

5th WATER LOSS BALKANS
FORUM AND EXHIBITION

AGS's journey through
the implementation of a
Performance Based
Agreement in Romania to
reduce non-revenue
water



31.08.2023



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2. Setting the path for water losses reduction
3. Tackling real losses
4. Tackling apparent losses
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AGS presentation

MARUBENI 100%

AGS has been working in the water sector for more than 35 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.



FRAMEWORK & SERVICES:

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

01.

Introduction

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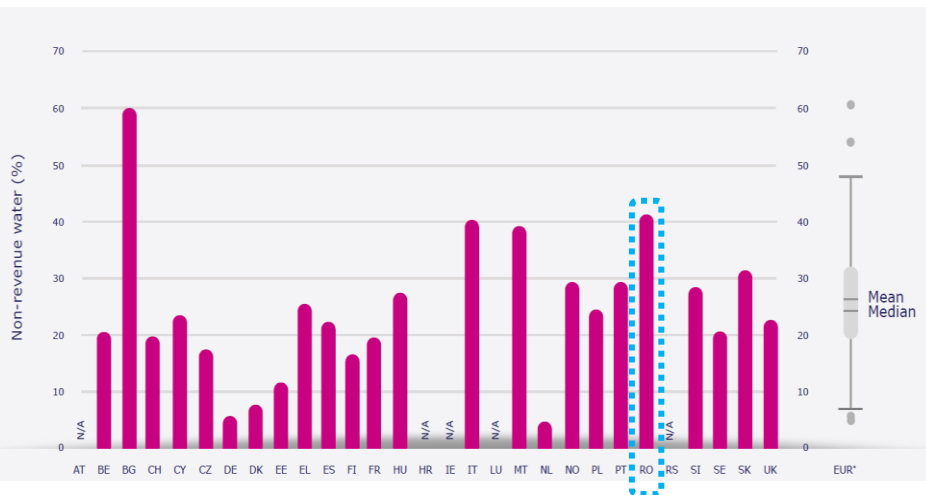
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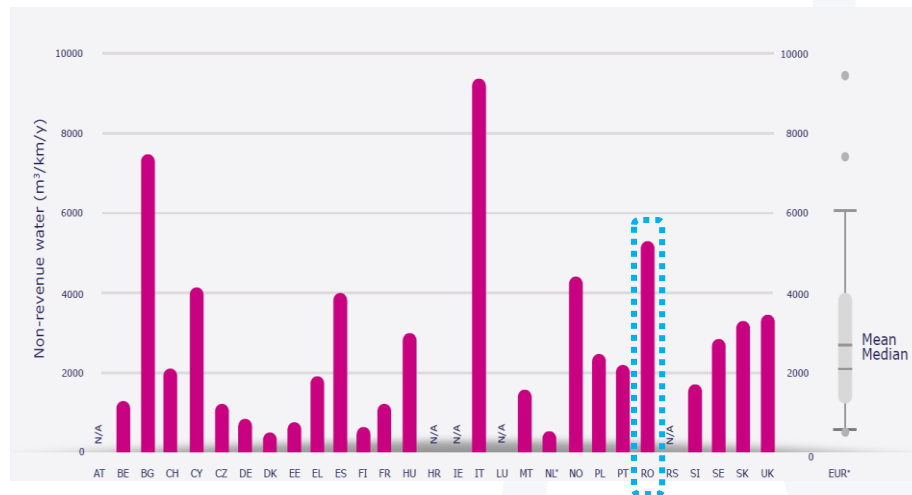
1. Introduction

An overview of NRW in some European countries...

Average NRW (%)



Average NRW (m³/km/year)



02.

Setting the path for water losses reduction



2. Setting the path for water losses reduction

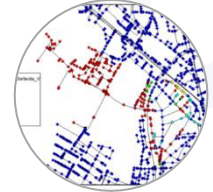
Initial challenges...



Partial measurement of water system volumes with local data collection and storage.



No District Metered Areas (DMA) implemented.



Hydraulic model in need of update and a responsible coordinator.



Flows and pressure data **recorded on paper**.



GIS in need of update: no customer georeferentiation, and outdated cadastre.

2. Setting the path for water losses reduction

Initial challenges...



Customer meter **readings collected in paper**. Partial smart metering for billing purposes.



Limited **performance assessment** and monitoring.



Work orders registration in paper. **No records** of valves manoeuvring or hydrant inspections.



Unknown **customer meter measurement errors** and low meter replacement rates.



Limited **asset management**.

2. Setting the path for water losses reduction

Performance-Based Service Contract (PBSC) for NRW reduction in the municipality of Constanța

January 2021 - January 2026

Goals:



1. Supporting RAJA to decrease NRW in Constanța municipality



2. Assisting RAJA understanding network performance



3. Helping RAJA in developing short, medium and long-term plans for NRW reduction

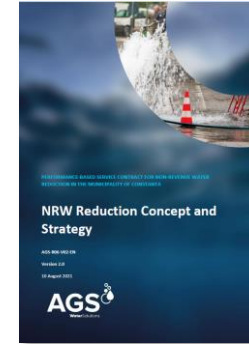


4. Providing staff training such that NRW reduction improvements can continue after the project

2. Setting the path for water losses reduction

NRW reduction strategy & action plan

- Strategy 1 | Promote the reduction of real losses
- Strategy 2 | Promote the reduction of apparent losses
- Strategy 3 | Promote the control of unbilled authorized consumption
- Strategy 4 | Increase competences on NRW management
- Strategy 5 | Improve network maintenance
- Strategy 6 | Improve data and information reliability
- Strategy 7 | Increase technological and automation level
- Strategy 8 | Promote the digitalization of water services
- Strategy 9 | Promote customers engagement



