
Itron
Temetra™
Analysis

INTRODUCTION

Water: The Universal Necessity for Human and Ecological Sustenance

Itron is dedicated to creating a more resourceful world. We believe that the way energy and water are managed will define this century. By working with our customers to ensure their success, we can improve the quality of life, ensure the safety and promote the well-being of people around the globe.

Empowering Communities through Efficient Water Management

Public health protection, food production, power generation—water plays a central role in these processes and is tightly connected to the economic growth of cities. The use of water through consumption from agriculture to industry puts a strain on this natural resource. While our water footprint continues to increase, it is critical that we—efficiently and effectively—manage every drop of clean water that is extracted, pumped, treated and distributed or sourced from a third-party provider.

Water scarcity already affects every continent. Water use has been growing globally at more than twice the rate of population increases in the last century, and an increasing number of regions are reaching the limit at which water services can be sustainably delivered, especially in arid regions (UNWater)[2].

Water use has been increasing worldwide by about 1% per year since the 1980s, driven by a combination of population growth, socio-economic development and changing consumption patterns. Global water demand is expected to continue increasing until 2050, accounting for 20% to 30% above the current level of water use, mainly due to rising demand in the industrial and domestic sectors. Over 2 billion people live in countries experiencing high water stress, and about 4 billion people experience severe water scarcity during at least one month of the year. Stress levels will continue to increase as demand for water grows and the effects of climate change intensify (UN, 2019)[1].

Water is also deeply related to energy through an inextricable link called the 'water-energy nexus'. They are mutually dependent, with each affecting the other's availability. Water is needed for energy development and generation, and energy is required to supply, use and treat drinking water and wastewater. Water utilities are typically one of the highest consumers of energy. Water that gets produced and does not get used, contributes to Greenhouse Gas (GHG) emissions. Reducing non-revenue water will have a positive impact on climate change through GHG emissions. This is the reason why efficient management of the water supply has a direct impact on addressing climate change.

DRINKING WATER—EVERY DROP COUNTS

As a water utility, you are expected to meet the ever-increasing regulatory requirements of relevant authorities. This includes meeting the expectations set by the responsible bodies in conjunction with other stakeholders, all while ensuring the long-term sustainability of the uninterrupted service. Constrained by resources in terms of manpower and finances, it is critical for water utilities around the world to operate and manage their water distribution system optimally, especially with respect to water losses.

Impacts of Water Losses

Water losses are a clear obstacle to sustainability:

- *Economic impacts*: Treating and transporting water, which is then lost, represents high costs that generate no revenue for your organization. Costly work is required to repair network incidents, pipe bursts and leakages. In countries where water scarcity is a concern, the economic impacts of water losses could be so high that it can impact the investment in other critical infrastructure developments.
- *Technological impacts*: High leakage in a water supply system can lead to a number of problems, including an inability to supply enough water to meet demand, as well as intermittent water supply. This is because the water pressure in the system can drop where there is high leakage, making it difficult to maintain a consistent flow of water to customers.

  In addition to the issues with water supply, high leakage can also allow air and contaminants to enter the clean water supply pipe, which can further degrade the quality of the water. This can increase the risk of waterborne diseases and other health problems for people who rely on the water supply.
- *Social impacts*: Poor supply due to failures, low pressure or service interruptions affects the end customer. Health risks can also rise as infiltrations into low pressure and intermittent supply systems occur. Education levels can also be impacted in countries where children are required to search for and collect water instead of going to school.

The aim of water utilities is logically to offer services to everybody in the area of responsibility of the utility, and to provide users with a continuous supply of drinking water under economic and social conditions that are acceptable to the users and to the utility (ISO 24510, 2007)[3].

[1] https://www.unwater.org/publications/world-water-development-report-2019/

[2] https://www.unwater.org/water-facts/scarcity/

[3] https://www.iso.org/obp/ui/#iso:std:iso:24510:ed-1:v1:en

» *Ecological impacts*: When water losses are not sufficiently reduced, water extraction needs to be increased. This creates additional stress on water resources and requires the input of energy which results in greater carbon dioxide emissions.

WATER LOSS CONTROL—THE PATH TOWARDS AUTOMATING DISPARATE DATA STREAMS

Temetra Analysis focuses on delivering measurable results that address the non-revenue water losses within your water distribution system. From reducing operating costs and improving operational efficiency to enhancing reliability and resiliency, we provide the technology and expertise to help you succeed. By integrating disparate utility data into a unified platform, we enable you to get additional value and insight out of your existing information and systems. This provides a holistic view of your water distribution operations. Leveraging advanced algorithms and forecasting tools in our platform allows you to gain quantifiable results that helps improve your Key Performance Indicators (KPIs).

