



Canal de
Isabel II

Moving forward in the use of Performance Indicators in a Sectorized Network

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Responsible of Efficient Use and Management

Canal de Isabel II

Water Loss 2010 – Sao Paulo - Brazil
June 6 to 9, 2010



Canal de Isabel II and the water cycle in Madrid Region

Supplies drinking water and sewerage services

- 6.000.000 people in the region of Madrid (Spain)
- 177 municipalities
- 16.000 km Distribution network
- 14 dams (946 million m³)
- 59 groundwater fields
- 13 water treatment plants
- 44 pumping stations
- 22 Big service reservoirs
- 258 Local reservoirs
- 139 Waste water treatment plants
- 5 Water reuse plants



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Performance Indicators in a Sectorized Network

Aim of using Performance Indicators

- **Reduce Real Losses**
 - **Control Apparent losses**
 - **Increase Quality of Service**
-
- **Support for ASSESSMENT & REDUCTION of NON REGISTERED water**
 - **Support for REDUCTION of number of BURSTS in network**
 - **Support for INTERPRETING the RUNNING of the system**

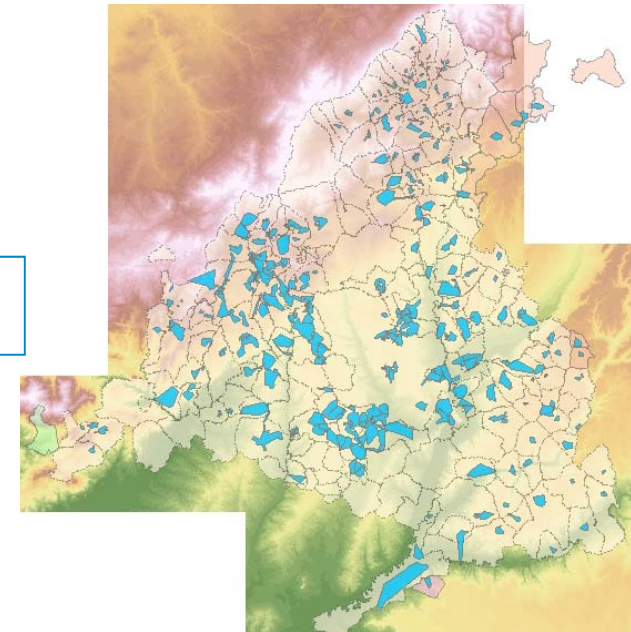
Performance Indicators in a Sectorized Network

**Active Control of Leakage
Studies and projects against Uncertainty
Performance Indicators since...**

Nowadays:

- **SECTOR = Basis for Control & Pressure Management**
- **Particularized Analysis**
- **Improve of Certainty**

REVIEW CRITERIA for proposing actions





Process for using Performance Indicators

Following:

➤ Assess Efficiency:

MONITORING ⇒ *DIAGNOSIS*

➤ Identify Weak Spots:

ANALYSE ⇒ *PROPOSE ACTIONS*

((Actions to improve efficiency))

➤ Description of Results:

EVALUATE RESULTS ⇒ *MORE APPROPRIATE ACTIONS*



Process for using Performance Indicators

DESCRIPTION of EFFICIENCY =

+ *CURRENT STATE*

Monitoring

+ *REFERENCE VALUE*

Analysing

+ *TREND VALUE*

**PROPOSE
ACTIONS**

Process for using Performance Indicators

Only possible on a Sectorized Network:

**Seasonal Values for
P.I. & Reference Values**



**Seasonal Uses & Frauds
≠
Real Losses**

Performance Indicators about Corrective Actions (Measure the Success)

- **Δ flow from ALC and Pipe Renewals**
- **Δ num. bursts & Δ Real Lossess from pipe and serv. connections renewals**
- **Δ Non_Registered water from fraud detection**



P.I. for assessment & REDUCTION of NON REGISTERED water

1. Real Losses: [m ³ /month] [m ³ /month·km] 2. Non Registered Volume: [m ³ /month] [m ³ /month·service connection] 3. Minimum Night Flow: [m ³ /s] [l/s·property] 4. Trend of Non Registered Water and Minimum Night Flow: [Δ%/month] 5. Control of state of Drains: [Number of Manoeuvring/month]	Maintenance
6. Water meters Age: [average] [% > 10 years] 7. Meter Error (individual calculation): [%] [m ³ /month] 8. Quality of water meter readings: [% m ³ estimated], [% estimated readings] 9. Irrigation surfaces: [m ² public] [m ² private] 10. Properties / Cadastral Parcels without service connection: [Number]	Commercial
11. Potential Frauds: [Num. works] [Num. new service connections] [m ² new housing development] [num. new network areas] 12. Differences Census housing <> contracted Dwellings and localized services connection: [Number]	Security



P.I. for REDUCTION of number of BURSTS in network

13. **Number of burst: [Main Burst/km-year] [Burst in S.Connec./S.Connec.·year]**
14. **Substandard pipes, and too old pipes: [% km], [% km > 30 years]**
15. **Renewal state: [% km < 3 años]**
16. **Response to renewals (reduction of burst num.): [Δ Main_Burst/renewed_km-year] [Δ Burst_S.Connec./S.Connec. in renewed-year]**
17. **Detected Leaks in active leakage control (related to network characteristics): [hidden leaks/km]**
18. **Flow of leaks detected: [m³/s·km]**
19. **Max. Pressure, Avg. Pressure and Min. Pressure in the Sector enter, and most significant values in network: [m. of water column]**
20. **Trends / changes of water pressure: [Δ m.w.c. Max] [Δ m.w.c. Min] [Δ m.w.c. Avg]**

Maintenance



P.I. for INTERPRETING the RUNNING of the system

21. Disturbs (& customer satisfaction): [Property·h disturbed / year]

Commercial

22. Water Balance: [m³/month] for every chapter

CYII co.

23. Water quality advisories and alerts: [Number/month]

24. Abrupt change in Night Flow: [Δ l/s] [Δ %]

25. Historical Low (Night Flow): [l/s]

26. Reliability of the measure in the sector entry (technology, location, size): [%]

27. Certainty in the boundaries of sectors (actions and manoeuvrings close to boundaries): [Number/month]

Maintenance



Conclusions: from P.I. to Actions

	CURRENT STATE				REFERENCE SEASONAL VALUES	PROPOSED ACTIONS	SUCCESS OF ACTIONS
AGAINST REAL LOSSES	22	1	2	3	4 13 14 15	RENEW AND REPAIR	16
		10 11			9 12	FRAUDS DETECTION	17 18
AGAINST APPARENT LOSSES		6		7 8	WATER METER RENEWAL		
					8 20 23	AWARDNESS TIME, CUTS TIME	
				19 21			
CERTAINTY (BOUNDARING, CALCULATION...)	5	26	27			REVIEWS	



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