ACTIVITATE	ACTIVITATE GENERALĂ	START	FINIS	DURATA
SA1 - Căminare activități	ACTIVITATE GENERALĂ	1	4	4
SA2 - Planificarea activității	Activități generale	1	1	1
SA3 - Planificarea activității	Evaluarea performanței	20	20	1
SA4 - Implementarea activității	Activități de implementare	20	26	7
SA5 - Planificarea	Proiectare	20	19	1
SA6 - Planificarea	Planificarea	20	19	1
SA7 - Etape de activități	Etape de activități	21	24	4
SA8 - Etape de activități	Etape de activități	21	24	4
SA9 - Etape de activități	Etape de activități	21	24	4
SA10 - Etape de activități	Etape de activități	21	24	4
SA11 - Etape de activități	Etape de activități	21	24	4
SA12 - Etape de activități	Etape de activități	21	24	4
SA13 - Etape de activități	Etape de activități	21	24	4
SA14 - Etape de activități	Etape de activități	21	24	4
SA15 - Etape de activități	Etape de activități	21	24	4
SA16 - Etape de activități	Etape de activități	21	24	4
SA17 - Etape de activități	Etape de activități	21	24	4
SA18 - Etape de activități	Etape de activități	21	24	4
SA19 - Etape de activități	Etape de activități	21	24	4
SA20 - Etape de activități	Etape de activități	21	24	4
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SA30 - Etape de activități	Etape de activități	21	24	4
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SA32 - Etape de activități	Etape de activități	21	24	4
SA33 - Etape de activități	Etape de activități	21	24	4
SA34 - Etape de activități	Etape de activități	21	24	4
SA35 - Etape de activități	Etape de activități	21	24	4
SA36 - Etape de activități	Etape de activități	21	24	4
SA37 - Etape de activități	Etape de activități	21	24	4
SA38 - Etape de activități	Etape de activități	21	24	4
SA39 - Etape de activități	Etape de activități	21	24	4
SA40 - Etape de activități	Etape de activități	21	24	4
SA41 - Etape de activități	Etape de activități	21	24	4
SA42 - Etape de activități	Etape de activități	21	24	4
SA43 - Etape de activități	Etape de activități	21	24	4
SA44 - Etape de activități	Etape de activități	21	24	4
SA45 - Etape de activități	Etape de activități	21	24	4
SA46 - Etape de activități	Etape de activități	21	24	4
SA47 - Etape de activități	Etape de activități	21	24	4
SA48 - Etape de activități	Etape de activități	21	24	4
SA49 - Etape de activități	Etape de activități	21	24	4
SA50 - Etape de activități	Etape de activități	21	24	4

2. Setting the path for water losses reduction

PBSC financing

European Bank for Reconstruction and Development (EBRD)



There is also an ongoing EBRD financed rehabilitation program

Client | RAJA

Consultant | AGS

Independent Technical Auditor (ITA) | RBS Wave

Construction works | Equipment
| Civil works (chambers, etc.)



	2021				2022				2023				2024				2025			
Quarters	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Consultancy	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Construction Works - Civil works																				
RAJA works			x	x	x	x														
First Tender							x	x	x	x										
Second Tender										x	x	x								
Construction Works - Equipment																				
First Tender				x	x	x	x	x	x	x	x	x								
Second Tender											x	x	X	x	x					

03.

Tackling real losses

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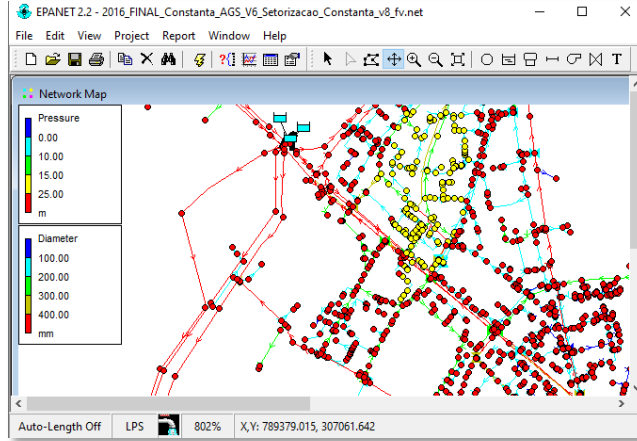
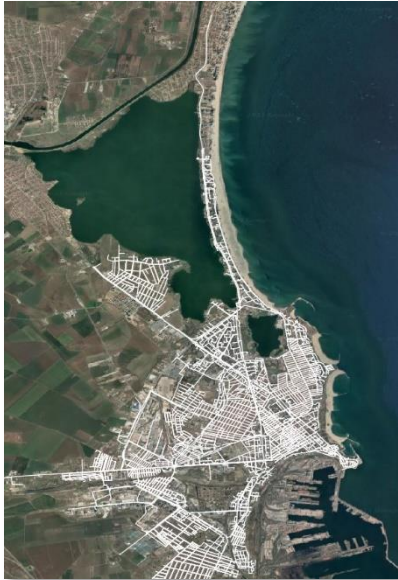
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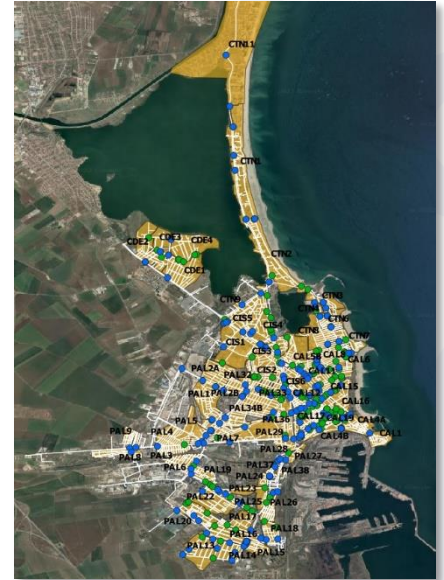