OPERATIONAL VISIBILITY—BUILDING A SOLID MONITORING FOUNDATION

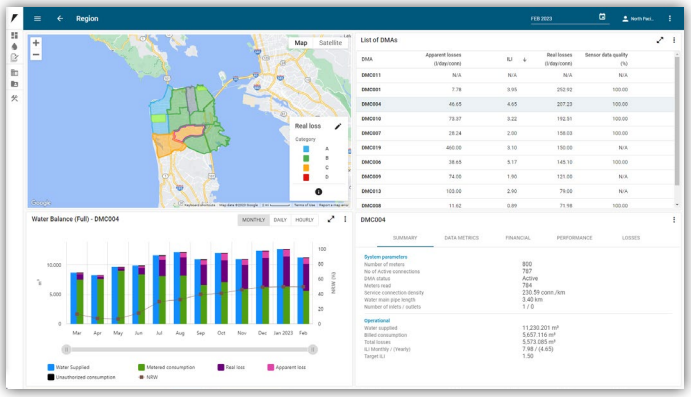
Everything is interconnected. The invisible line that connects disparate systems is often missing in advanced analytics. There is an abundance of data within your water utility. However, data from your distribution system is often siloed, prohibiting you from gaining valuable insights into the overall performance. Extracting and bringing data into one single platform is a key step towards water digitalization. This will allow you to enable greater operational efficiencies, improve maintenance planning, provide better performance predictability, optimize your workforce and maximize your return on investment.

Operational Visibility can bring data in from field sensors, supervisory control and data acquisitions system (SCADA), hydraulic modelling software, geographic information systems (GIS) and customer information systems (CIS)/consumption data from our cloud-based meter data collection software, Temetra. Using Temetra Analysis, this data is brought together under one single platform that allows for visualization and analysis to support your decision making. When these technologies converge, it can accelerate your digital water transformation. This helps reduce the time and effort to create and disseminate valuable insights throughout your utility.

Operational Visibility provides an automated water balance table per the International Water Association (IWA)/American Water and Wastewater Association (AWWA) and is based on your entire water distribution system or District Metered Areas (DMAs) within the system. The monitored interval of the water balance table is dependent on the consumption data granularity availability for your water distribution system or DMAs.

This view provides critical information on the split between real (leaks) and apparent (metering inaccuracies and theft) losses in each of the DMAs and establishes critical water loss KPIs that can be tracked. With continuous enhanced monitoring, we can help you prioritize and focus your resources and budget on specific areas within your water network (that need critical action) to better provide for the communities you serve.

Water distribution infrastructure is underground so events can occur instantaneously without operator awareness. Having insights to the type and frequency of these events (such as bursts, leaks, unknown hydraulic maneuvers, DMA mixes and frauds) allows the appropriate tracking of the actions needed to close out these events. Depending on the type of events, corrective workflows can be applied to ensure the swift and efficient resolution of these occurrences.



Operational Visibility provides intuitive views, dashboards and reporting to enable water utilities to monitor the health and performance of their entire water distribution network.

Event Investigation

As part of the Operational Visibility application, Event Investigation provides a scalable workflow method designed to allow for the detection of various anomalies within the water distribution network. It monitors any changes in consumer usage as well as sensors within each DMA. It allows for the assignment of devices/events to specific users where further investigation is required. It also allows your utility to drill down to the individual sensor/service point for additional information, such as consumption time series analysis, trends and connection/sensor metadata.

Transmission Mains Monitoring

Expanding on our solution for monitoring water distribution within DMAs, transmission mains monitoring looks to provide a solution for monitoring the mass balance of water within your transmission mains. A water distribution network contains multiple sectors from the pipe/s that connects to a water source, treatment plants, storage and finally transmission to the destination regions/DMAs.

Transmission Mains Monitoring provides a platform to visualize the mass balance of each sector, providing a water balance of inflow, outflow and losses. The capability also extents to water tanks and storage sectors, providing insight into water distribution throughout your system.

This solution comes as part of Operational Visibility allowing you to take advantage of monitoring your entire network beyond DMAs.

THE WHERE, WHEN AND WHAT OF WATER LOSSES

Operational Visibility provides a snapshot of the health of the water distribution. It identifies **WHERE** and **WHEN** you have a high amount of water loss in your distribution network. It also provides **WHAT** the split of the water loss is in relation to real and apparent losses.

Once you have information on what is attributing to your water losses, you can assess your plan of action on how to address any water loss issues with the Water Loss Reduction modules from Temetra Analysis.

