Non-Revenue Water Reduction and Control: Building Sustainable Cities by Taking Action against Water Losses

2nd e-MarketPlace for a Water-Secure and Resilient Asia and the Pacific
Oct 18th, 2021

NON-REVENUE WATER

A global challenge

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$39*
billion/year
the financial cost / value of Non-Revenue Water

800*
million people
could have access to water supply if the world value of NRW was reduced by 1/3

30%*
of water system input volume across the world is NRW

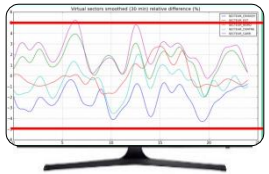
* IWA

Non-Revenue Water
SUEZ Approach

Define the optimal actions combination

ASSESSMENT TOOL

SPOT LEAKS



Quick detection and response to reduce leakage duration

CALM NETWORK

Pressure control to reduce leakage flowrate and burst rate

NET VISION

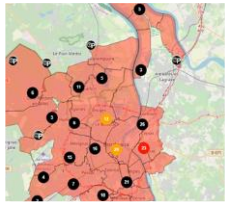
Identification of degraded assets to reduce burst rate

OPTI REVENUE

Detection and reduction of unaccounted-for volumes

SUEZ Approach

Some of our Supporting Technologies



Aquadvanced™

Real-Time Monitoring & Control

Twinet™

Virtual DMA's

Calm Networks™

iDroloc™

Tracing gaz leak detection

Meter Optimization

Machine learning based

Asset Advanced™

Optimal Asset Management

Burst Forecast

Machine learning based

Aquacircle™

NRW Assessment

Satellite Image analysis

Advanced Inspections

Field assessment

NRW References

NRW USE CASES

BORDEAUX, FRANCE
2007-2011

Definition and implementation of physical losses reduction program, including asset renewal, leak detection and repair and advanced pressure management.

8600 km of pipelines surveyed for leak detection	**25 %** Burst rate reduction	**2.7 million m³** annual reduction in physical losses

OLINDA, BRAZIL
2016-2020

Performance based contract for efficiency improvement of the water supply system of the city of Olinda, from design and construction to O&M for a period of 4 years.

24/7 continuous supply achieved	**32** new pressure zones implemented	**48.5 million m³** non-revenue water recovered

MACAO SAR, CHINA
2009-2030

Extension of the operation and management of water services contract for the municipality of Macao Special Administrative region of the people's Republic of China

390,000 m³/d water supply capacity	**7.3 %** NRW water rate achieved, leading level in Asia	**503 km** of new pipelines installed

