

# AGS presentation

Supporting utilities on water losses reduction  
Engineering and digital tools

João Feliciano (jfeliciano@ags.pt)

April 2023



# AGS presentation

MARUBENI 100%

## FRAMEWORK & SERVICES:

- Concessions and PPP
- Performance-based agreements
- Operation & maintenance contracts
- Engineering services provider
- IT services provider (Aquasis)

AGS has been working in the water sector for more than 30 years, focusing its goal on the preservation of the environment and acting throughout the urban water cycle.

AGS activities range from consultancy and development of specialized engineering services to the management, operation and maintenance of urban water systems and treatment facilities.

**1'800'000**  
served inhabitants

**2'800**  
km wastewater

**4'800**  
km water

**CHILE**

**350'000**  
served inhabitants

**360**  
km wastewater

**470**  
km water

**BRAZIL**

**1'200'000**  
served inhabitants

**3'498**  
km wastewater

**5'750**  
km water

**PORTUGAL**

**296'000**  
served inhabitants

**660**  
km water

**ROMANIA**

**9'850'000**  
served inhabitants

**6'800**  
km water

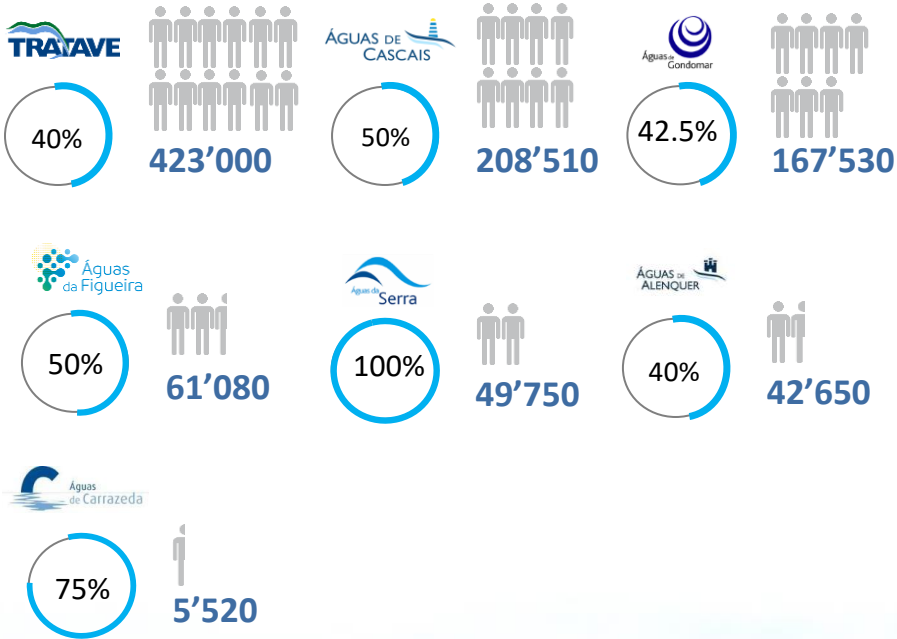
**500**  
km wastewater

**PHILIPPINES**

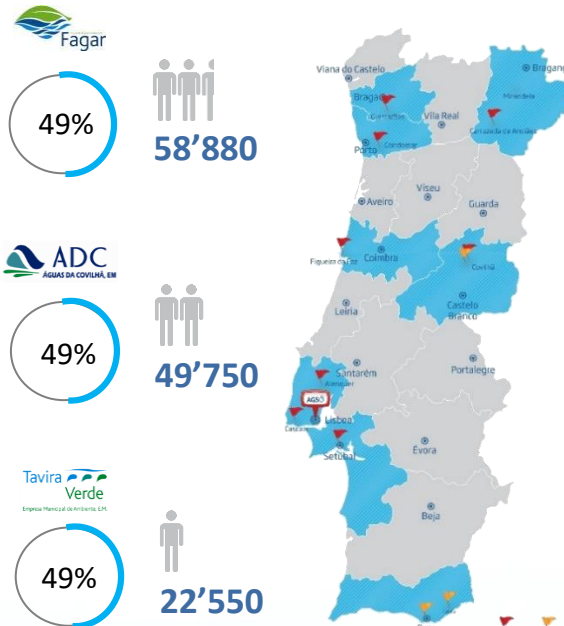
Manila (Maynilad)