WATER LOSS REDUCTION

Visualization, Simulation and Calibration

Gaining an understanding of your distribution network and moving away from tribal knowledge allows you to better optimize resources to meet increasing needs. We can take CAD or GIS data and generate a digital twin of your water infrastructure. Hydraulic modelling can then be used to optimize the network, help identify leaks and help with seasonal demand fluctuations. Additional functionality allows you to simulate the effects of:

- Increase/decrease in demand
- Opening/closing valves
- Pressure reduction optimization

These simulations are done within the confines of a digital twin before implementation in the real world.

Water Revenue Assurance

Having accurate records of consumers within your CIS system is key to understanding your revenue flow. With Water Revenue Assurance, the aim is to provide insight not just into meters in the field but also CIS data inaccuracies. Data cleaning is an integral part of water revenue assurance. It ensures the detection and correction of any inaccurate records from the database before consumption data is analyzed such as results of duplicate IDs, missing IDs, data errors, etc.

Once cleaned, consumer consumption and metadata is loaded into Temetra Analysis. Consumption profiles are applied to meter data to aid in the detection of losses and age analysis. Detection of reverse meter flow, consumption pattern changes, incorrectly sized meters, unusual usage such as high or low consumption, zero consumption, increasing/decreasing consumption and endpoints with no reads are provided. The output of the analysis is a meter replacement list along with NPV and ROI projections.

Water Revenue Assurance can be provided as a one-off analysis of your CIS data and meter population or as a monthly subscription. Having a subscription for water revenue assurance allows utilities to keep accurate CIS records while tracking field changes, monitoring meter gain, and providing long-term revenue trends.

When used in conjunction with Operational Visibility, Water Revenue Assurance provides you with the ability to see the effects of field changes in the form of regional/DMA water balance along with changes in overall meter consumption gain.

Water Leak Management

Leak detection using hydraulic models for spatial analysis of flow, consumption and pressure is another way to reduce losses. The pre-localization of potential high leakage areas can be visualized in Temetra Analysis. This provides you with the ability to target defined areas for leak pinpointing on a regular basis, rather than waiting for leaks to surface or implementing manually intensive regional/DMA leak surveys.

Wherever you are in your journey to reduce non-revenue water, our dedicated subject matter experts will have continuous engagement with you to deliver measurable results.