SANTIAGO, CHILE

SUEZ NRW CONSULTANCY USE CASE

5-YEAR MASTER PLAN
DETAILED RESULTS

Santiago, Chile

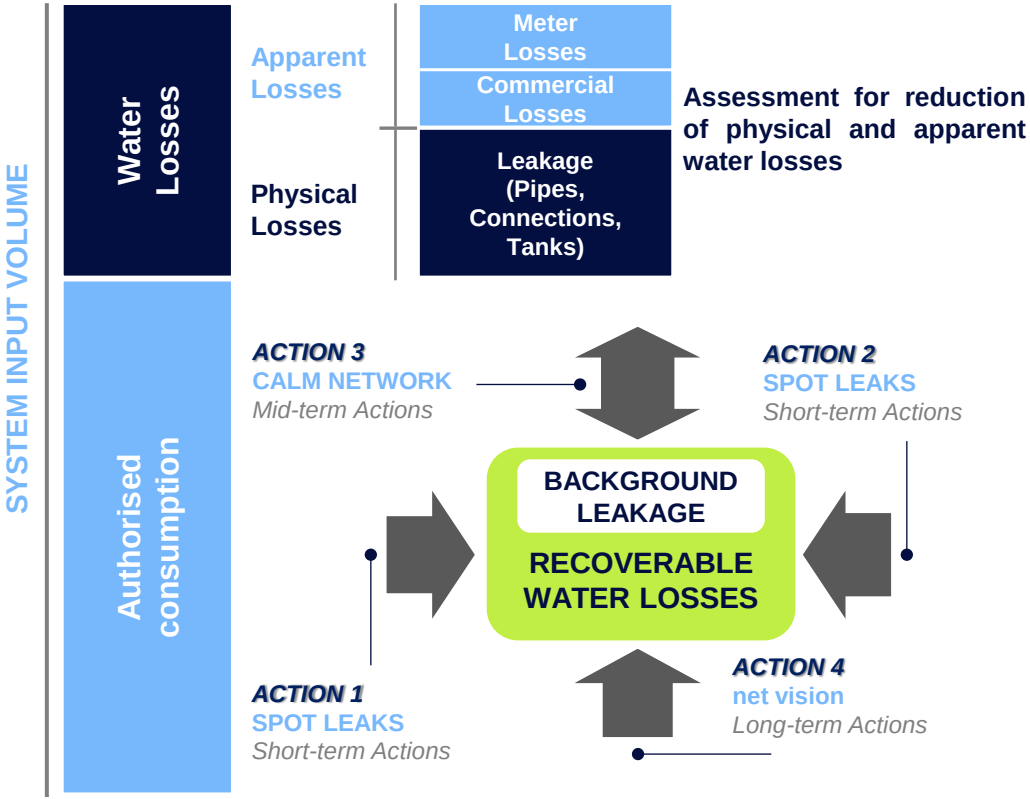
Location

Santiago de Chile is the capital and largest city of Chile and is located in the country's central valley. The operator Aguas Andinas®, subsidiary of SUEZ Group, asked to reduce the NRW volumes, which were around 30% at the end of 2016, in the frame of a Master Planning contract to reduce NRW in 10% by 2021

- **Supplied volume** 654 Mm3/year
- **Population:** 5.56 million inhabitants
- **Customers:** 1,733,852 clients
- **Network length:** 11,607 km of pipes
- **Connections:** 1,244,416 service connections
- **NRW before actions:** 30% water loss

Santiago, Chile

Master Plan



Initial Water Losses Assessment using AQUACIRCLE® determined the following best matching cost efficiency SUEZ strategies and services to be deploy:

1. ***SPOT Leak Service:*** *Including Leak inspection planning and leak detection campaigns, Active leak monitoring, and Network Sectorization*
2. ***Calm Network Service:*** *Including optimal pressure regulation and control to reduce NRW*
3. ***Opti Revenue:*** *Including recommendations on water meter selection, optimal meter replacement programs, detection of irregular consumptions, and optimization of the inspection activity in the field*

Master Plan definition included 2 consultancy phases and 4 pilot projects between them to set the baseline, and evaluate current real condition on Real and Apparent Losses in strategic areas prior to scaling action plans to the whole network. Total execution time for Master plan definition was 18 months

Santiago, Chile
Master Plan

Proposed structure

Consultancy. Phase 1
- *Initial Water Losses Assessment*
- *NRW Audit and Baseline definition*
- *NRW Matrix per DMA*

Consultancy. Phase 2
- *Secondary sectorisation*
- *Dynamic Micro-sectorisation*

CHANGE MANAGEMENT

NETWORK EFFICIENCY MASTER PLAN
Economic Evaluation · Action Plan · Investment Planning

Pilot Project 1. Physical Losses

SPOT Leaks:
- *Scope: Zone1-560 km & Zone2-123 km*
- *Active leak management*
- *Leak detection acoustics & iDroloc*
- *Leak repair*

Calm Network:
- *Scope: Zone2-123 km*
- *Pressure regulation*

Pilot Project 2. Apparent Losses

Opti Revenue:
- *Scope: All customers in metropolitan area*
- *Irregular consumption*
- *Metering optimization (Consumption patterns, Average meter error, etc.)*

Pilot Project 3. Full NRW approach
- *Scope: Zone3-13 km*
- *SPOT Leaks*
- *Calm Network*
- *Opti Revenue*
- *Smart Metering*

Pilot Project 4. Remote Control
- *Pilot technology support*
- *Improvement of Operational Control Centre*