# AGS companies | Water utilities

## CONCESSION (100% under private management)



## PPP (JV with municipalities)



## BRAZIL (50% SGA)



X'XXX – population served

# How AGS has been supporting utilities?

## OPERATION & MAINTENANCE

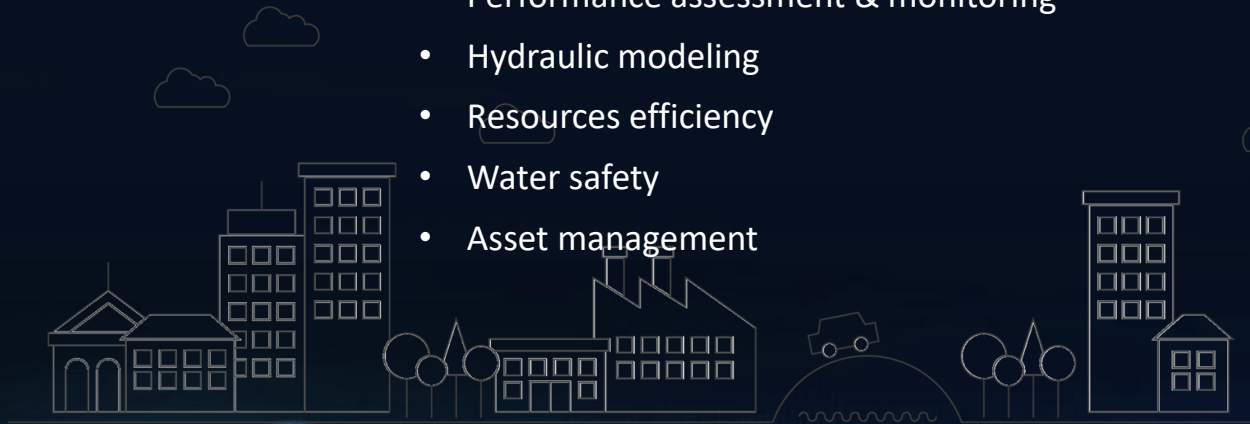
- Operation of systems and facilities
- Maintenance management
- Quality control

## ENGINEERING & CONSULTANCY

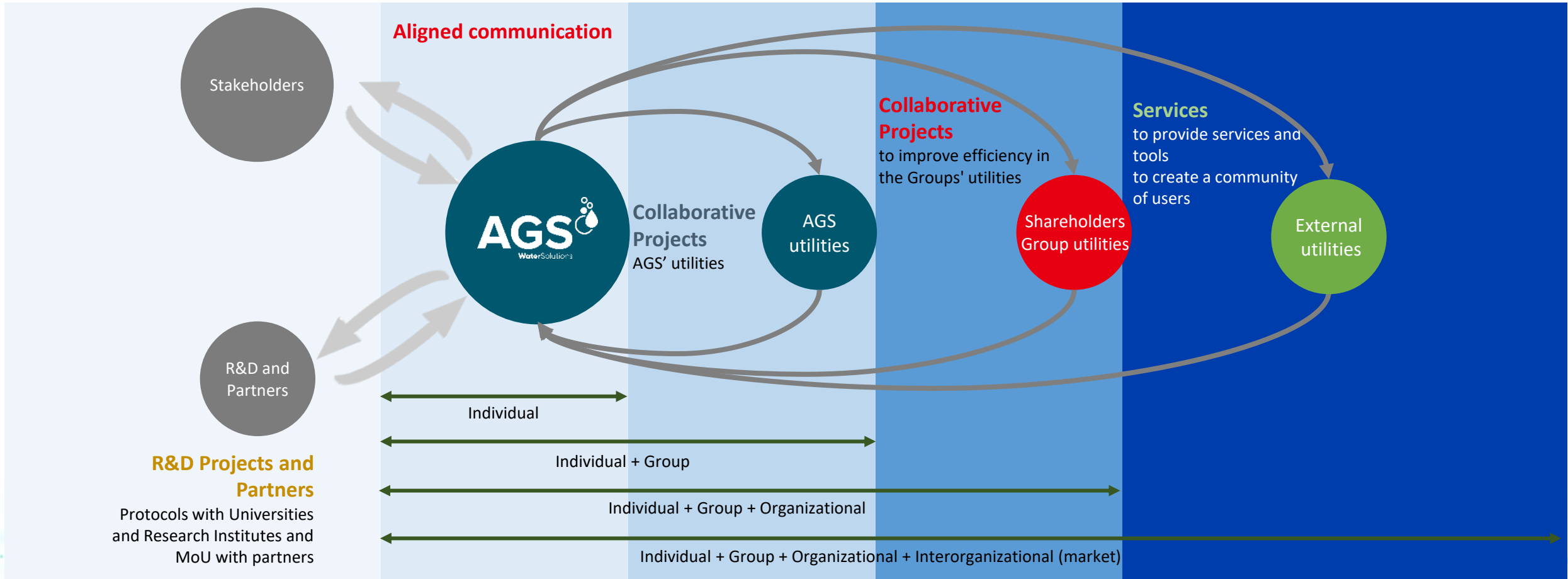
- Non-revenue water reduction
- Inflow and infiltration reduction
- Energy efficiency
- Performance assessment & monitoring
- Hydraulic modeling
- Resources efficiency
- Water safety
- Asset management

## KNOWLEDGE TRANSFER & TRAINING

- Operation & maintenance
- Water losses
- Inflow and infiltration
- Energy efficiency
- Hydraulic modeling
- Asset management