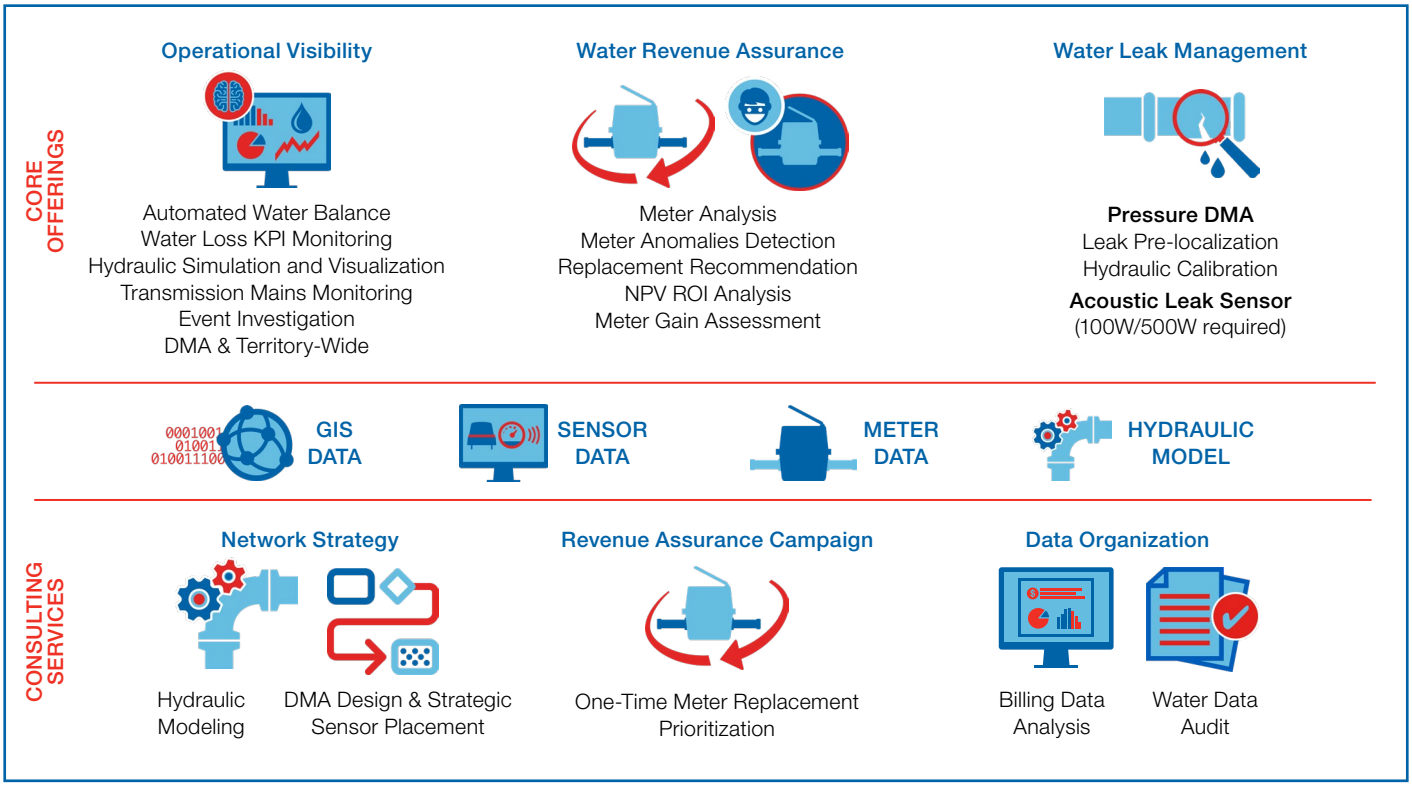
CONSULTING SERVICES

Our dedicated team of data scientists and hydraulic engineers have the experience to provide utilities with insights into operational efficiency. In addition to supporting the delivery of our core offerings, the team can provide services like data cleaning, system readiness, network assessment, water revenue assurance campaign and DMA planning and design.

Establishing DMAs helps to improve visibility into the water distribution performance and losses. The addition of hydraulic models for water networks/DMAs provides insights into "what-if" scenarios within this digital twin before field implementation.

For utilities who are in the beginning journey of their water loss management, our team provides services for data organization such as billing data analysis and water data audits. This allows the utilities to gain insights and determine their next steps to manage their water existing water infrastructure and plan continuous improvements.

TEMETRA ANALYSIS OFFERINGS



At Itron, we have a dedicated team of experts who will work alongside you in your journey to optimize your operations, reduce your operating costs, manage your assets effectively and ultimately decrease your non-revenue water losses. Through our consulting services, we work with you every step of the way to reach your targeted goals. Together, we succeed in making the world a more resourceful place for this generation and many more to come.

COMMERCIAL APPROACH

There are a couple commercial approaches for Temetra Analysis offerings:

- Subscription-based pricing (bundled approach for software and services)
- Subscription-based pricing with potential pay-for-performance elements incorporated

Depending on your goals and your need for various commercial approaches, we can create an offer that will meet your needs.

YOUR ACTIONS, OUR FUTURE

Together, we take the actions required to manage, conserve and optimize every drop of clean water that is pumped, treated and distributed. In doing so, we fulfill our duties to our stakeholders, the communities and its citizens we serve and ultimately, we create a better connected, sustainable and more resourceful world.

TEMETRA PACKAGES (NAM)

temetra

HEADEND & METER DATA MANAGEMENT			TEMETRA ANALYSIS		
WALK-BY	**DRIVE-BY**	**AMI ESSENTIALS**	**OPERATIONAL VISIBILITY**	**WATER LEAK MANAGEMENT**	**WATER REVENUE ASSURANCE**
✓ Walk-By AMR ✓ Reading and Billing Cycle Automation ✓ Basic Subscription ✓ Manual Reading ✓ Long-term Data Storage	✓ Drive-by AMR ✓ Turn-by-turn with Automatic Voice Guidance ✓ Geo-Sequencing ✓ Geo-Routing	✓ High-Frequency Data Collection ✓ Critical Alarms Management ✓ Data Validation and Dispatching ✓ Customer Portal	✓ Data Aggregation by DMA ✓ Bulk Inflow/Outflow & Pressure Data Import ✓ Daily Full Water Balance (Real, Apparent Losses & Unauthorized Consumption) ✓ Water Distribution Monitoring ✓ Device Status Assessment ✓ Data Quality Assessment ✓ Hydraulic Model Visualization	✓ Digital Twin Generation through Hydraulic Models ✓ Validate DMA Boundary (Hydraulic Isolation) ✓ DMA Leak Pre-Localization	✓ Meter Replacement Analysis (Right Sizing, Meter Aging, Meter Replacement Campaign, Total Volume, Flow Range, Metering Efficiency, Revenue And Volume Recovery) ✓ Consumption Profile Assessment ✓ Customer Segmentation ✓ Consumption Patterns Analysis

Itron

Join us in creating a more **resourceful world**.
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