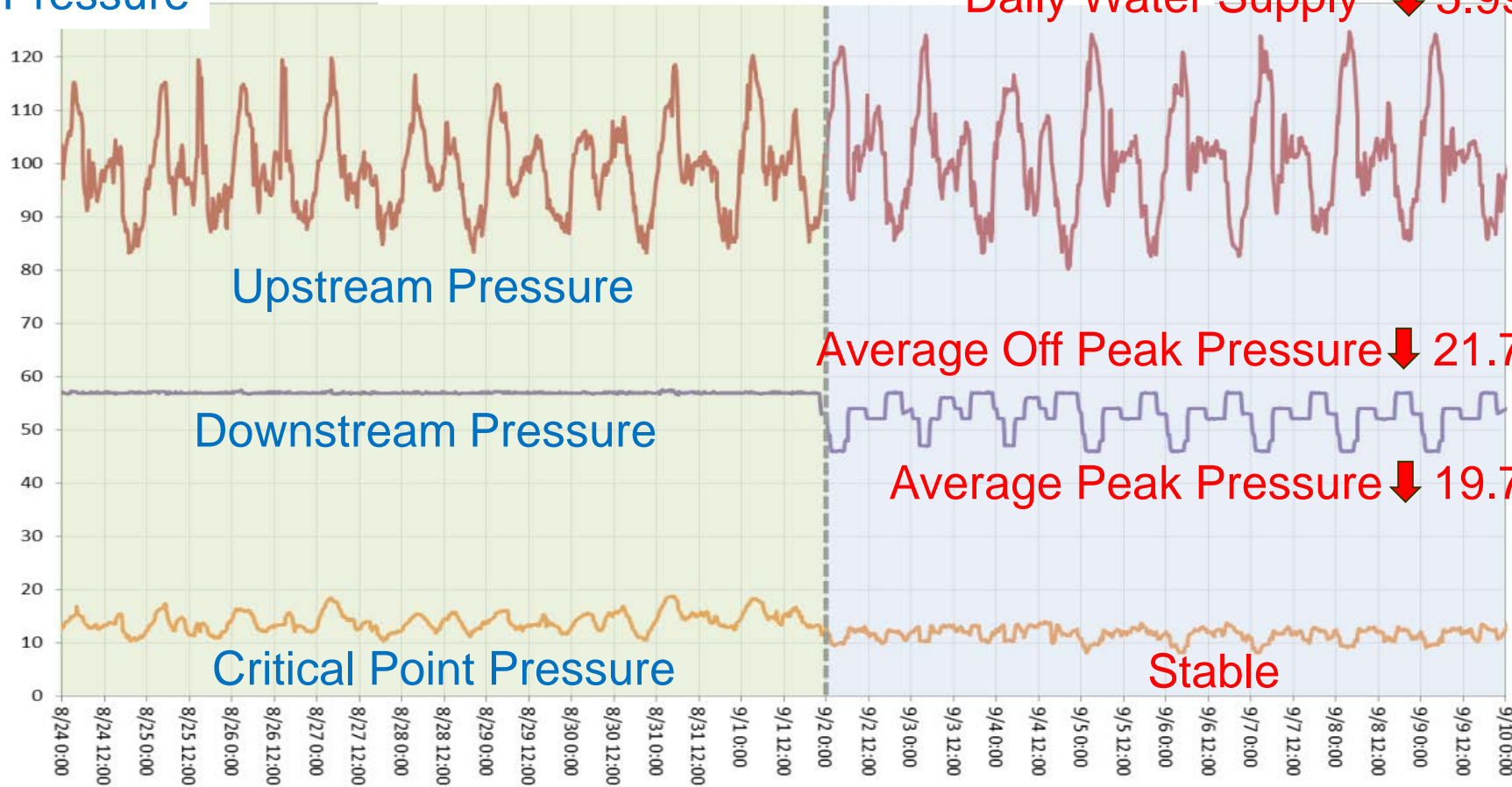
← Before Control → | ← After Control →

Flow of PRV



Minimum Night Flow ↓ 39.7%
Daily Water Supply ↓ 5.99%

Pressure



Average Off Peak Pressure ↓ 21.77%
Average Peak Pressure ↓ 19.71%

Stable



II. Water Loss Management

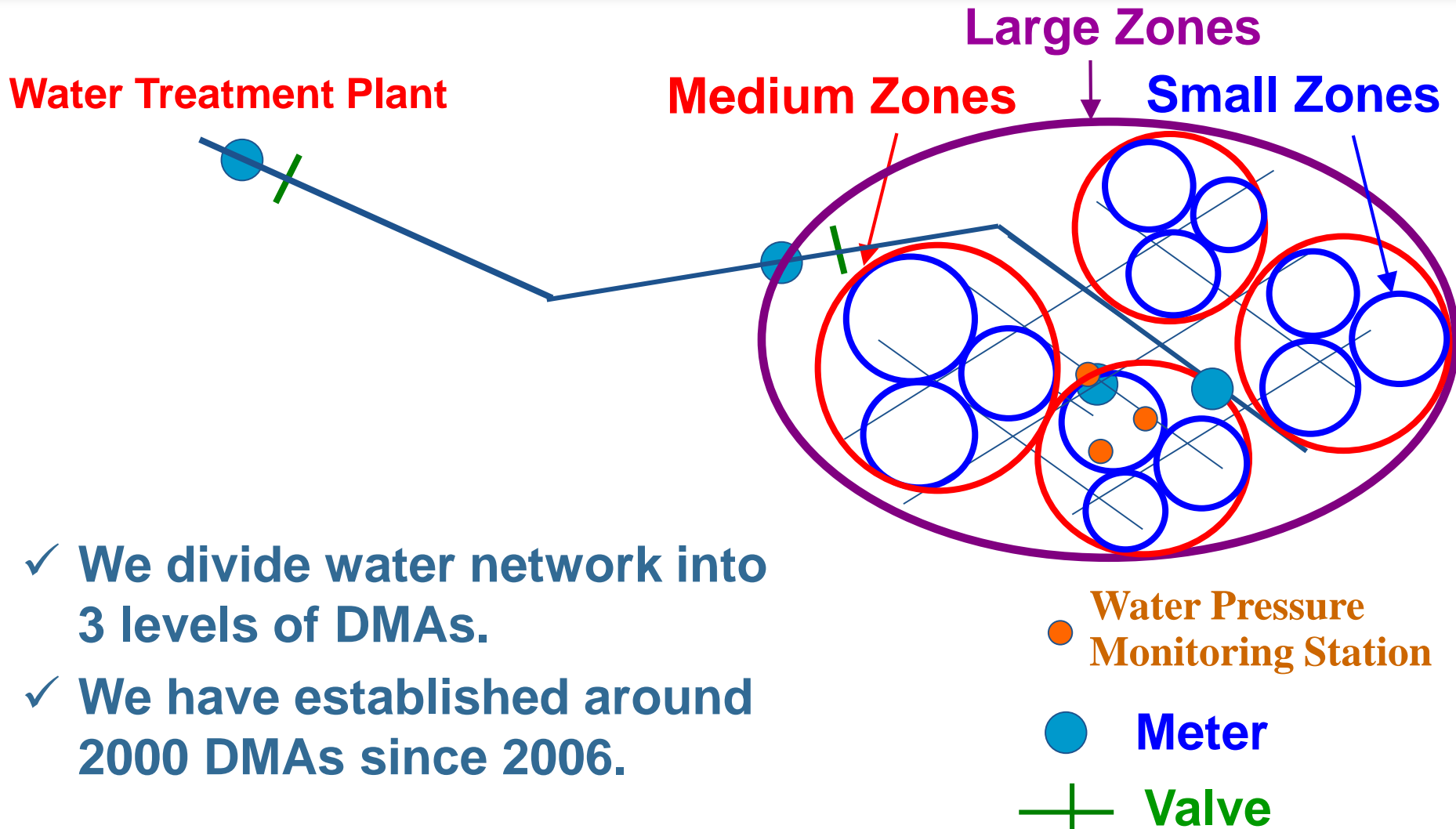
Active Leakage Control

➤ Our strategies include...

- implementing Annual Water Loss Detection Plan
- establishing and maintaining District Metered Areas (DMAs)

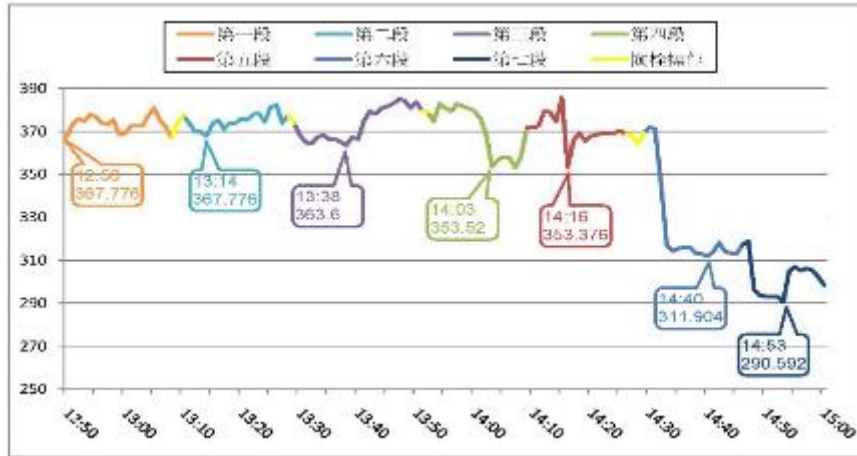
• DMA means a hydraulically isolated sub-zone in a distribution network for which the water consumption is monitored by water meters.