# Boosting utilities' performance



# Technological solutions

## Engineering, Digitalization & Innovation

 **G/Interaqua.**  
GIS solution for water and wastewater systems

 **aquaman.**  
Enterprise asset & facilities maintenance

 **aquaworks.**  
Work orders & operational management

Knowing the systems

Operating the systems

Efficiency and effectiveness  
improvement

Resilience and sustainability of  
services

 **flowise.**  
Real-time monitoring of water and wastewater systems

 **meterwise.**  
Customer meters management

 **infrawise.**  
Optimized rehabilitation investments

# Engineering services/tools

## Developed projects & tools

PORTUGAL

SPAIN

CHILE

ROMANIA

BRAZIL

JAPAN

PHILIPPINES

EAST TIMOR

ANGOLA

SÃO TOMÉ E PRINCIPE

GUINEA-BISSAU

MOZAMBIQUE

16

NON-REVENUE  
WATER



15 Utilities

10 000 km of network



60 Utilities

60 000 km of  
network

6

WATER SAFETY  
PLAN



7 Utilities

500 000 customer meters



12 Utilities

500 000 assets/equipment

6

INFLOW &  
INFILTRATION



18 Utilities

using Infracore  
methodology



22 Utilities

1 900 operational routines

14

INFRASTRUCTURE ASSET  
MANAGEMENT

# SUCCESSFUL PROJECTS ON NRW

a few examples...





# Methodology applied

## Reporting

- Inception report
- Daily reports
- Quarterly reports
- Base year report
- Annual reports

## Monitoring

- Results analysis
- Technical support
- Activities control

## Implementation Action Plan

- Hydraulic modelling
- Measuring equipment
- Pressure management
- DMAs & active leakage control
- Maintenance & quality of repairs
- Combatting commercial losses
- Other activities



## Analysis

- Assessment
- Current practices
- Risks analysis
- Mitigation measures
- Work & staff



## NRW concept & strategy

- Vision
- Mission
- Objectives, criteria & targets
- Activities planning (short-term, medium-term and long-term)



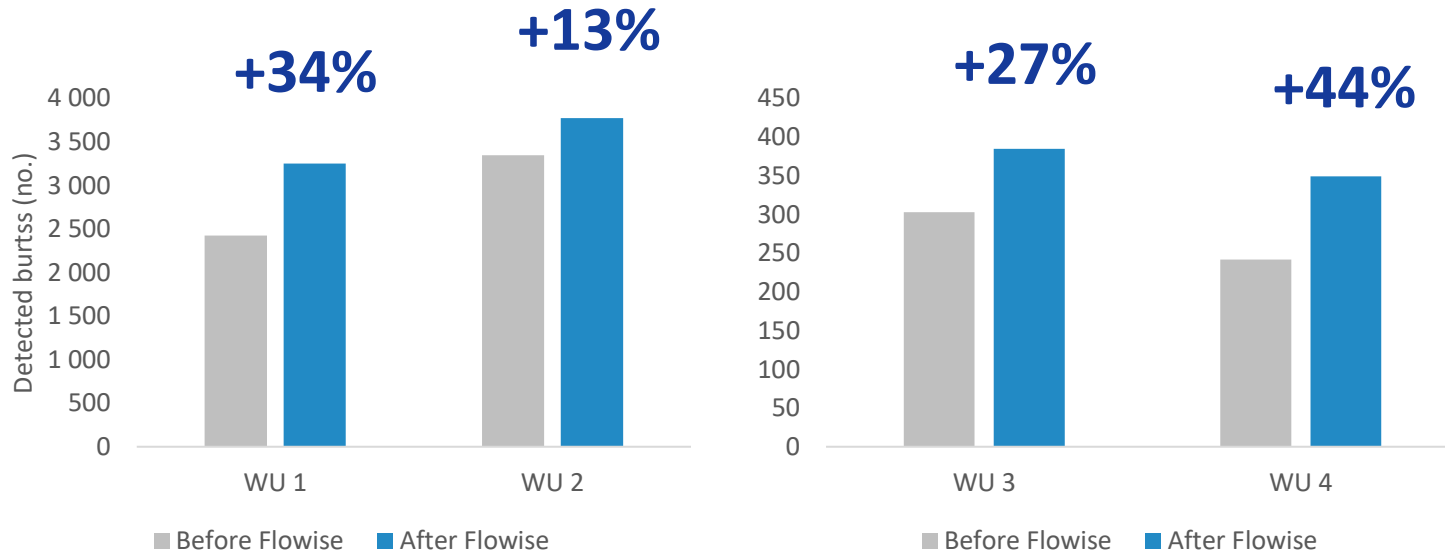
## Procedures & specifications

- Data collection
- KPI methodology
- Equipment description and specifications
- Best practices

**Action Plan working areas:** network sectorization | active leakage detection | pressure management | repair procedures | hydraulic modelling | illegal connections detection | meters inaccuracies and replacement program | real-time monitoring | performance monitoring | asset management