3. Tackling real losses

District Metered Areas (DMA) planning



Hydraulic modelling



3. Tackling real losses

District Metered Areas (DMA) implementation

- Several DMA are implemented with online flow and pressure monitoring
- Overall DMA implementation and monitoring:

79 DMA;

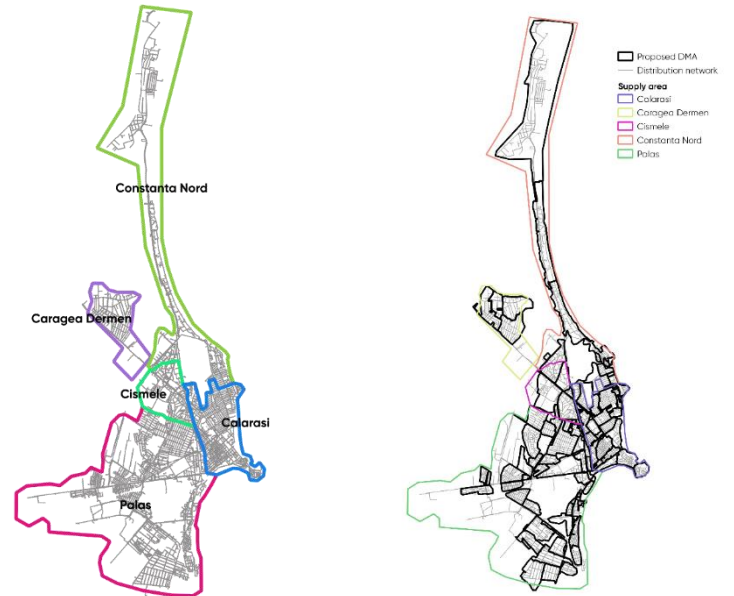
19% of the DMA are implemented;

669 km of network;

255 pressure sensors;

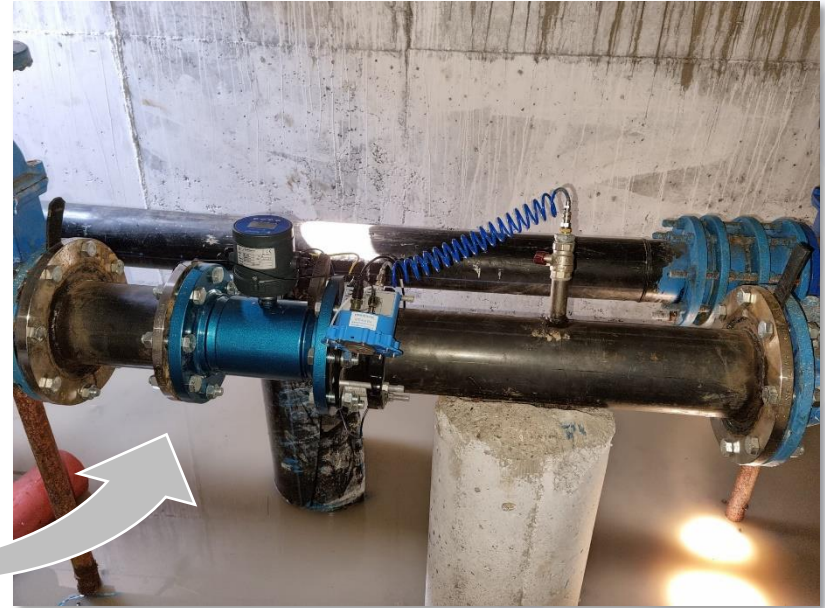
161 flow meters;

151 boundary valves.



3. Tackling real losses

District Metered Areas (DMA) implementation

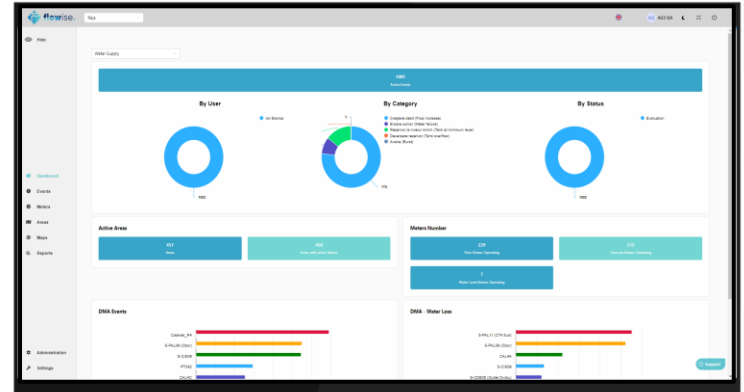


Flow metering at the entrance of the DMA and data communication (datalogger) to a central database

3. Tackling real losses

Continuous monitoring of flow and pressure 

- All **water system input and output volumes** are permanently measured with **remote data collection**.
- Flow and pressure data is **automatically analysed**, compared with historical and **alarms are generated**.
- Monitoring pressure and flows in multiple points of the network.