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Master Plan

Consultancy. Phase 1 – NRW Audit

Background

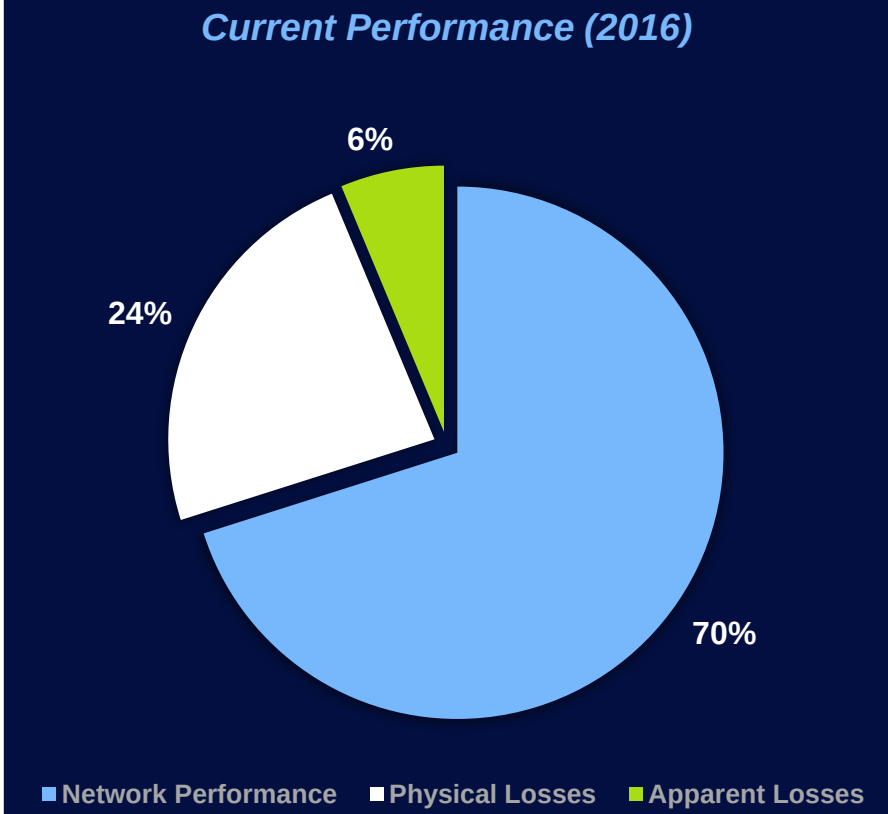
- Macro-metering in poor condition
- 30% NRW, below Aguas Andinas' standards

Physical Losses

- Inhouse methodologies developed
- Heterogeneous water loss per DMA
- High level of water losses

Apparent Losses

- Unknown at the beginning, estimated through pilots
- Homogeneous water loss (efficient meter renewal policy)
- Low level of losses (micro-metering in good condition)



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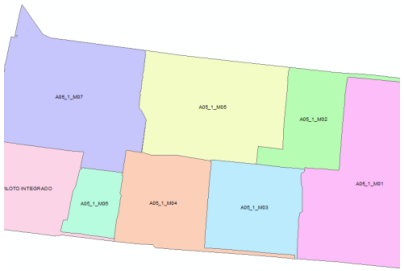
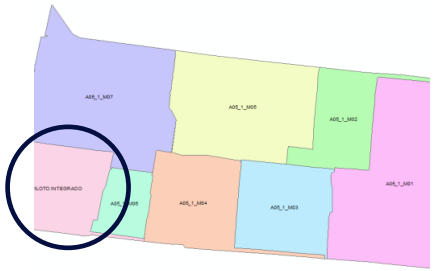
Pilot projects. Scope Zones. Characteristics

Zone 1
- *Length: 536 km*
- *Customers: 67.265*
- *Micro-DMAs: 31*
- *Boundary ON/OFF Valves: 159*
- *Micro-DMA Av. Size: 18 km*