II. Water Loss Management



II. Water Loss Management

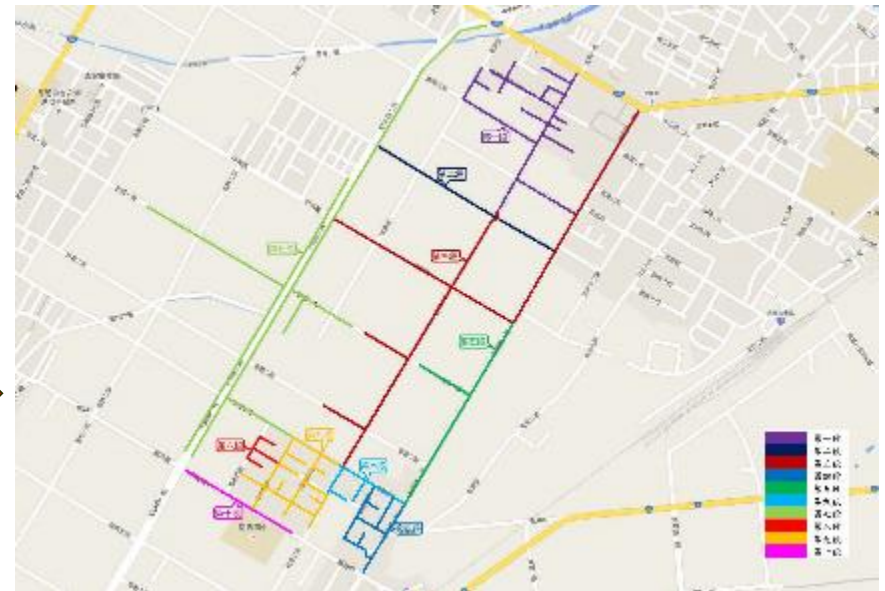
Step Test



管段	漏水量	口徑(mm)	管種	管線年份
一	34.6CMD	80,100,200	PVCP,DIP,DIP	2002,2012,2006
二	16.2CMD	50	PVCP	1987
三	74.9CMD	80,200,200,200	PVCP,DIP,DIP,DI P	1989,1998,2006, 2012
四	45.1CMD	80	PVCP	無資料
五	164.5CMD	200	DIP	1998
六	72.9CMD	80,200	PVCP,DIP	無資料,1999
七	430.6CMD	100,200,300,400	PVCP,DIP,SP,SP	無資料,1999,1996 1996
八	16.6CMD	80	PVCP	無資料
九	33.1CMD	100,200	PVCP,DIP	無資料,1999
十	132.5CMD	300	DIP	1999
合計	1020.9CMD			

Leakage Calculation

✓ In case of leakage recurrent or high frequency leakage in DMAs, we'll replace those pipe sections ASAP.



Distribution Diagram of Leakage

II. Water Loss Management

- **Case Study:** We have adopted SmartBall leakage detection technology in large diameter pipelines ...
- for leakage detection and condition assessment
 - innovative free-swimming in-line leakage detection technology designed to operate in a live pipeline

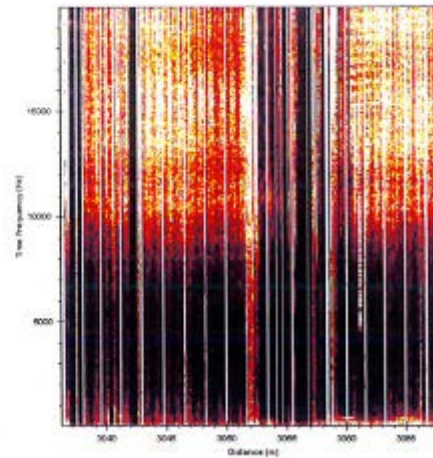
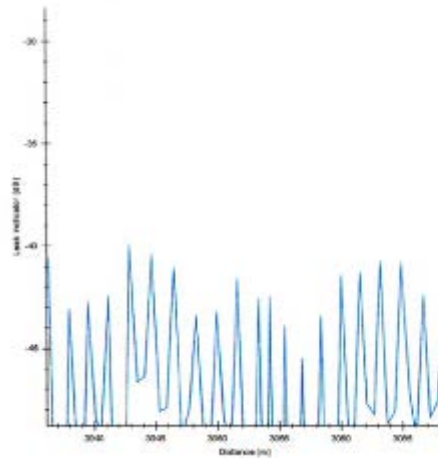


- ①- inlet point
- ②③- leakage detection
- ④- retrieval point



source: <http://www.puretechltd.com>

- ✓ The pilot project was in north of Taiwan in 2011.
- ✓ We found that $\phi 1,000\text{mm}$ PCCP was leaking, but the leaking points were difficult to detect.
- ✓ Pipe Length of Leakage Detection was 6.5km.



Sound spectrum





II. Water Loss Management

- Result:
We found 4 leaking points.



a leaking exhaust valve

II. Water Loss Management

Speed and Quality of Repairs

➤ Our strategies include ...

- establishing leakage repair management information system to record repair information, location of leaking point, expenditure, etc.



The screenshot shows a software interface with a search filter set to '斗南區' and a list of repair records. A red oval highlights the record for '斗南鎮南興里民生路7號'.

案號	受理時間	案件位置	現狀
SP0902180	20091031 35	雲林縣斗南鎮中正路(在黃河路對面)	●
SP0902181	20091031 33	斗南鎮南興里民生路7號	●
SP0902180	20091031 33	雲林縣斗南鎮南興里民生路7號	●
SP0902189	20091031 30	斗南鎮南興里民生路7號	●
SP0902188	20091030 15	斗南鎮南興里民生路7號	●
SP0902187	20091030 10	雲林縣斗南鎮南興里民生路7號	●
SP0902186	20091030 10	雲林縣斗南鎮南興里民生路7號	●
SP0902185	20091030 10	雲林縣斗南鎮南興里民生路7號	●
SP0902184	20091030 10	雲林縣斗南鎮南興里民生路7號	●
SP0902183	20091030 10	雲林縣斗南鎮南興里民生路7號	●





II. Water Loss Management

- increasing Leakage Repair Rate

- **Leakage Repair Rate: the proportion of leakage that was repaired in 1 or 3 days**

Year	Leakage Repair Rate in 1 day	Leakage Repair Rate in 3 days
2013	92.92%	99.53%
2014	90.86%	98.60%
2015	92.02%	98.50%
2016	92.31%	97.47%
2017	95.35%	99.03%



II. Water Loss Management

Pipeline and Assets Management

- Our strategies include ...
 - On average we replace 800km pipelines each year (around 1.3%).
 - We set out rules for pipe replacement. The main indicators are “**age**”, “**leakage frequency (leaking points/km)**”, and “**material**”.

II. Water Loss Management

- We adopted DIP (diameter under ϕ 2000mm) or PCCP (diameter over ϕ 2000mm) as distribution pipe , and we also adopted HIWP, SSP, or DIP (diameter under ϕ 100mm) as service pipe.
- According to our analysis, 70% of leaking points were found in the service pipes. We replace distribution pipes together with connected service pipes.