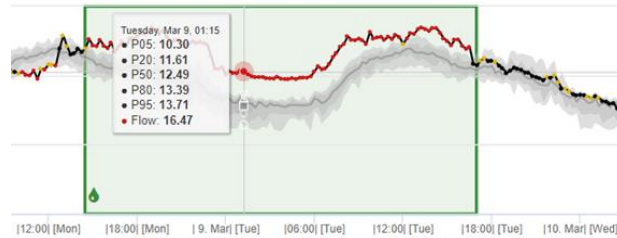
3. Tackling real losses

Continuous monitoring of flow and pressure



DATA COLLECTION

Pressure, flow, temperature, rainfall, chlorine, conductivity and other variables from SCADA or any other data bases



INTEGRATED ANALYSIS

Historical patterns created from meter readings and compared with real-time readings



Responder | Responder a Todos | Reencaminhar
to: 01-05-2018 01:19
Flowise
Event #8340 Flow Increase at 17-TD006C

Para
Se existirem problemas com a forma como esta mensagem é apresentada, clique aqui para vê-la num browser.

Event # 8340 Notification

Area	17-TD006C	Meter	-
Category	Flow Increase	Status	Open
Volume	227.47 m ³	Start Date	2018-03-01 01:12:00
Max Value	45.52 m ³ /h	End Date	-

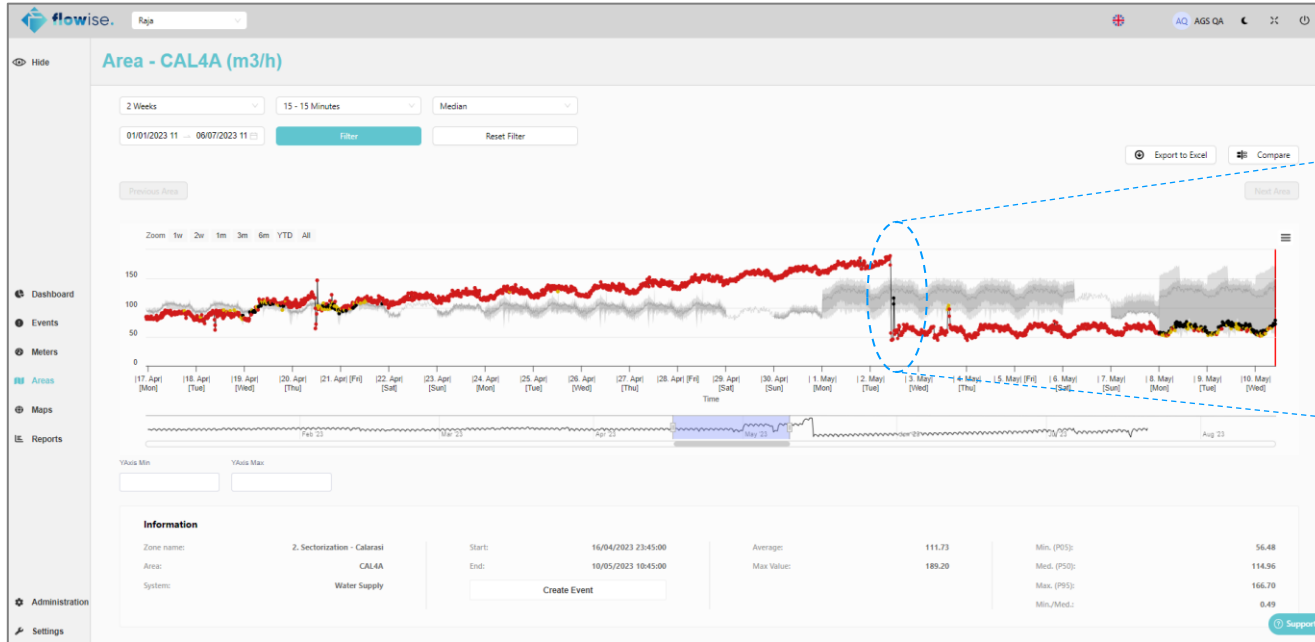
[See in browser](#)

EVENTS GENERATION

Events are automatically generated according to user defined rules and notifications are sent via app or email

3. Tackling real losses

Continuous monitoring of flow and pressure



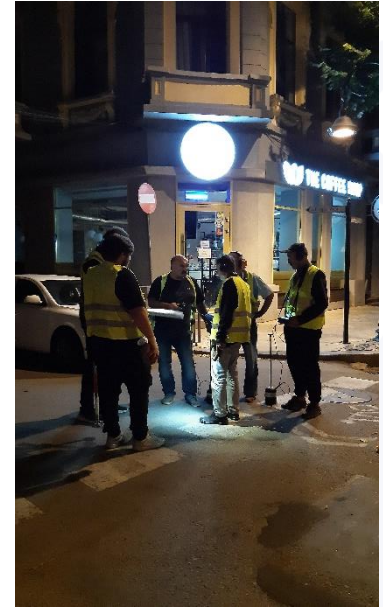
Reduction of flow from 180 m³/h to 60 m³/h

Burst in a DN100 pipe caused by corrosion and detected by the ALD team.

Software for flow and pressure monitoring – detection of anomalous events in the network

3. Tackling real losses

Active leakage detection



Development of active leakage detection as a daily activity to find invisible bursts

3. Tackling real losses

Asset management

- Relevant data for asset management is now being collected in works orders (e.g. bursts causes and consequences, repair costs, pipes condition)
- Survey on pipe's installation date to estimate pipe's useful life
- Smarter replacement of pipes and proactive asset management will be enabled by good quality of work orders data
- The quality of repairs is being improved as well as the time between detecting and repairing bursts



04.