Zone 2
- *Length: 123 km*
- *Customers: 12.400*
- *Micro-DMAs: 8*
- *Boundary ON/OFF Valves: 27*
- *Micro-DMA Av. Size: 15 km*
- *PRVs: 5*



Zone 3
- *Length: 13 km*
- *Customers: 1.300*
- *Micro-DMAs: 1*
- *Meter renewed: 1,300*
- *Remote Meter Reading*

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Master Plan

Pilot project 1. Physical losses

SPOT Leaks

Network Sectorisation (Z1. 560 km & Z2. 123 km):

- Secondary Sectorization execution
- Dynamic Micro-Sectorization execution

Active Leak Management (Z1. 560 km & Z2. 123 km):

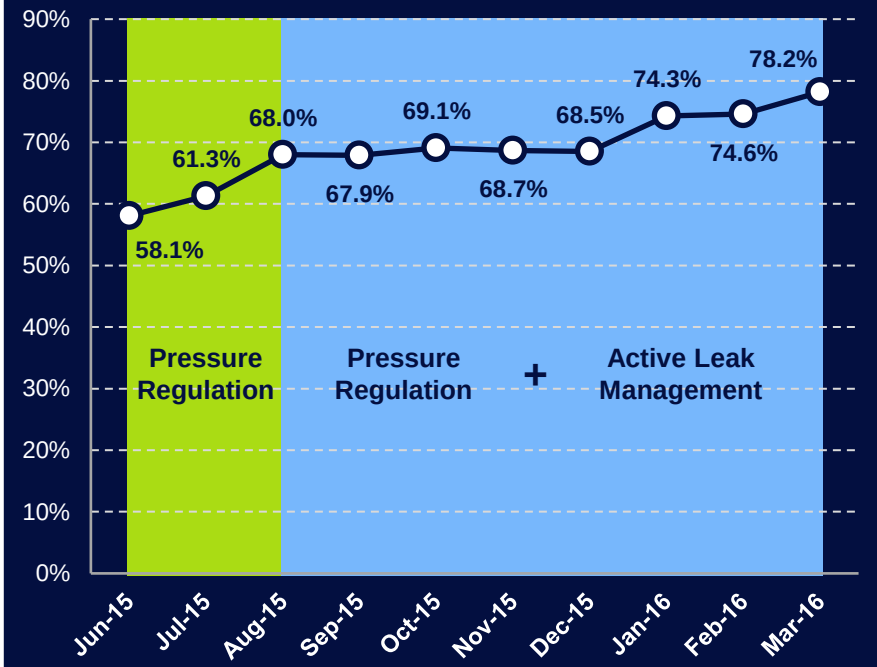
- Active Leak Management on both network zones
- 6% points in NRW reduced

Calm Network

Pressure regulation (Z2. 123 km):

- 14% points in NRW reduced
- 0.6% billing reduction for a 30% pressure reduction

Performance evolution Z2



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Master Plan

Pilot project 2. Apparent Losses

Opti Revenue

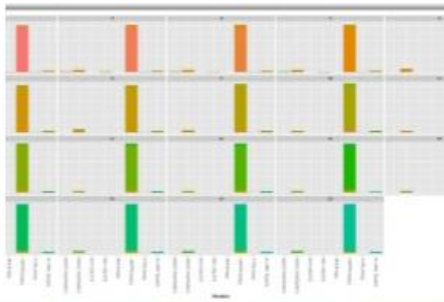
Scope: All customers in Metropolitan Area

Metering optimization:

- 400 consumption pattern analyzed
- 1,500 meters analyzed for Meter Audit
- 1,250 meters checked
- -7.67% average metering error on domestic meters

Irregular consumption:

- Based on advanced data analytics
- 18,760 customers analyzed
- 11% of customers under suspect
- 84% of customers under suspect investigated
- 7% of customers investigated had irregular consumption
- 0.63% increment in revenues



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Master Plan

Pilot Project 3. Full NRW approach

Scope: Z3. 13km

SPOT Leaks

Active Leak Management:
- Active Leak Management (Acoustics & iDroloc)
- Network sectorization
- NRW water balance