III. Smart Water Management

III. Smart Water Management

■ Basic Framework of Smart Water Management

Management Needs

Customer Service

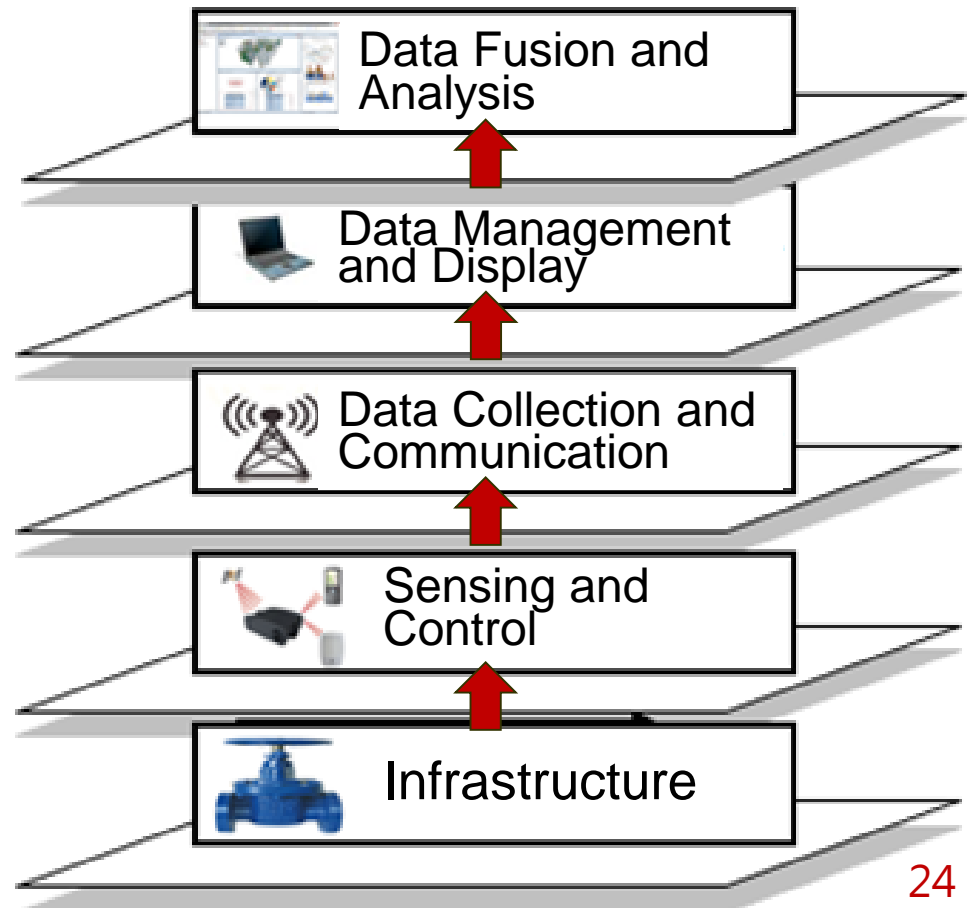
Decision-Making

Data Management

Water Supply
Monitoring

Pipelines and
Assets Management

Smart Water Framework





III. Smart Water Management

Pipeline and Assets Management

➤ **GIS establishment**

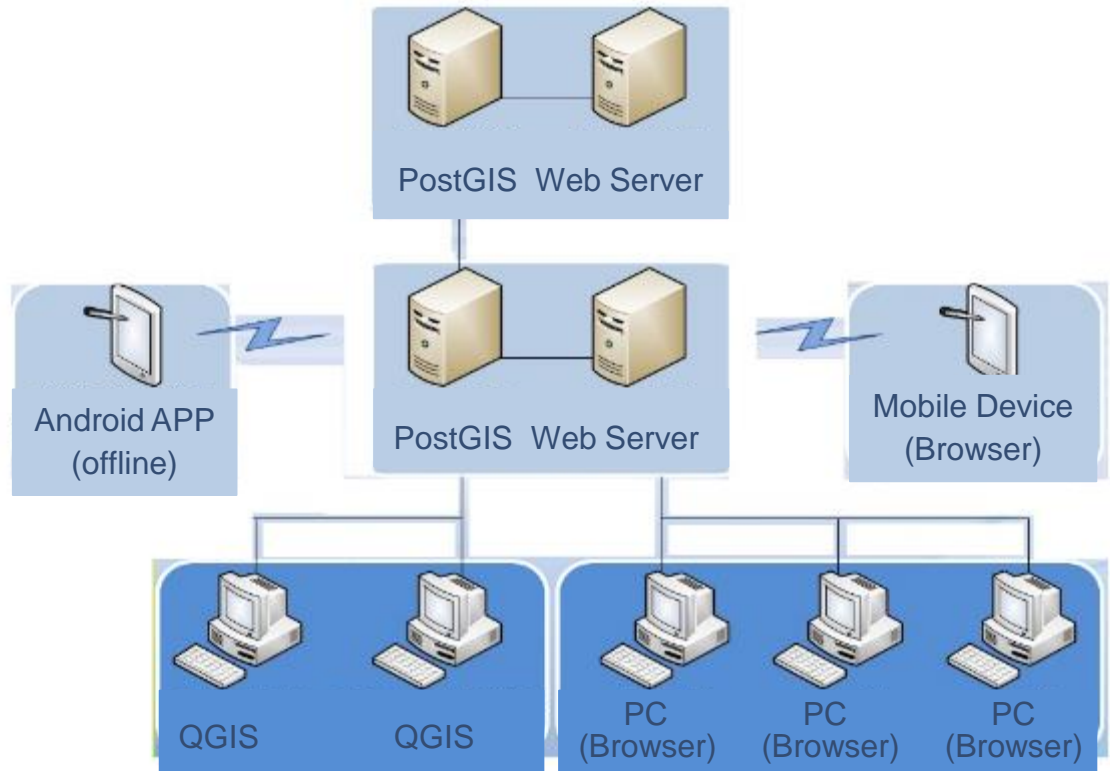
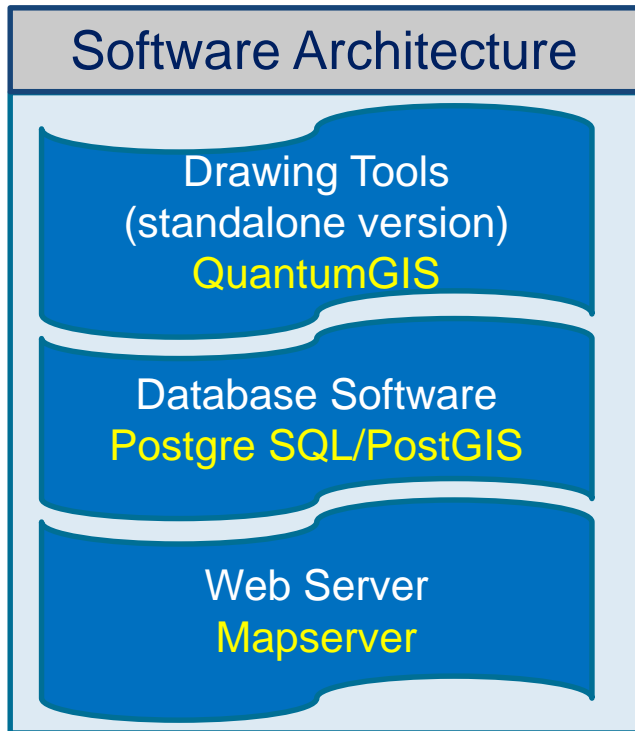
- 2004 --- Set up a “GIS Promotion Task Force”
- 2005 – 2015 --- digitalized all the paper maps into digital format
- 2016-2017 : We had upgraded GIS software to free and open-source software

• **Previous GIS was costly to upgrade when new OSs were announced each time. After evaluation, we adopted free and open-source GIS software (QGIS).**



III. Smart Water Management

● GIS Renewal Project



III. Smart Water Management

- The spatial database consists of many map layers.

NO.	Layer Code	Layer Name
1	eumeter	Customer Meter
2	eupipe	Service Pipe
3	hydrant	Fire Hydrant
4	hydrantl	Hydrant Pipe
5	saddle	Tapping Saddle
6	meter	Bulk Meter
7	valve	Valve
8	manhole	Manhole
9	pipe	Pipe
10	station	Monitoring Station
11	stationl	Water Treatment Plant
12	smallarea	District Metered Area



Spatial Database



III. Smart Water Management

- The basic function is to display spatial data on the map.

The screenshot shows a GIS application interface with a search panel on the left and a map in the center. The search panel includes a search bar with the text "0462006217667180400161" and a table of search results.

深度 (m)	識別碼
0.000	046200621766718040016

Additional search results shown below the table:

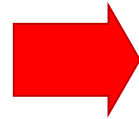
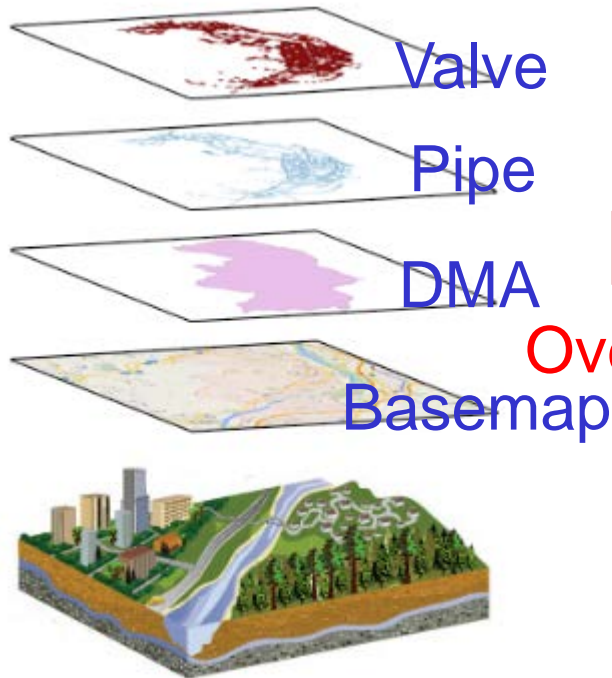
- 照片
- 編號: 161
- 種類: 制水閘
- 埋設位置:
- 深度(m): 0.000
- 埋設日期: 2011年07月20日

The map displays a street network with labels such as "五權路", "錦南街", and "路一段". Various plot numbers are visible, including "3-21號", "5-21號", "7-21號", "212-2號", "212-3號", "21號", "25號", "29號", "33號", "37號", "50號", "50-1號", "56號", "58號", "60號", "214-14號", "214-19號", "214-2", "220號", "222號", "226號", "230號", "234號", "24號", "24-6", and "24-1".