Tackling apparent losses

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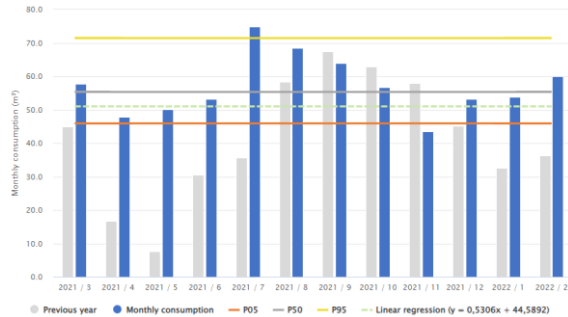
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4. Tackling apparent losses

Integrated customer meter management

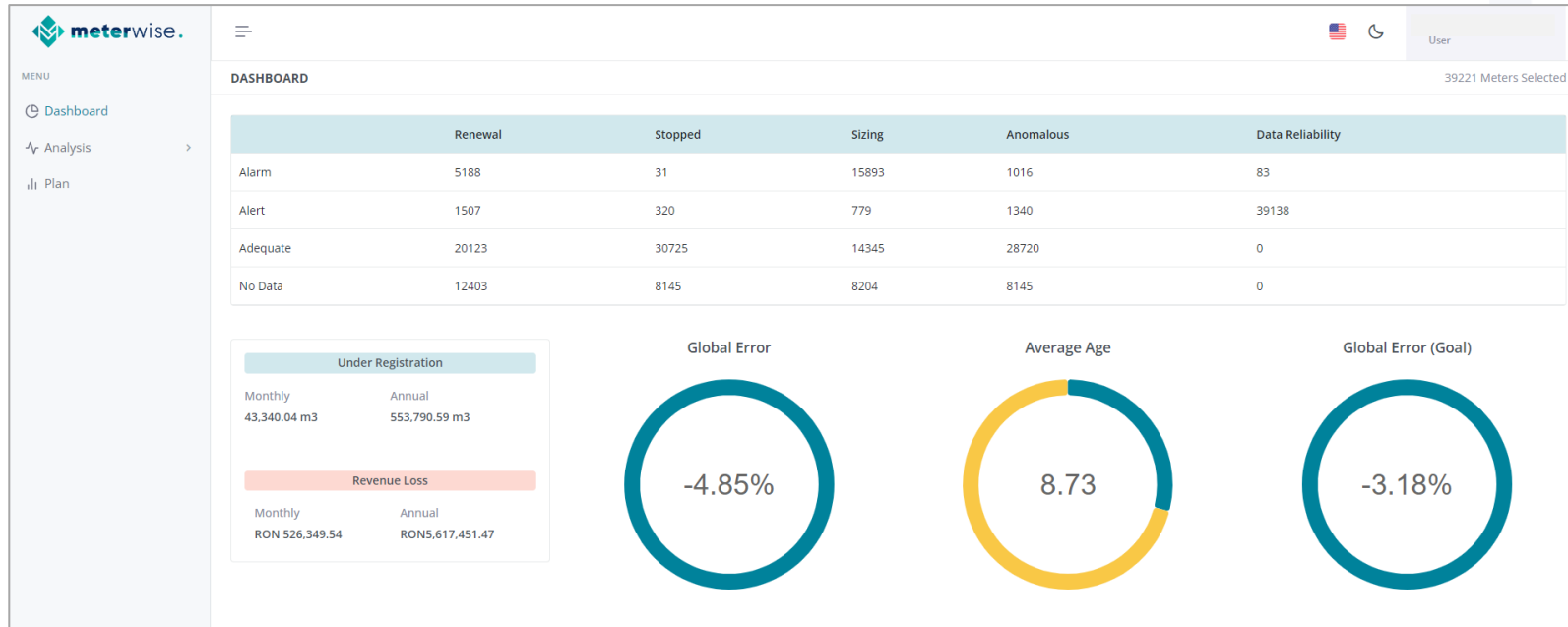


- Monitoring of customer metering errors and setting of priorities for replacement
- Lab bench tests to assess degradation rate of customer meters
- Individual assessment of customer meters' useful life



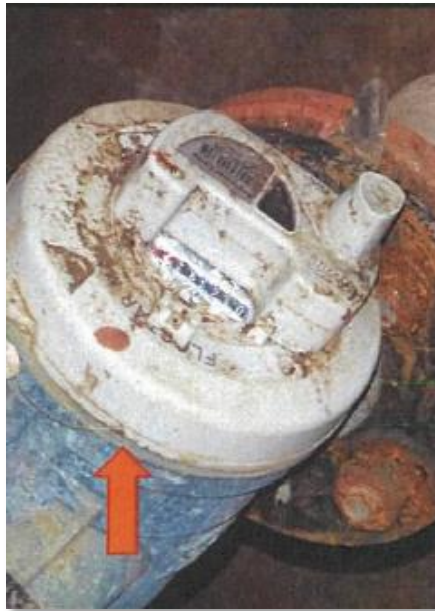
4. Tackling apparent losses

Integrated customer meter management – the software  meterwise.



4. Tackling apparent losses

Detection of frauds and illegal uses



Inspections for fraud and illegal connections detection

05.

Results so far and main benefits of the project



5. Results so far and main benefits of the project

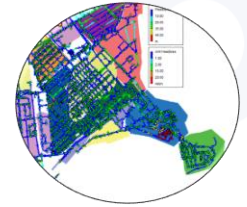
Following the path to NRW reduction...



Control of all service area
inlets and outlets
(100% measurement).
Remote monitoring of flow
and pressure



Promote the
establishment of all
DMAs



Making use of the hydraulic
model to simulate **network**
behaviour in different
scenarios



Increase efficiency of
operational activities (ALD,
customers inspections, ...)



Moving towards a **full**
updated GIS based on a
new data model

5. Results so far and main benefits of the project

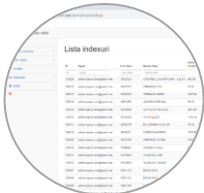
Following the path to NRW reduction...