# Boosting real losses reduction

Burst detection increase with Flowise software



Water utilities increase 13% to 44% bursts' detection



Country	Water utility	Network length (km)	Customers (no.)
Chile	WU 1	1 200 km	166 500
	WU 2	2 200 km	240 000
Portugal	WU 3	1 400 km	117 000
	WU 4	690 km	23 000



# Boosting real losses reduction

## Bursts' repair time reduction with Flowise

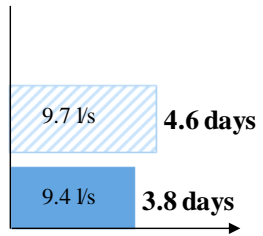


Water utilities reduce more than 50% the time of repair in small bursts

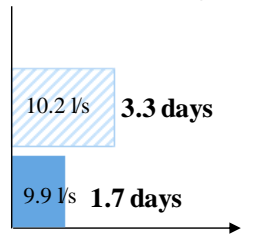
Case study presented in IWA congress:

Medium burst

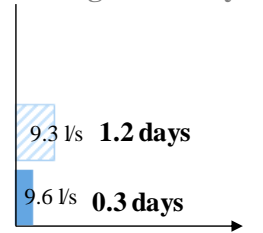
Overseas utility A



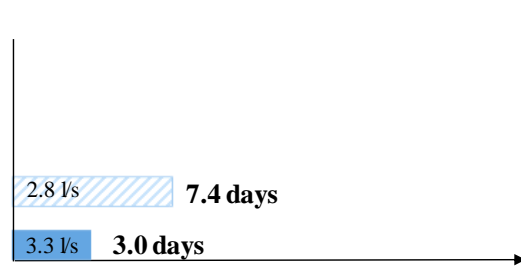
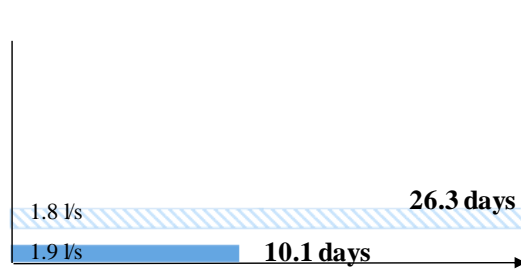
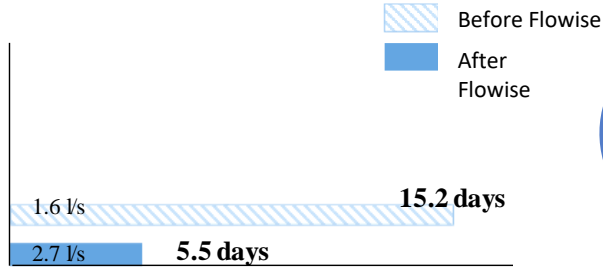
Overseas utility B



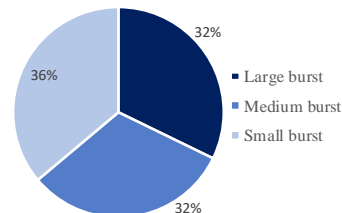
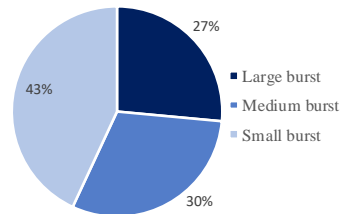
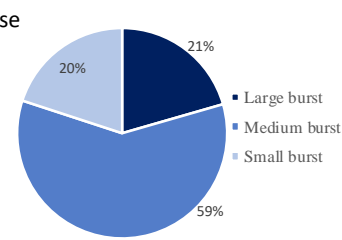
Portuguese utility C



Small burst



Water losses volume distribution (2017)



**Boosting network efficiency through real-time monitoring**  
 A. Santos\*, M. Soares\*\*, P. Ramalho\*\*, A. Ganhão\*\*, E. Almeida\*\*, J. Feliciano\*\*  
 \*AGS - Administração e Gestão de Sistemas de Saneamento, S.A., Lagos Park, Edifício 6, piso 0-A, 2740-214 Póvoa do Varzim, Portugal, santos@ags.pt  
 \*\*AGS - Administração e Gestão de Sistemas de Saneamento, S.A., Lagos Park, Edifício 6, piso 0-A, 2740-214 Póvoa do Varzim, Portugal, msoares@ags.pt, ramalho@ags.pt, aganhao@ags.pt, rafaela@ags.pt, jfeliciano@ags.pt  
**Abstract:** Water systems' efficient management is nowadays one of water utilities' main goal, being non-revenue water (NRW) reduction and operational water loss control a major concern. Flow and pressure monitoring became an effective method to support network control and to understand systems and consumers' behaviour. In this context, real-time monitoring tools relevance has been increasing to support utilities operational work. This paper aims to present how the implementation of a flow and pressure real-time monitoring tool supported operational work improvements and contributed to NRW levels reduction. A case study in three utilities focusing water network events analysis and bursts characterisation will be presented. Leaky network was compared between utilities enabling the establishment of targets to reduce bursts detection and repair time and contribute to operational works optimisation. Results regarding the reduction of leaky network and its influence on water losses volume will be analysed and discussed.