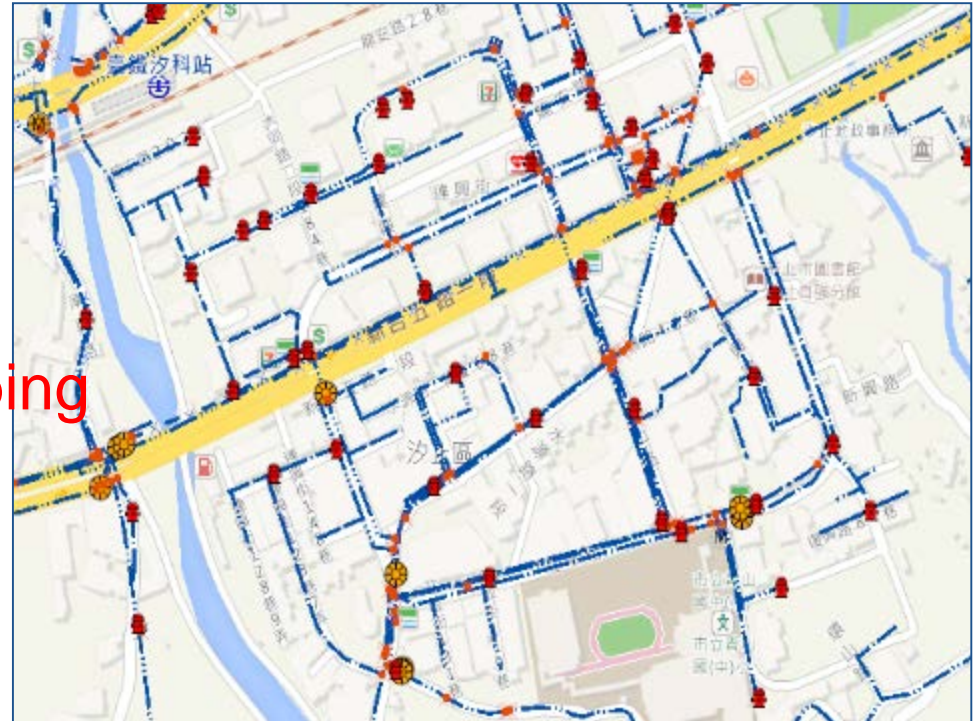


III. Smart Water Management

- We also overlap the spatial data to create theme maps.



Overlapping



III. Smart Water Management

- **Example:** We overlap the layers of material, age, information of leakage points, etc., for evaluation of pipe replacement.



III. Smart Water Management

- Our GIS includes Mobile Equipment Inspection System for valves and hydrants management.





III. Smart Water Management

- We also provide API (Application Programming Interface) for sharing spatial data with external systems.

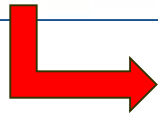
TwcApi

SOAP 1.1

下列是 SOAP 1.1 要求與回應的範例。預留位置顯示之處必須代入實際的值。

```
POST /TWCapi/API.asmx HTTP/1.1
Host: localhost
Content-Type: text/xml; charset=utf-8
Content-Length: length
SOAPAction: "http://www.water.gov.tw/Coordinate"

<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <Coordinate xmlns="http://www.water.gov.tw/">
      <crs>string</crs>
      <x>double</x>
      <y>double</y>
    </Coordinate>
  </soap:Body>
</soap:Envelope>
```



Example: sharing spatial data with Water Outage Query System



III. Smart Water Management

Water Supply Monitoring & Data Management

1999

2002

2007

2009

2011

2013

2014

2017

➤ **Standalone Monitoring System**

- adopted PLCs (Programmable Logic Controller) to connect sensors with computers
- **standalone system for single water treatment plant without connecting to branch office**
- **User Interface of DOS**
- connected to external monitoring system by communication card



III. Smart Water Management

1999

2002

2007

2009

2011

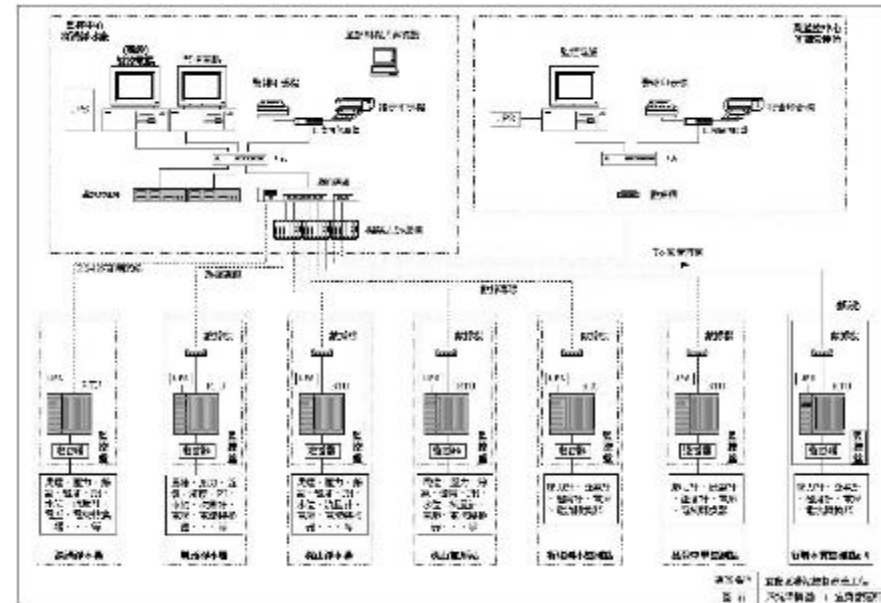
2013

2014

2017

➤ Client-Server SCADA System (1st Generation)

- adopted Client-Server architecture to integrate monitoring terminals of WTPs and branch office
- Graphic User Interface of Windows
- monitoring terminals were connected to the others by dial-up internet connection (low speed)
- new and old PLCs coexisted



III. Smart Water Management

1999

2002

2007

2009

2011

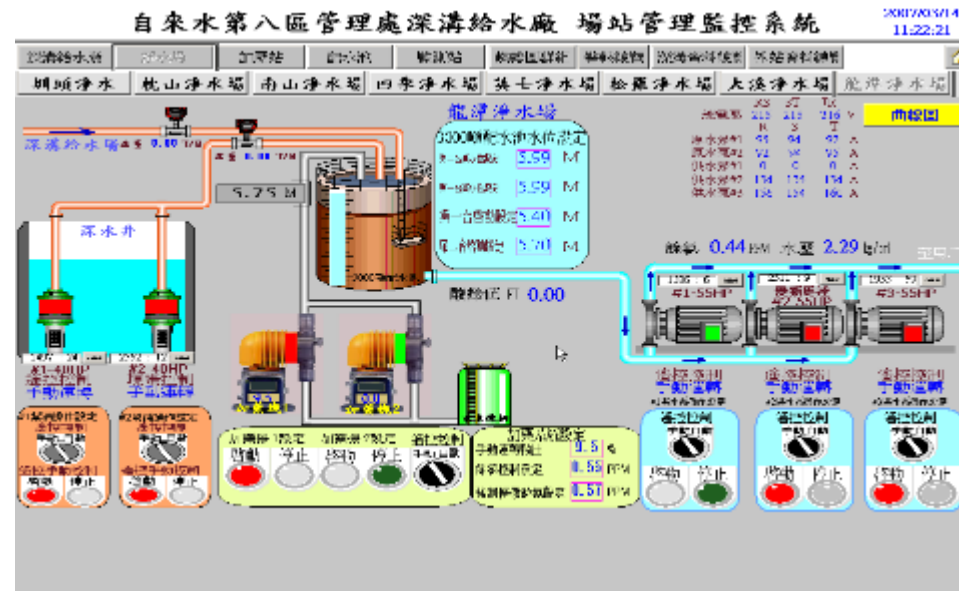
2013

2014

2017

➤ Integrated SCADA System (2nd Generation)

- upgraded and rehabilitated hardware and software
- **Graphic User Interface of Windows**
- **monitoring terminals were connected to the others by broad-band network (higher speed)**
- PLCs were Integrated and upgraded
- Started Web-based SCADA system pilot project





III. Smart Water Management

1999

2002

2007

2009

2011

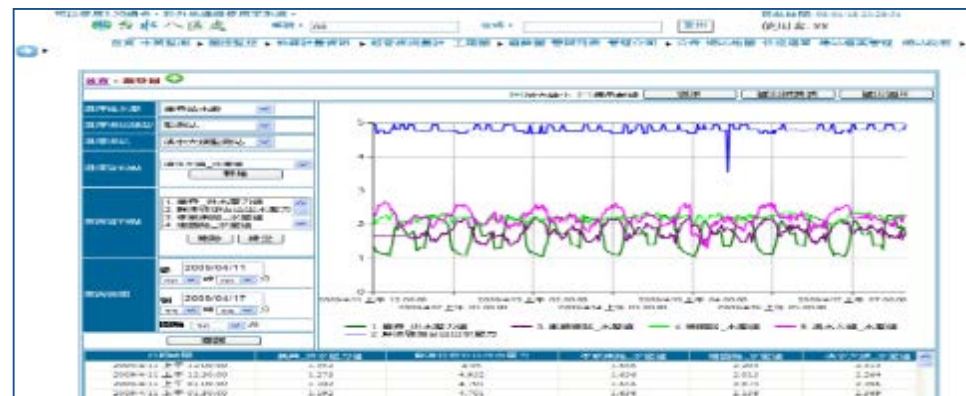
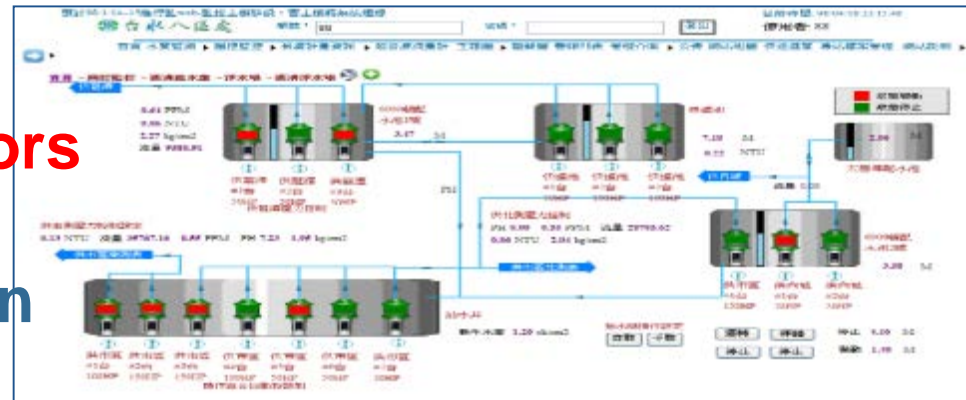
2013