Improved **equipment management**



Performance assessment is a **continuous activity** with clear targets and activities to achieve results.



Transition to **digital records** instead of paper format making use of software



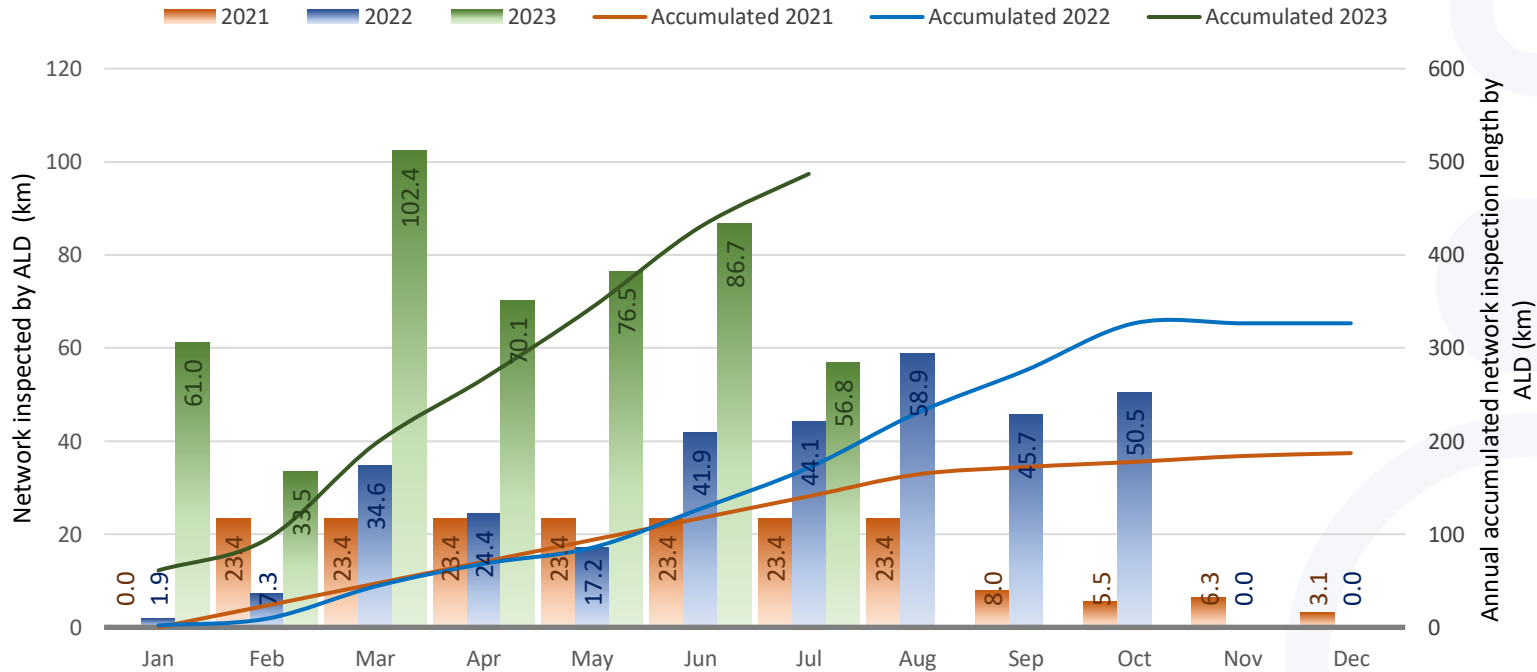
Identification of customer **meters to be replaced** based on metering error and equipment useful life



Investments are made **timely** to the assets of highest need.

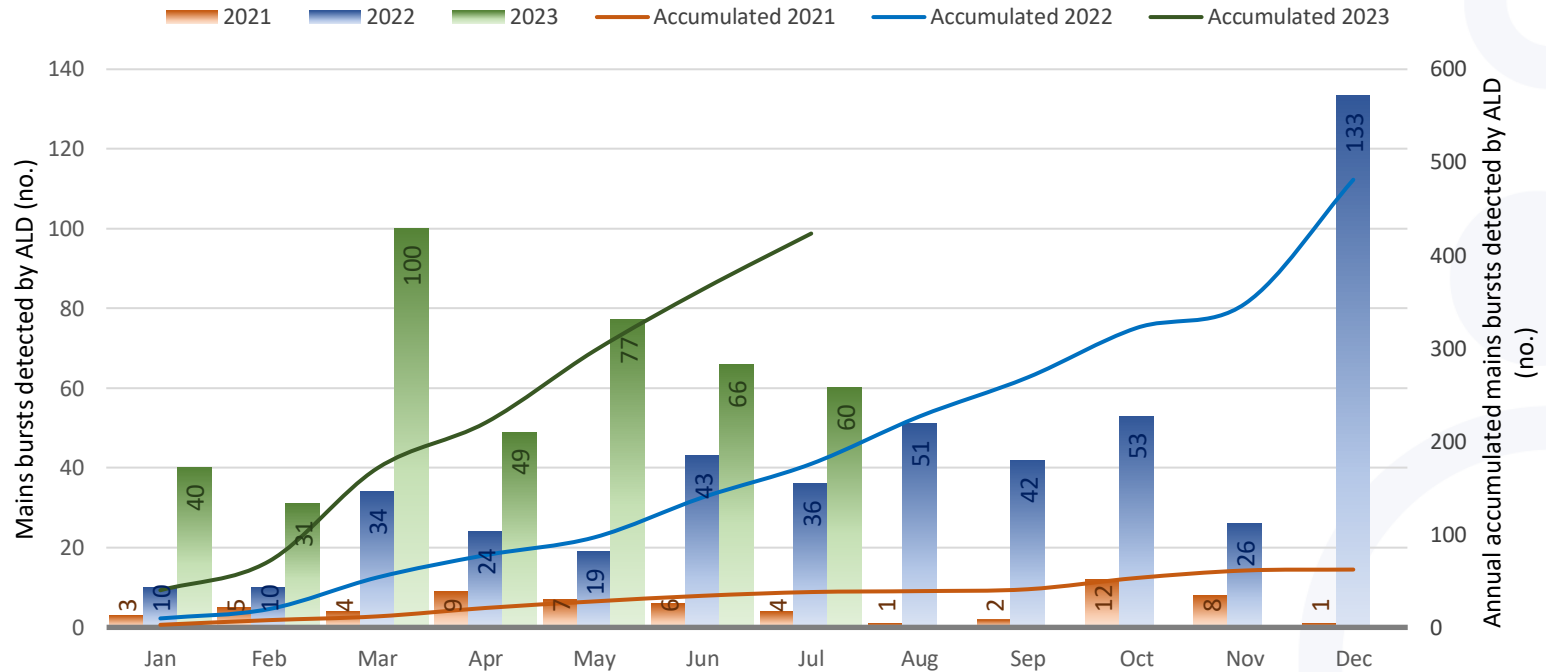
5 . Results so far and main benefits of the project