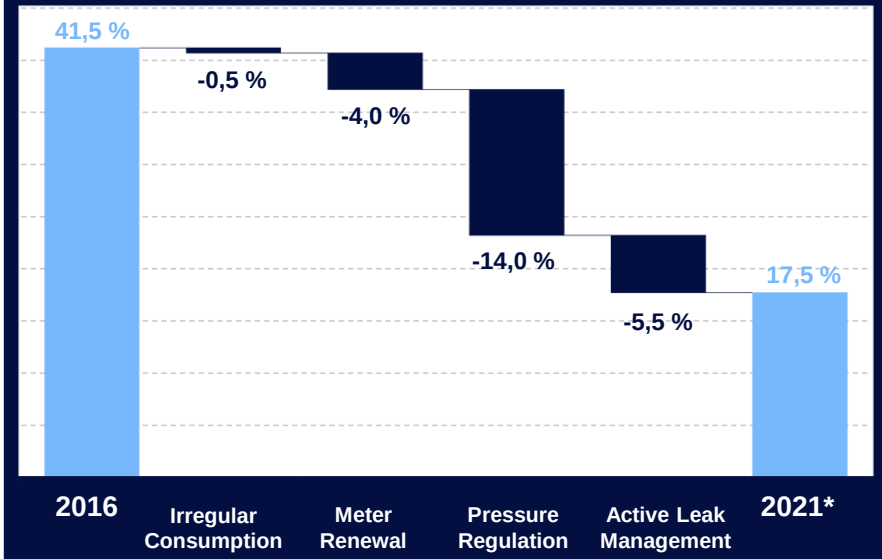
Calm Network

- Pressure regulation

Opti Revenue

- Meter optimization. Including 2 scenarios:
  - Scenario 1: According to Aguas Andinas' meter renewal policy
  - Scenario 2: Full meter renewal
- Irregular consumption
- Smart metering

Impact of actions on NRW



*Expected contribution and NRW reduction level after execution of actions proposed in the Master Plan

Santiago, Chile

Master Plan

Network Efficiency Master Plan Conclusions

Physical losses:

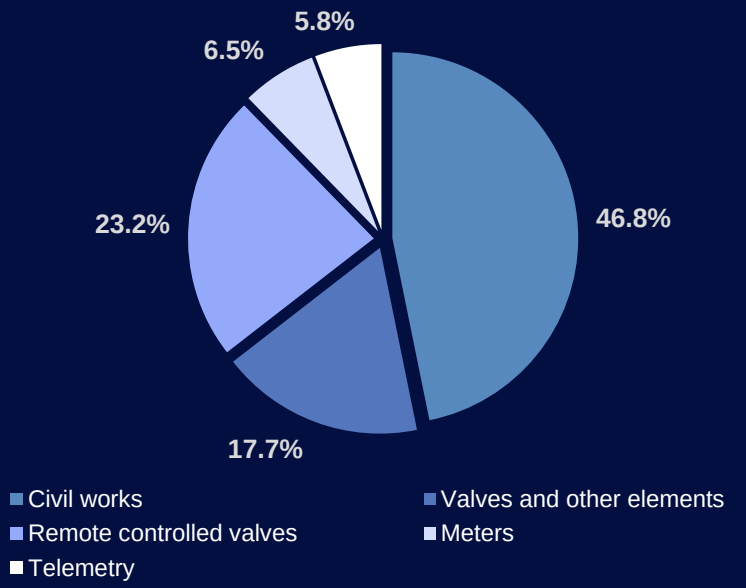
Economic Evaluation and Investment Planning

- Pressure regulation over 49% of network (649 pressure zones)
- Micro-Sectorization over 42% of network (961 micro-sectors)
- $5 M per year investment (during 5 years), payback 3 years

Apparent Losses:

- 690,511 meters renewed
- $32 M investment (in 1 year), payback 5 years
- Water recovered 11 million m³ per year

Split of Actions Planned



	Number of elements
Civil works	3.813
Valves, pipes and other elements	1.366
Controlled valves	1.752
Meters	965
Telemetry	1.315

Thank You

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