2014

2017

➤ Web-based SCADA System (2nd Generation)

- shared data for administrators of branch office
- added data analysis function
- installed mobile (GPRS) pressure and flow sensing devices
- integrated Automatic Meter Reading (AMR) system into SCADA system





III. Smart Water Management

1999

2002

2007

2009

2011

2013

2014

2017

- Integrated GIS with SCADA
- established Maintenance Information System



III. Smart Water Management

1999

2002

2007

2009

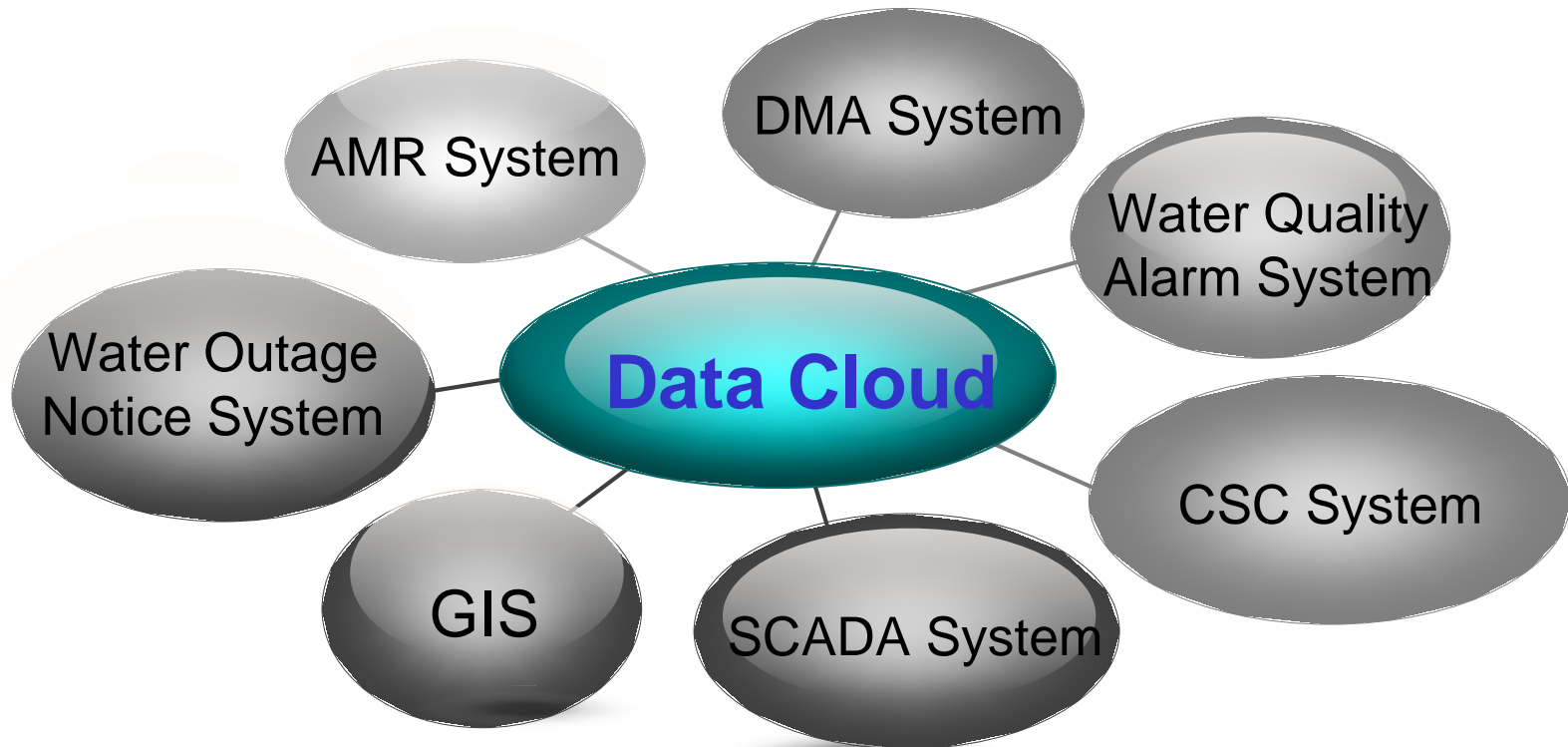
2011

2013

2014

2017

- integrated monitoring data into the data cloud built in TWC's headquarters
- Integrated Customer Service Center (CSC) System



III. Smart Water Management

1999

2002

2007

2009

2011

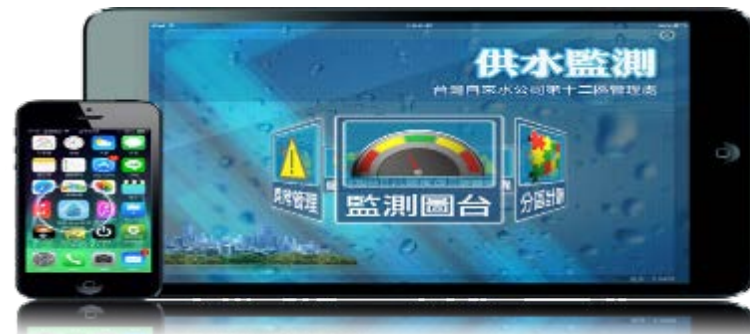
2013

2014

2017

➤ Integrated Water Treatment Plant Information System (3rd Generation)

- adopted web-based SCADA System
- remote data backup
- established Water Supply Monitoring Platform
- adopted broad-band network to communicate among sensing devices, SCADA system, WTPs, and branch offices



III. Smart Water Management

1999

2002

2007

2009

2011

2013

2014

2017

Flow Pressure



Water Quality
(pH, turbidity,
residual
chlorine)



Water
Level



Valve



Electronic
Meter



- We collect 8 kinds of real-time monitoring data into Data Cloud.

監測站	傳訊點	數值範圍	即時值	傳訊時間
更樂國小	餘氯		20.00 ppm	16:45:00
	電導度		397.00 uS/cm	16:45:00
	PH		7.17 pH	16:45:00
	溫度		7.55 °C	16:45:00
海墘三	溫度		0.34 NTU	16:45:00
	餘氯		0.83 ppm	16:45:00
	電導度		156.99 uS/cm	16:45:00
	PH		0.00 pH	16:45:00
	溫度		23.44 °C	16:45:00



III. Smart Water Management

Data Management

■ Data Cloud -- data storage and exchange

Senslink 台灣自來水公司供水監控整合雲 語言: [繁體中文](#) | [cablessoft](#) | [登出](#)

[前往查詢功能頁面](#) [前往管理功能頁面](#) [前往客服系統介紹平台](#) [前往客服系統後端管理平台](#) [Web監控元件](#) [使用手冊](#)

目前DB伺服器剩餘容量: 755.1 GB (773261 MB) 總容量 1TB

區處	累積出水量	平均(清水)餘氯	出水平均濁度	出水平均餘氯度	出水平均壓力
清洲OPC	系統沒有昨日資料	0.00 ppm	0.00 NTU	0 無單位	0.00 kgf/cm2
八區OPC	58209_CMD	0.46 ppm	0.15 NTU	7	0.45 kgf/cm2

八區OPC 出水平均濁度

每頁顯示 10 紀錄 搜尋

監測站名稱	監測項目名稱	值
九山淨水場	2000噸配水池濁度 * 清水瞬間流量	0.11 * 524.96
大港淨水場	深井濁度 * 供大港清水瞬間流量	0.18 * 12.38
大港淨水場	深井濁度 * 供大港清水瞬間流量	0.18 * 26.43
天送埤淨水場	深井濁度 * #1清水瞬間流量	0.00 * 0.00
壽溪淨水場	1000噸配水池濁度 * 清水供上部塔瞬間流量	0.09 * 63.16
寮潭淨水場	1000噸配水池濁度 * 清水供下部塔瞬間流量	0.10 * 996.89
廣興淨水場	10000噸清水池濁度 * 10000噸清水池流量	0.20 * 724.23
廣興淨水場	10000噸清水池濁度	0.20 * 0
廣興淨水場	10000噸清水池濁度	0.20 * 0
東潭淨水場	深井濁度 * 清水瞬間流量	1.09 * 12.88

顯示 1 到 10 的 32 紀錄 ◀ 上頁 下頁 ▶

It collects data from 12 branch offices & over 100 WTPs.