Operational results: network inspected by Active Leakage Detection teams



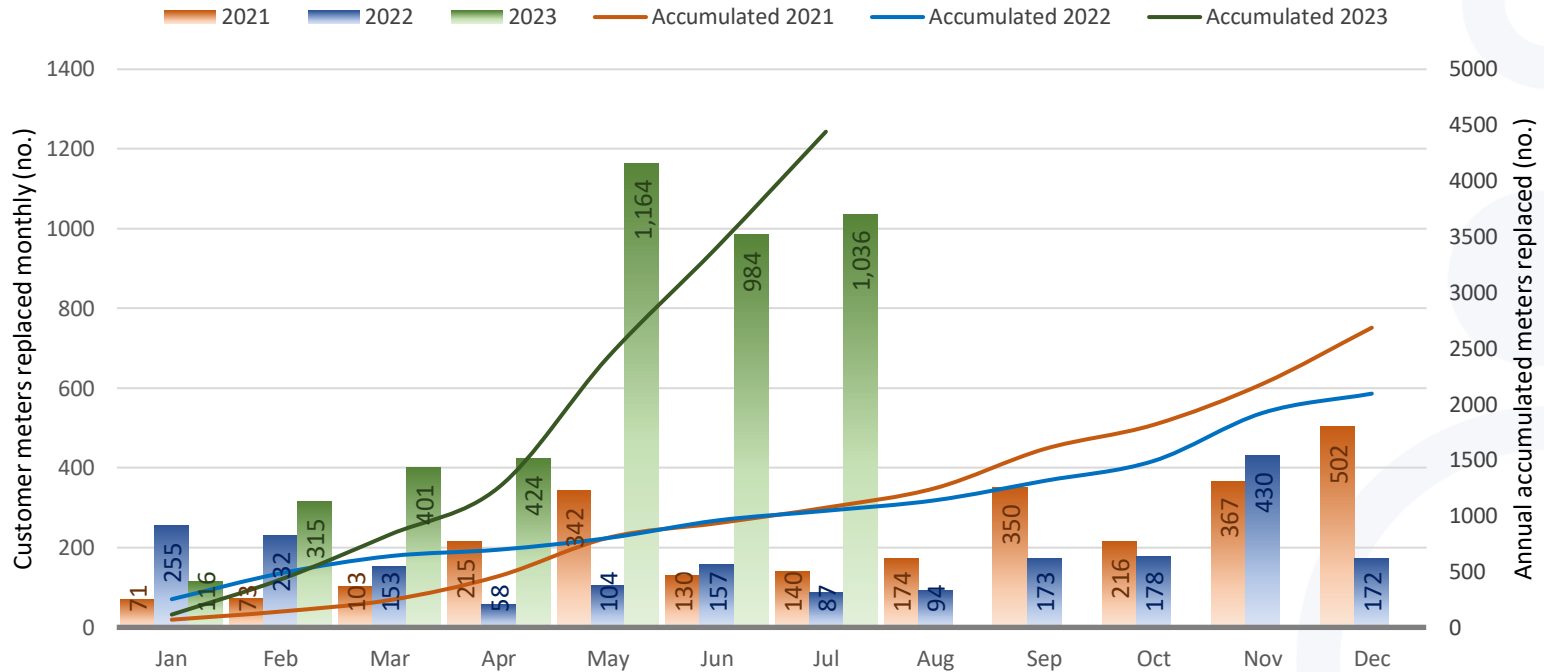
5 . Results so far and main benefits of the project