Boosting network efficiency through real-time monitoring

A. Santos, P. Ramalho, A. Ganhão, J. Feliciano

IWA World Water Congress 2018



# Boosting apparent losses reduction

## Optimization of customer meters replacement based on Meterwise methodology

Economic feasibility analysis

Utility	Approach	Investment (€)	Payback period (years)
A	Traditional	1 382 478 €	1.6
	<b>Meterwise</b>	<b>988 986 €</b>	<b>1.0</b>
B	Traditional	3 414 107 €	4.1
	<b>Meterwise</b>	<b>1 236 554 €</b>	<b>1.8</b>

**Meterwise approach** based on useful life requires a **lower initial investment** and **lower payback periods**, while allowing to decrease customer metering inaccuracies volumes.

**< 2 years**  
payback period

**10-30%**  
revenue increase

**40%**  
decrease in  
commercial losses

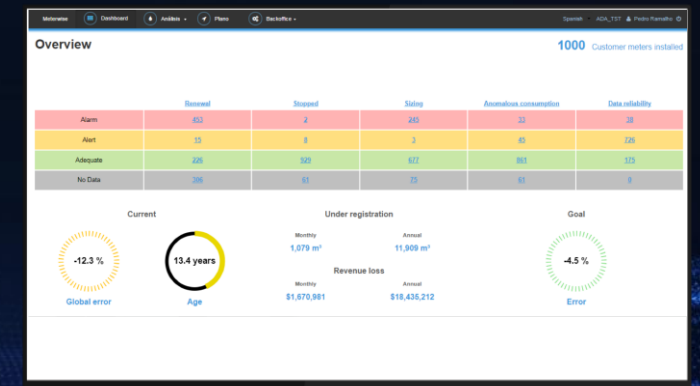


### TRADITIONAL APPROACH

Customer meters replacement practice based on the age endorsed by the national legislation or defined in the company

### METERWISE APPROACH

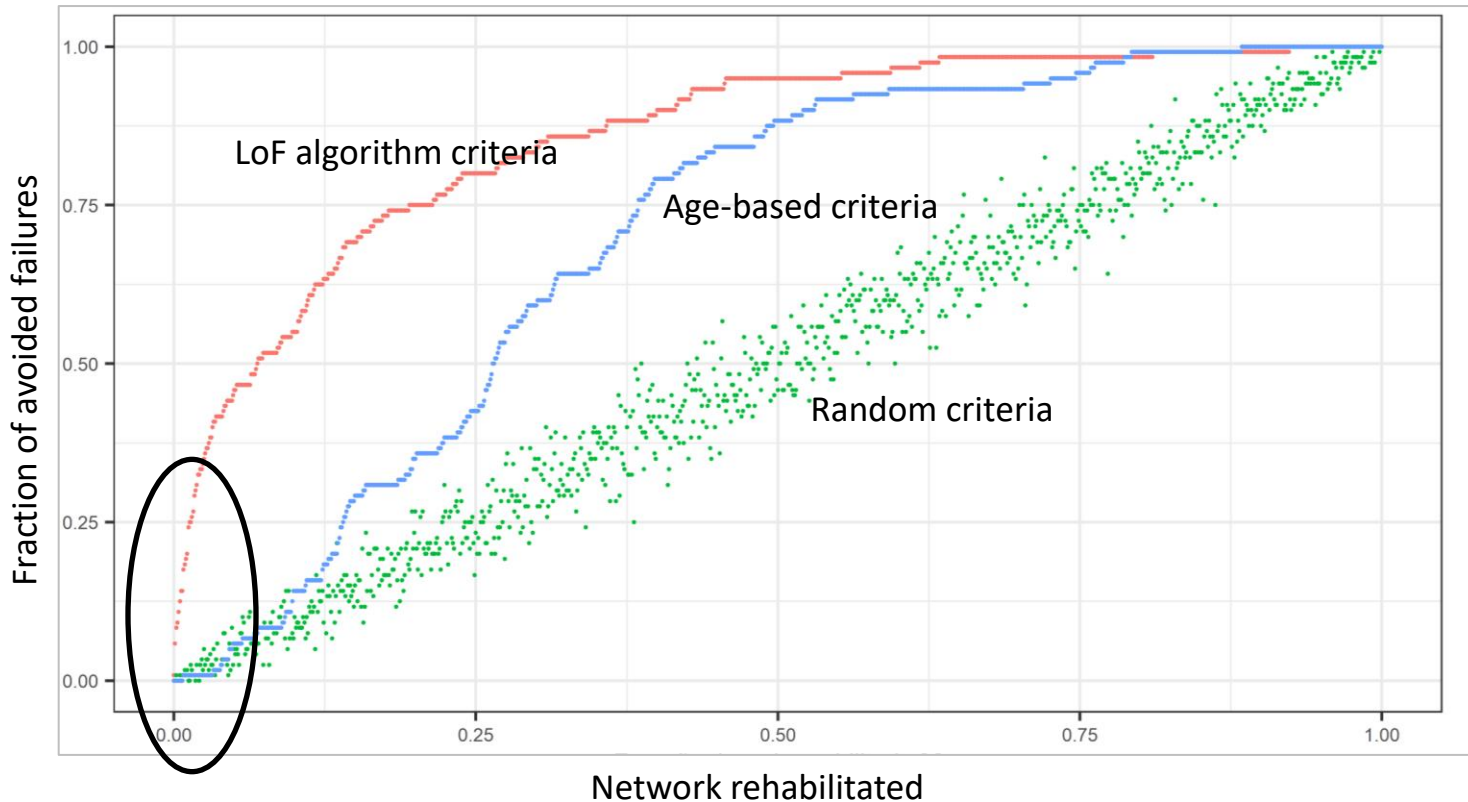
Customer meters replacement practice based on economic criteria, this is, when the cost associated with metering error exceeds the cost of purchasing and installing a new equipment