III. Smart Water Management

■ Water Supply Monitoring System (for displaying all collected data from data cloud)

- **web edition** for PC & laptop

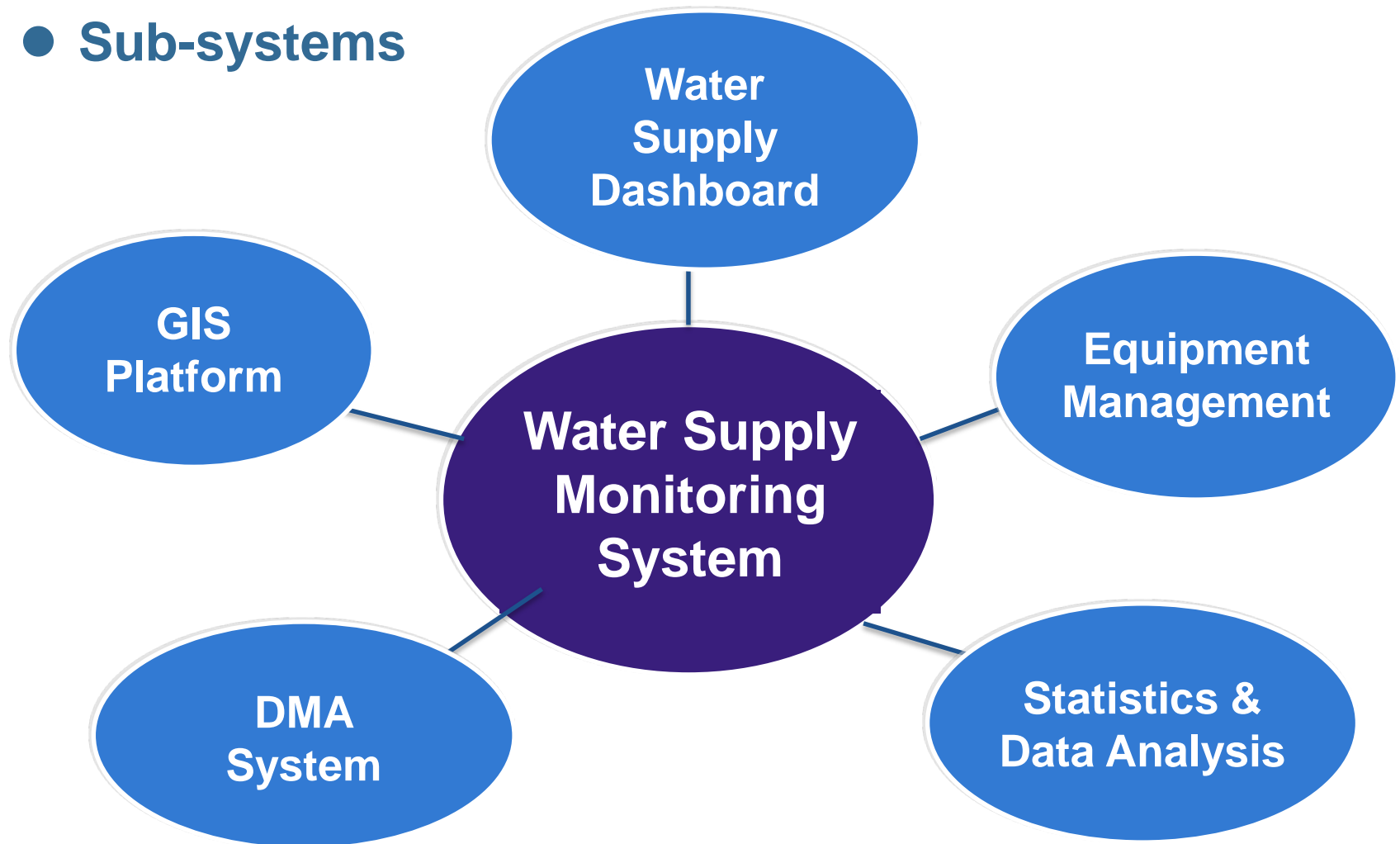


- **app edition** for tablet & smartphone



III. Smart Water Management

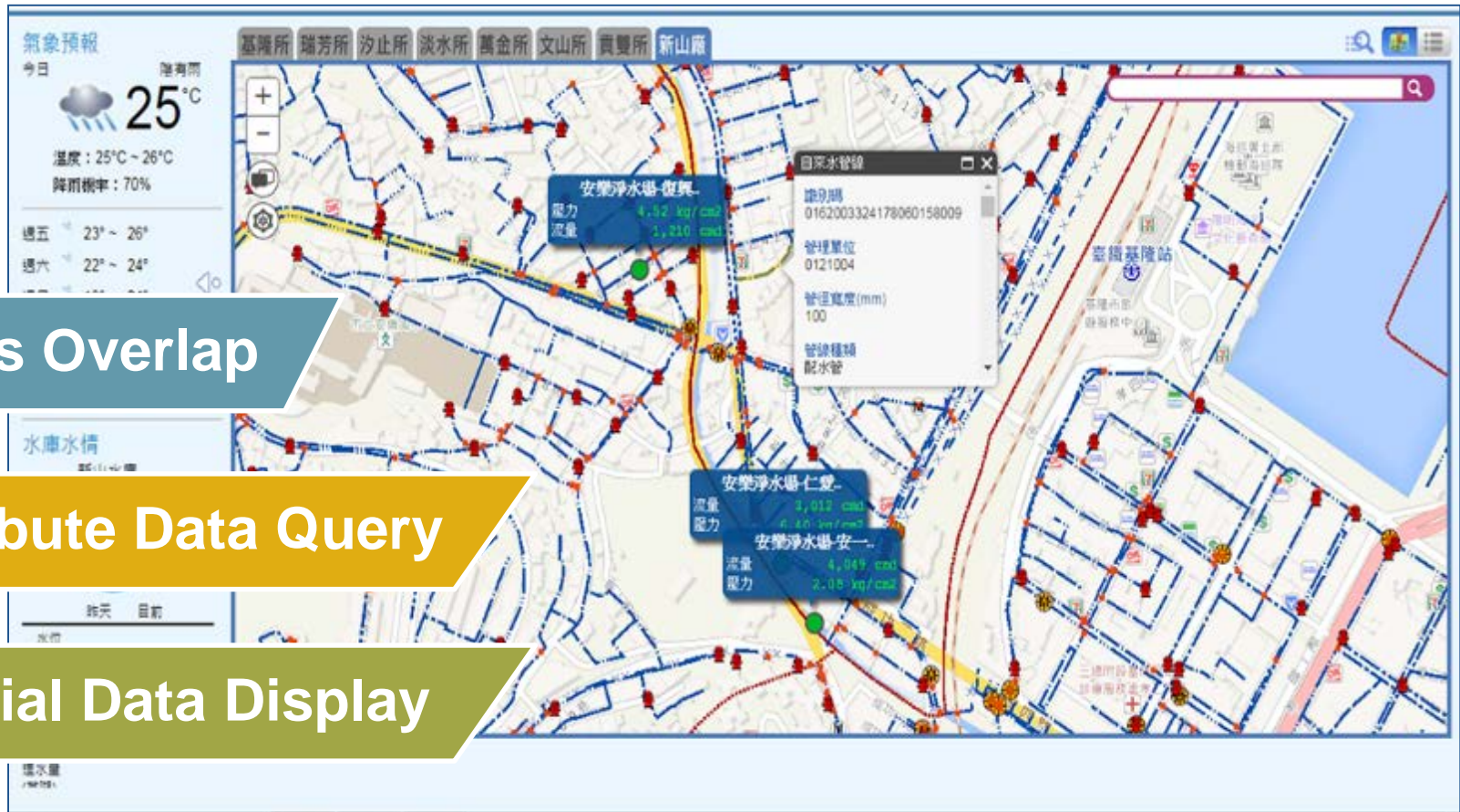
- Sub-systems





III. Smart Water Management

GIS Platform



Maps Overlap

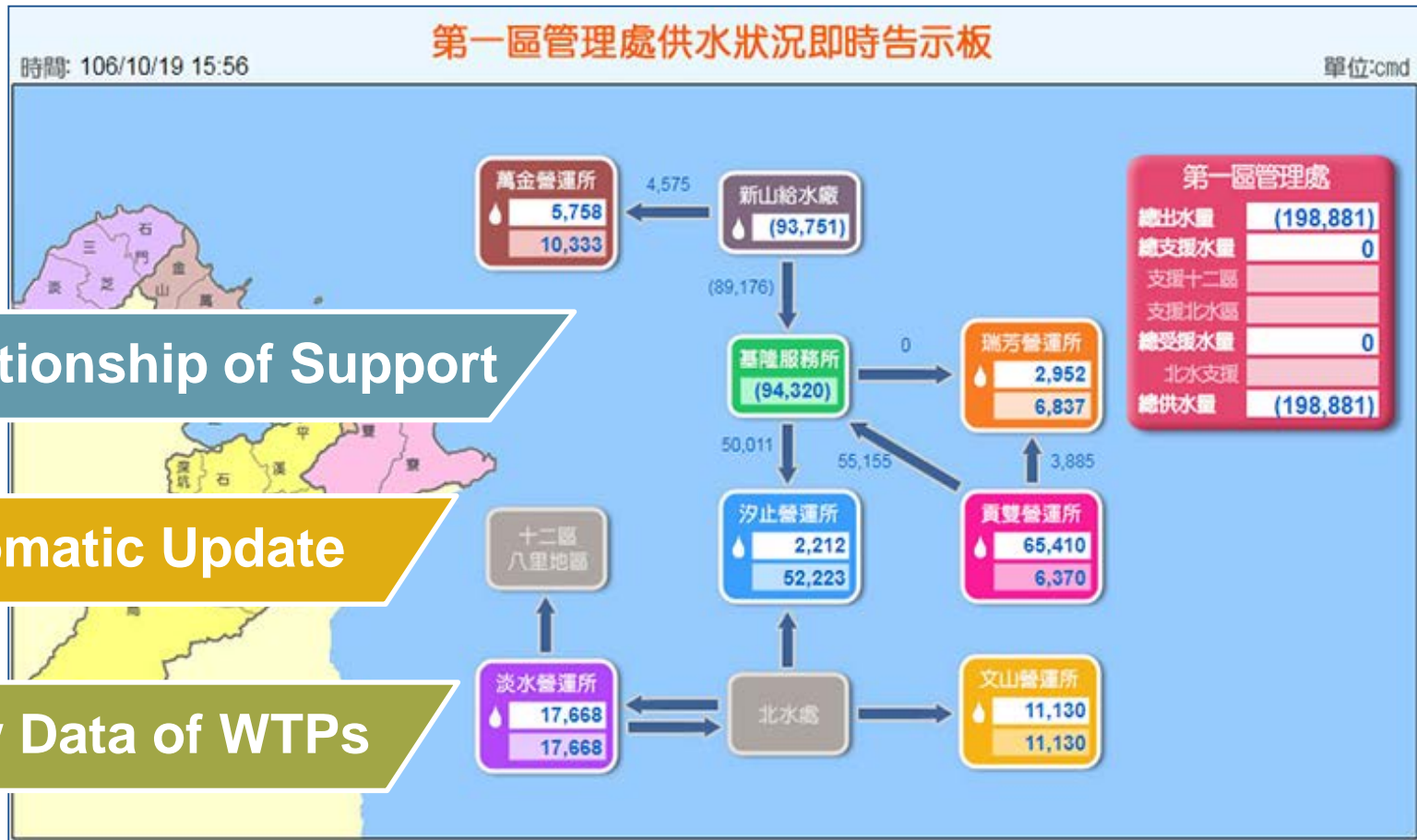
Attribute Data Query

Spatial Data Display



III. Smart Water Management

Water Supply Dashboard





III. Smart Water Management



Distribution of water pressure



III. Smart Water Management

DMA System

GIS & Satellite Map

分區計量監測 **基隆所** 瑞芳所 汐止所 淡水所 萬金所 文山所 貴陽所

0101-01-03-00 丹鳳路小區
 + [月眉路100]流量

0101-01-03-01 東明路55巷加壓站小區	—
0101-01-03-02 東明路77巷口加壓站小區	—
0101-01-03-03 東明路77巷加壓站小區	—
0101-01-03-04 愛九路加壓站小區	4,016
+ [復興街200]流量	4016.00
0101-01-03-05 愛七路延平街小區	475
+ [延平街150]流量	475.00
○ [延平街150]壓力	0.88
0101-01-03-06 南榮第二加壓站小區	—
0101-01-03-07 南榮路加壓站小區	—
0101-01-03-08 龍安街198巷加壓站小區	—
0101-01-03-09 龍安街332巷加壓站小區	—
0101-01-03-10 東明路小區	—
0101-01-03-11 仁一路小區	—

0101-01-03-05 愛七路延平街小區

供水區域	管線長度
用水戶數	最大時數量
最大日數量	最大時供量
最大日供量	最小時數量
	最小時供量



III. Smart Water Management

Boundary of DMA

Monitoring Data

The dashboard displays monitoring data for various districts and a map of the water network. The data table is as follows:

Category	Item	Value
1201-51-04-01 樹人小區	總流量	2,833
	樹人小區主大安路618號(主)流量	2,362
	樹人小區副東安路17號(副)流量	0.00
	樹人小區副東安路8號(副)流量	471
	樹人小區副東安路6號(副)壓力	2.01
1201-51-04-02 備內小區	總流量	907
	備內小區大安路551號(主)流量	907
1201-51-04-03 育林小區	總流量	1,152
	育林小區大安路551號(主)流量	1,152
1201-51-04-04 啟智小區	總流量	3,586
	啟智小區大安路551號(主)流量	3,586
1201-51-04-05 日新小區	總流量	4,709