Operational results: main bursts detected by Active Leakage Detection teams



5 . Results so far and main benefits of the project

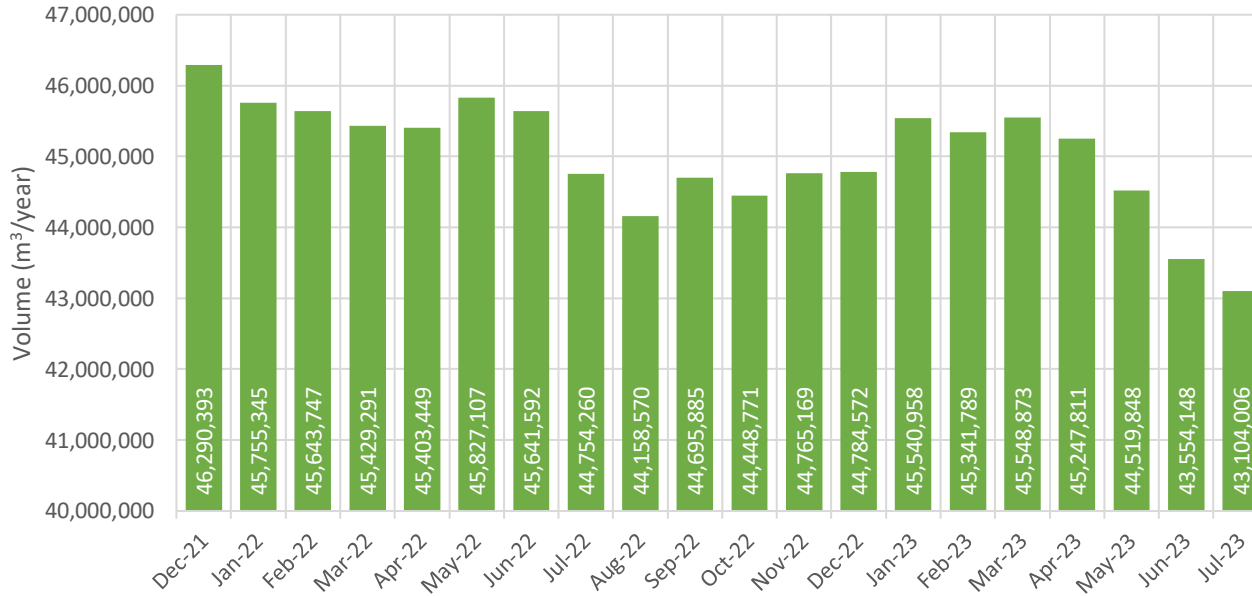
Operational results: customer meters replaced



5 . Results so far and main benefits of the project

Operational results: *service area*

NRW volume



Since December 2021, approximately **3.2 Mm³** of NRW were reduced in the service area.

5 . Results so far and main benefits of the project

More operational results

		2021	2022	2023 (so far)	Diff.	
Inspected network	km	184	326	430	134%	▲
Bursts detected in mains	No.	62	481	363	485%	▲
Bursts detected in service connections	No.	22	92	66	200%	▲
Irregular uses detected	No.	26	38	68	162%	▲
Operational people working in water loss	No.	11	15	21	91%	▲
DMA implemented	No.	2	7	15		



5. Results so far and main benefits of the project

Main benefits

- Decrease of **non-revenue water** (real losses and apparent losses) and the amount of **water abstracted** from surface and groundwater sources
- Reduced **operational costs**, including energy
- More **resilient** water system
- Use of advanced **equipment** and **software**
- Better prepared staff with higher **skills** and **competences**
- **Internal communication** and **workflows** are more effective
- Improved **customer satisfaction** with the service provided

5. Results so far and main benefits of the project

Software for monitoring and analyzing performance indicators



Acasă Rezumat Volumele de apă Comparație anuală NRW Comparați KPI KPI al proiectului Variabile de proiect Definiție KPI **Monitorizarea** Variabile de monitorizare Specificații de monitorizare Comparație lunară

AGS RAJA S.A. **Monitorizarea**

Șterge Monitorizarea KPI Global Sistem de distribuție ZMD

An 2021 2022 2023

Lună Ian Feb Mar Apr Mai Jun Jul Aug Sep Oct Nov Dec

Monitorizarea KPI

Nivelul de evaluare	KPI	Unități	Data	Apr 2023	Mai 2023	Iun 2023	Iul 2023
Global	Lungime retea inspectata	%		10.01	10.93	11.66	7.64
	Avarii pe bransamente detectate prin control activ al pierdenilor	Nr./1000 br		3.17	3.34	3.45	3.45
Sistem de distribuție	Detecția utilizanilor neregulamentare	%		5.43	11.54	-	-
	Avarii pe conducte detectate prin control activ al pierdenilor	Nr./10 km		8.90	9.73	9.47	9.79
	Timp reparatie avarii conducte	ore/avarii		3.49	3.55	3.48	3.63
ZMD	Timp reparatie avarii bransamente	ore/avarii		2.67	2.75	3.30	2.59

KPI Group

- Sustenabilitatea infrastructurii
- Funcționarea rețelei
- Utilizarea resurselor de apă
- Sustenabilitatea economică
- Lucrări operaționale**
- Resurse umane
- Calitatea serviciilor
- Investiție
- Comercial

Indicator de performanta

Selecții curente

- Language Romanian
- PERMIS_SOCS ADMIN
- NTNAME AGS-WS1WW_RJ
- year 2023
- month_ro Apr, Mai, Iun, Iul
- Selection Global
- Selection_ro Global
- Group_ro Lucrări operaționale



06.

Final remarks

6. Final remarks

Difficulties along the way...

Lack of data to support decisions;

Human resources constrains (lack of personnel, retain qualified staff, communication);

The difficulty of **timely** completing the **implementation plans**;

The ongoing cadastre updates, which are a result of **unknown buried infrastructure**;

Paper recordings make some processes more difficult and **time consuming** than what it should be;

Scattered and **incomplete databases** can lead to **wrong conclusions**.

6. Final remarks

The water sector in Romania is **rapidly developing**, aiming to become more efficient through the implementation of efficiency projects such as NRW reduction.

RAJA and AGS' PBSC in Constanta is resulting in **NRW reduction** due to the combined effort of both parties. The **operational rhythm** is **increasing**, and results can be seen every month.

There is yet a long way to go but RAJA is on the right path to becoming **increasingly efficient** on water management and NRW reduction.

Thank you.

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