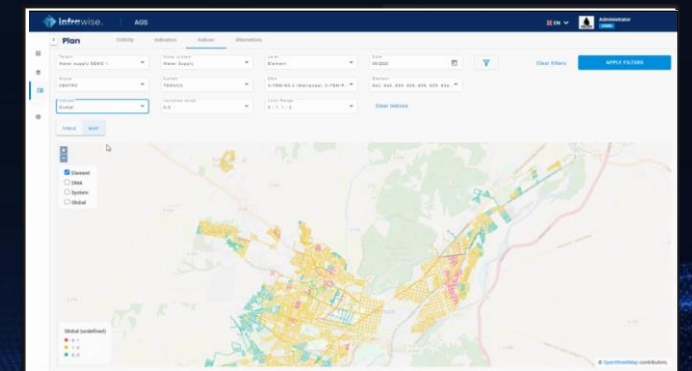
# Increasing resilience & sustainability

Rehabilitation priorities based on performance, cost and risk multi-criteria, including likelihood of failure (LoF) algorithm

Portuguese utility: specific analysis for HDPE pipes



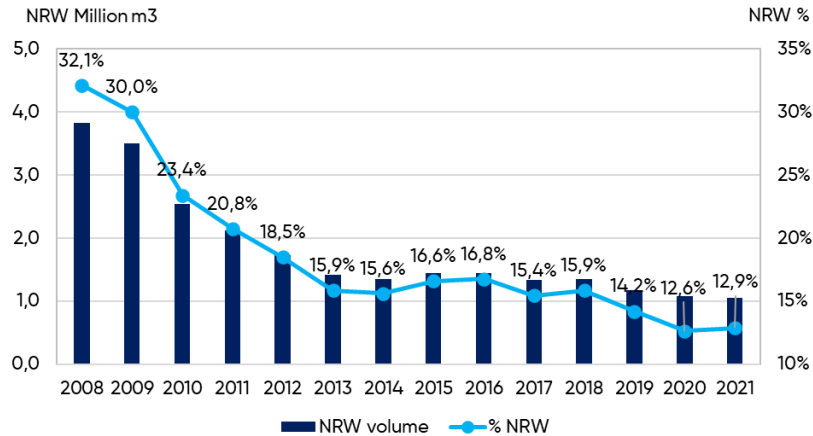
At 1-2% rehabilitation, whereas age-based and random rehabilitation can only avoid 0-2% of failures, **Infrawise model can avoid 20-30% of the failures**



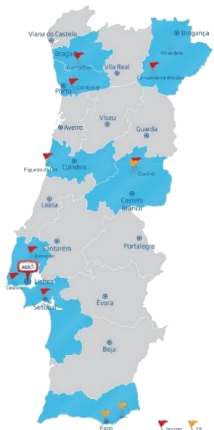
# NRW performance | AGS utilities

Results and activities developed under the technical assistance in two utilities

## Utility A



**NRW < 15%**  
Reduction of **62 million m<sup>3</sup>** on NRW



### Main figures

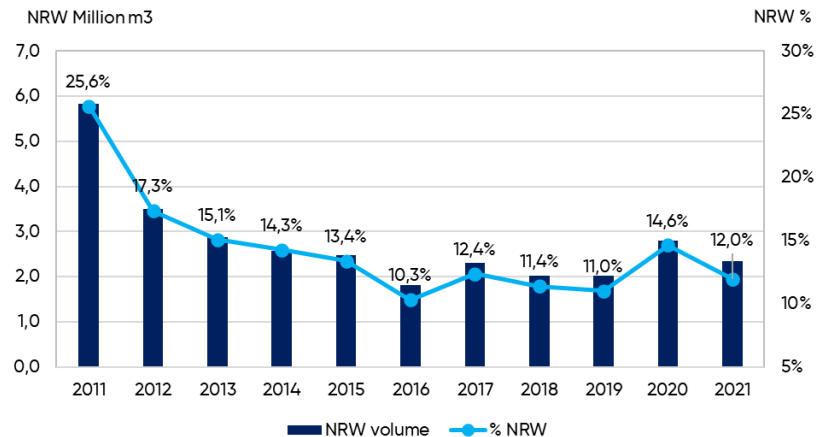
**378 415** inhabitants population served