	日新小區大安路551號(主)流量	4,709
1201-51-05-01 文林小區	總流量	2,34
	文林小區大安路551號(主)流量	2,34
1201-51-05-02 樹林工業區小區	總流量	2,903
	樹林工業區大安路551號(主)流量	2,26

The map shows the DMA boundary (dashed red line) and monitoring points (green dots) with labels: 樹人小區, 1201-51-04-03 育林小區大安路551號 (2,903), 樹林工業區小區, 備內小區, 啟智小區, 日新小區, 文林小區, 樹林工業區小區, 備內小區, 啟智小區, 日新小區, 文林小區, 樹林工業區小區. A line graph at the bottom right shows flow data from 02/19 to 03/08.



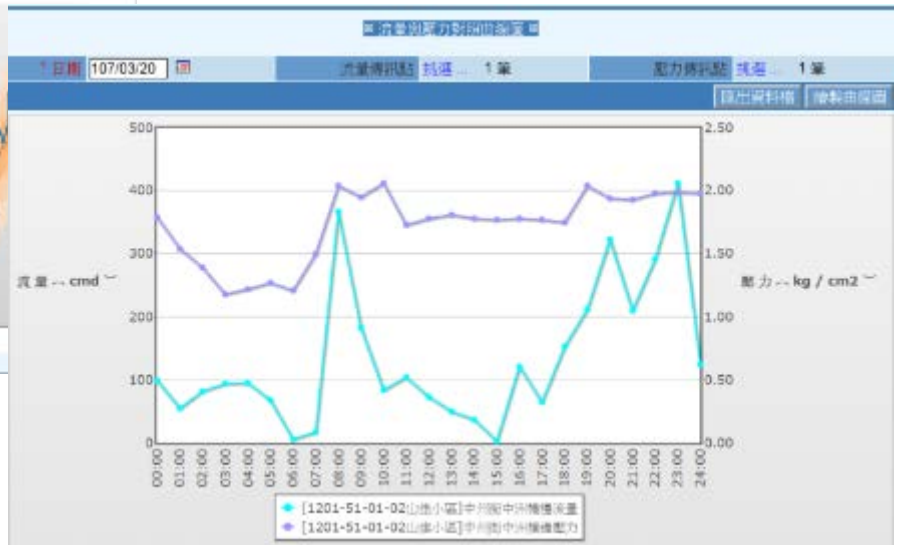
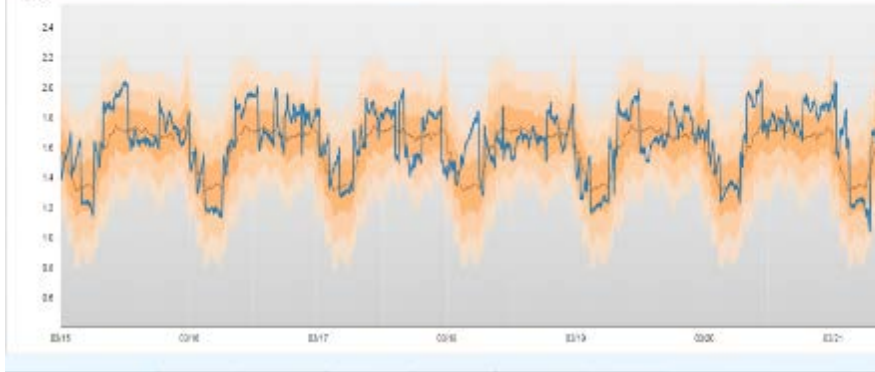
III. Smart Water Management

Statistics & Data Analysis

【輸入小區】系統內的相關式

管理單位	材料提供	供水區號	供水戶數
位置地點	宗區：東山99號 編號：24 601880	經度：121.410700	高度：30.000 電壓電壓：3.63
壓力	經 緯： 海拔日期：	學 號：G71 工作電壓：	該區水價：設備年費

107年05月15日起 - 地圖畫面





III. Smart Water Management

Equipment Management

* 壓力計管理查詢 *

管理單位: 設置地點:

[搜尋結果共 246 筆]

管理單位	卡號	設置地點	基本資料	檢查紀錄	修單紀錄
板橋服務所		三民路二段150號前 (傳訊點: [民享小區1201-04-05-02]壓力)	HC31 ...	(無)	(無)
板橋服務所		大觀路一段38巷184號前 (傳訊點: [榮中一街1201-04-01-04]壓力)	HC31 ...	(無)	(無)
板橋服務所		大觀路一段59號天橋右側 (傳訊點: [台新			
板橋服務所		大觀路一段59號對面 (傳訊點: [華僑中學			
板橋服務所		大觀路二段47號前 (傳訊點: [徐氏之家			
板橋服務所		大觀路二段339號 (傳訊點: [寶六12			
板橋服務所		大觀路二段57號 (傳訊點: [
板橋服務所		大觀路二段59巷對面 (傳訊點: [
板橋服務所		大觀路二段650巷2號 (傳訊點: [大			
板橋服務所		中山(二)中區 (傳訊點: [中山(二)中			

* 壓力計資料的詳細基本資料 *

* 管理單位: 板橋服務所 * 卡號: 號

* 設置地點: 傳訊點: [華僑中學1201-04-01-03]壓力

或 (緯度: 經度: 高程:)

廠牌:

製造國家:

型式:

測定範圍: kg/cm²

傳送距離: M

電壓: V

指示計:

使用溫度範圍: °C

出力信號:

測定原理:

代理商商及地址:

現況照片一



此張照片上傳請使用傳訊點基本資料維護功能

現況照片二



此張照片上傳請使用傳訊點基本資料維護功能



III. Smart Water Management

Decision Making

■ Emergency Response Platform

- web-based
- displayed on LED TV wall
- established in Emergency Response Center of the branch office
- Including monitoring data, weather, etc.



III. Smart Water Management

Customer Service

● Water Outage Query

↑ 定位

定位查詢

行路區停水

取水站查詢

即將/修正資訊

貼心提示：於停水區域或取水站顯示連線點及滑鼠左鍵兩下查看詳細資訊

● Water Quality Query

平均水質查詢

平均水質查詢-新山淨水場
(Sinshan)基隆市麥金路720號

淨水場：	新山淨水場 (Sinshan)基隆市 麥金路720號	最大限 值
英文：	Sinshan	
自由有效餘氯 (mg/L)：	0.71	0.2-1.0
濁度(NTU)：	0.45	2
色度(鉑站單 位)：	<5	5
臭度(初嗅數)：	<1	3
總鹼度(mg/L)：	28.5	-
pH值(-)：	7.1	6.0-8.5
氯鹽(mg/L)：	17.6	250

● Water Tariff Query

台灣自來水公司
TAIWAN WATER CORPORATION

我的水費資訊

您的帳單資料 共有 11筆

帳單資料 第1筆

[前往優惠活動專區](#)

水號： 4158824 * * *

水號地址： * * * 1 2 號 1 1 樓

繳費年月： 10705

帳單到期日： 107/05/21

用水度數(不含分攤度數)： 61度

合計度數(含分攤度數)： 61度

應繳金額： 631元

實繳金額： 元

銷帳日期：

繳費狀況： 未繳費 [顯示繳費條碼](#)

與去年比較增減度數： N/A

省水比例(含分攤度數)： N/A

省水比例(不含分攤度數)： N/A

帳單資料 第2筆

[前往優惠活動專區](#)

52

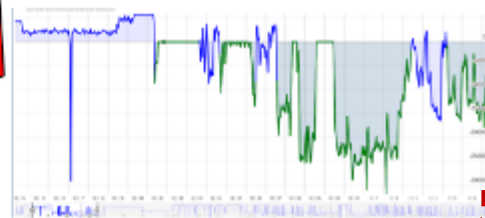
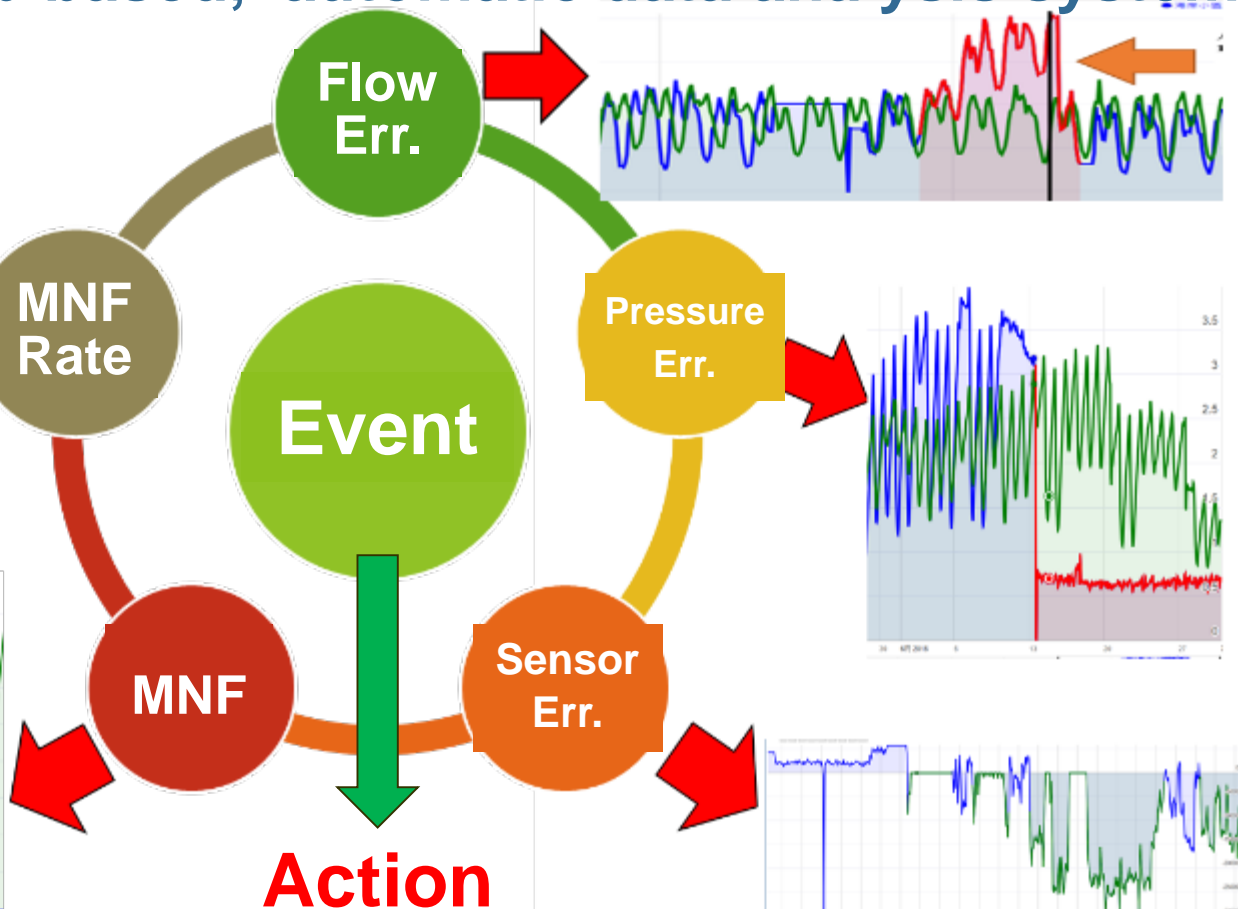
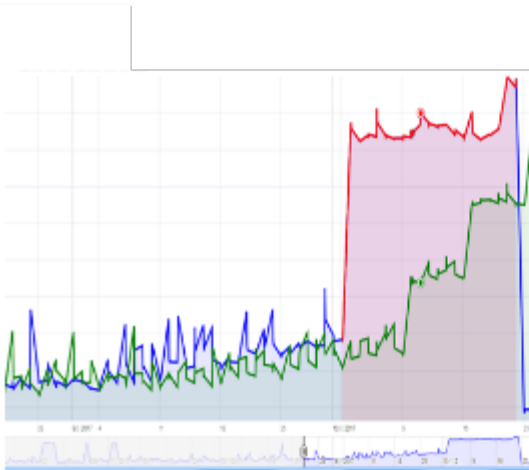


III. Smart Water Management

What's next.....?

We are now setting up a **Big Data Analysis Task Force**, and developing a web-based, automatic data analysis system.

站名	日期	流量(m³)	压力(kPa)	容错率(%)
1 北湾供水站	2016/06/01	950	950	100.00
2 北湾供水站	2016/06/02	940	950	99.50
3 北湾供水站	2016/06/03	950	950	99.50
4 北湾供水站	2016/06/04	960	950	99.50
5 北湾供水站	2016/06/05	970	950	99.50
6 北湾供水站	2016/06/06	980	950	99.50
7 北湾供水站	2016/06/07	990	950	99.50
8 北湾供水站	2016/06/08	1000	950	99.50
9 北湾供水站	2016/06/09	1010	950	99.50
10 北湾供水站	2016/06/10	1020	950	99.50
11 北湾供水站	2016/06/11	1030	950	99.50
12 北湾供水站	2016/06/12	1040	950	99.50
13 北湾供水站	2016/06/13	1050	950	99.50
14 北湾供水站	2016/06/14	1060	950	99.50
15 北湾供水站	2016/06/15	1070	950	99.50
16 北湾供水站	2016/06/16	1080	950	99.50
17 北湾供水站	2016/06/17	1090	950	99.50
18 北湾供水站	2016/06/18	1100	950	99.50
19 北湾供水站	2016/06/19	1110	950	99.50
20 北湾供水站	2016/06/20	1120	950	99.50
21 北湾供水站	2016/06/21	1130	950	99.50
22 北湾供水站	2016/06/22	1140	950	99.50
23 北湾供水站	2016/06/23	1150	950	99.50
24 北湾供水站	2016/06/24	1160	950	99.50
25 北湾供水站	2016/06/25	1170	950	99.50
26 北湾供水站	2016/06/26	1180	950	99.50
27 北湾供水站	2016/06/27	1190	950	99.50
28 北湾供水站	2016/06/28	1200	950	99.50
29 北湾供水站	2016/06/29	1210	950	99.50
30 北湾供水站	2016/06/30	1220	950	99.50





Concluding Remarks

- Providing high standard service and high quality drinking water has been a goal that TWC has persistently pursued.
- TWC hopes to become a leader among the domestic water utilities and keep pace with the best international water utilities.



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Thank You



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