**172 520** clients

**2 300 km** network length

**25 Mm<sup>3</sup>/year** Water consumption

## Utility B



## ACTIVITIES DEVELOPED

### Working areas:

- Network sectorization
- Real-time monitoring
- Leakage detection planning
- Pressure management
- Hydraulic modeling
- Illegal connections detection
- Performance monitoring
- Customer meters replacement plan
- Rehabilitation plan

### Outputs:

- Diagnosis report
- Intervention plan with identification of resources needs
- Action plan with operational activities and priorities for intervention
- Performance monitoring system
- Skilled teams

# Engineering services

Integrated project with **technical assistance and digital tools** to reduce non-revenue water

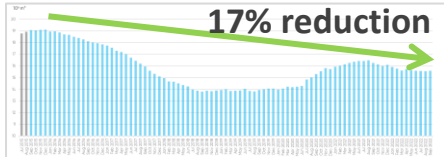
Utility A  
1 100 km of network  
500 000 inhabitants

Utility C  
860 km of network  
280 000 inhabitants

Utility B  
2 000 km of network  
940 000 inhabitants

Utility D  
625 km of network  
120 000 inhabitants

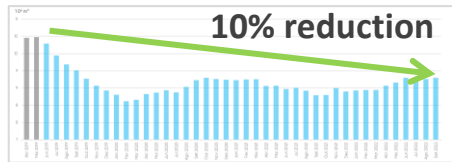
Utility A – since Sep 2015  
- 24,0 million m<sup>3</sup>



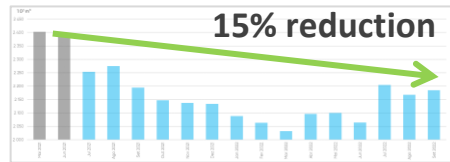
Utility B – since Sep 2015  
- 36,5 million m<sup>3</sup>



Utility C – since Jan 2019  
- 2,0 million m<sup>3</sup>



Utility D – since Jun 2021  
- 0,5 million m<sup>3</sup>



Reduction of **63 million m<sup>3</sup>** on NRW



5,200 Olympic swimming pools/year



Estimated savings of 12 MUSD/year

## REDUCE WATER LOSSES

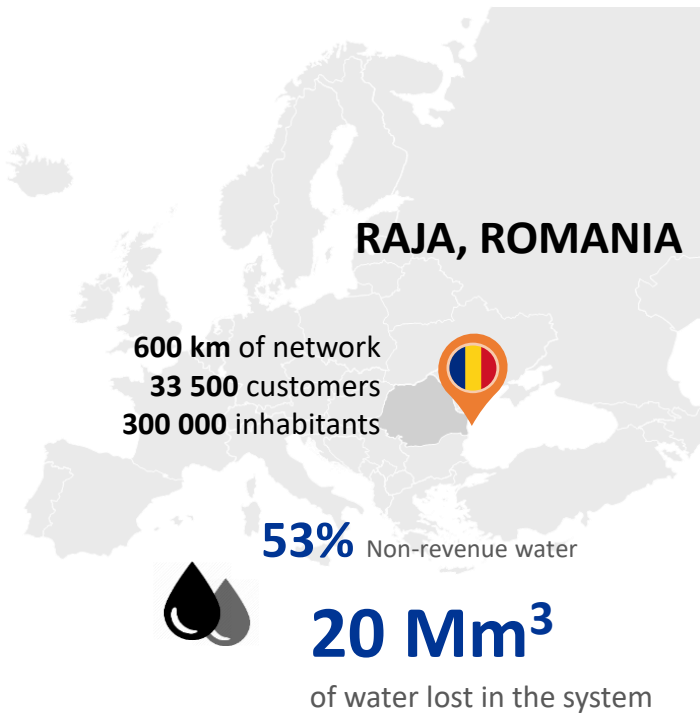
Main achievements:

- New approach to water losses control
- Improvement of network knowledge
- Increase of operational control
- Better alignment and effective teamwork
- Data and information improvement

# Performance Based Agreement



**WATER EFFICIENCY IMPROVEMENT** in the water supply system of the municipality of Constanta



Utility main goals  
5-year project

**Non-revenue water** reduction  
**Infrastructure resilience** improvement  
Reduction of **water losses** in the network

Achievements  
Project 2<sup>nd</sup> year

**34** flow meters, **76** pressure meters and **6** monitoring areas  
Development of **hydraulic model**  
Implementation of **3** AGS' software solutions  
**20** training sessions for more than **100** employees

Reduction of **1,5 Mm<sup>3</sup>** of NRW

Remuneration  
Model

Remuneration model based on a **fixed component**  
and a **variable component** depending on the  
results obtained on **4 performance indicators**





# Performance Based Agreement

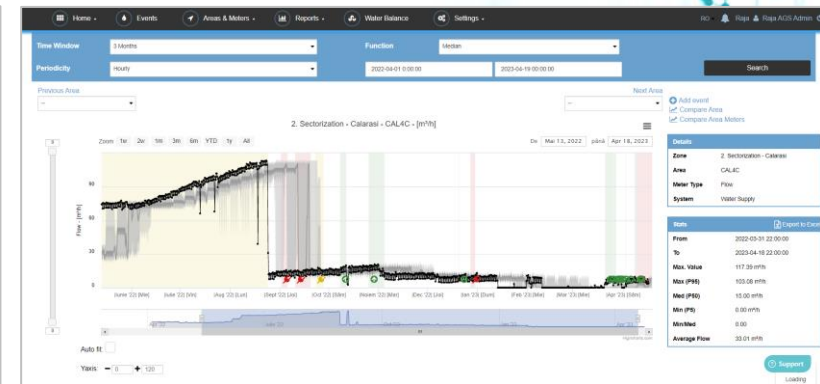
## BOOSTING LEAK DETECTION THROUGH FLOWISE



Flow reduction:  
Qmed: 76 m<sup>3</sup>/h  
Qmin: 63 m<sup>3</sup>/h



Flow reduction:  
Qmed: 11 m<sup>3</sup>/h  
Qmin: 9 m<sup>3</sup>/h



Flow reduction:  
Qmed: 81 m<sup>3</sup>/h  
Qmin: 69 m<sup>3</sup>/h

# Performance Based Agreement

## WATER EFFICIENCY IMPROVEMENT

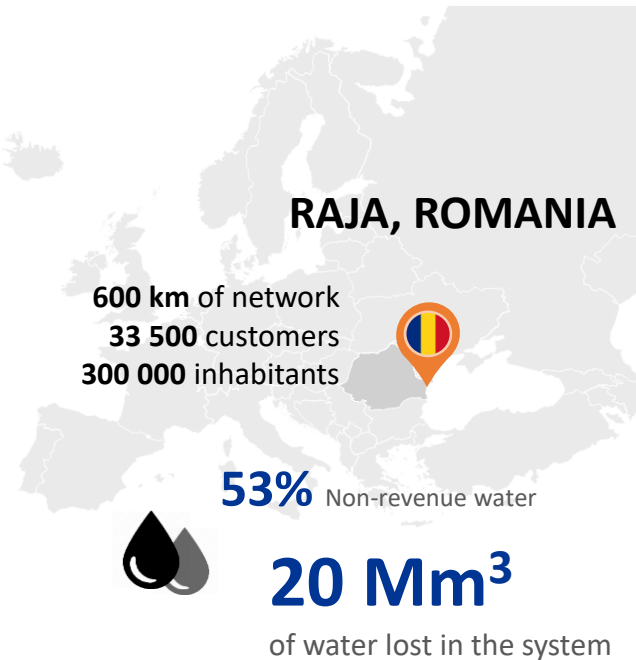
### Sharing risk and responsibilities

#### Utility responsibilities:

- Procurement process and construction works
- Coordination of operational teams

#### AGS responsibilities:

- Development of NRW strategy and identification of intervention priorities
- Definition of technical requirements to improve network and sectorization
- Improvement of operational procedures
- Installation of software support tools
- Performance evaluation and monitoring
- Teams' training



### BBC StoryWorks documentary

Project identified by *International Water Association (IWA)* to be part of the online film series *#BeneathTheSurface* produced by *BBC StoryWorks*  
<https://www.bbc.com/storyworks/beneath-the-surface/the-city-below>

## CRITICAL ASPECTS

- Quality of the project preliminary study
- Baseline definition accuracy
- Balanced sharing of savings
- KPI selection that will support project monitoring
- Capex execution constraints: investment and timely execution capabilities of the Utility
- Responsiveness of utility operational teams
- Utility maturity level must guarantee that basic tools are implemented (e.g. assets register, GIS, service orders' register, CRM and billing in place)

# RESEARCH & DEVELOPMENT



# Research & Development project partners

Partnerships with R&D institutions in areas of critical knowledge



Participation in national and international R&D projects



Collaboration with International Water Association, national and international institutes



# Participation in international events



# Awards



IWA 2014 Project Innovation Awards (PIA) – **Infrastructure asset management collaborative project in AGS Utilities**



International Mulheim Water Award 2014 – **Infrastructure asset management collaborative project in AGS Utilities**


PT Global Water Awards 2017 – Services category - **Non-revenue water project in two water utilities in Chile**




PT Global Water Awards 2021 – Services category - **Performance based agreement focused on non-revenue water project in one water utilities in Romania**

PT Global Water Awards 2021 – Research, Development and Innovation category – **Infrawise software**

PT Global Water Awards 2022 – Research, Development and Innovation category – **Flowise Corporate software**



The awards acknowledged **"an excellent contribution to structured infrastructure asset management in water companies"**



AGS was **"recognized by the accomplishments and the performance on NRW reduction in two water utilities in Chile"**

Thank you.