Casablanca in figures

Casablanca:

Population: 
Around 5 M inhabitants

Network:

Network length:  
350 km of primary network  
4450 km secondary network

Customers:  
Around 250 000 connections for 960 000 meters

Volume:

Daily consumption: 450 000 to 650 000 m3/d
Storage capacity: 634 330 m3 for 29 reservoirs
Pressure zone: 11 zones from 0 to 240 m above sea level (25 to 1200 km)
Price of m3 purchased: 4,34 MAD

2011: 186 Mm3 purchased / 141 Mm3 supplied / 45 Mm3 lost
Evolution of the yield

Evolution 1998 - 2015

- Start of the first NRW Action Plan
- Increasing of the yield till 2002
- 64.10%
- 1998

- Leak detection
- Meter replacement
- Network renewal
- Results maintained and yield remain still
- 2002
- 72.50%

- Start of pressure modulation on 1000 km of network
- 2006
- 74.00%

- Hard winter conditions
- Yield collapses
- 2008
- 72.34%

- NRW Action Plan reinforced
- 2009
- 74.31%

- Start of sectorization
- Active leakage control
- Pressure modulation on 1500 km
- October 2012: 75.5%

- 2015
- 80.00%
NRW Diagnosis

CERCLE DES EAUX DISPAPARUES – Evaluation 2009

Total losses in 2009
50 Mm3

Strong actions to **reduce physical losses**

- Metering losses 5%
- Commercial losses 5%
- Physical losses 17%
- Sales 73%

Total losses in 2009
50 Mm3
Flow monitoring
Flow monitoring
Pressure Modulation

Pressure > 5 bars: Increase the risk of damaging the network

Pressure Modulation on 1500 km

Réseau AEP Casablanca
Pressure > 5 bars
Situation Heure Creuse
coef 0,35 / JMIM

Modulation 2005 – 2007
Modulation 2010
Modulation 2011
Pressure Model

Network after pressure modulation / Peak day 2008
Night Time
Zone 140: Pressure upstream /downstream

Flow before and after: - 100 L/s
Sectorisation - DMZ / DMA
Sectorisation – DMZ / DMA

Zone 2 Steps
Minimum Night Flow

Minimum night flow: 0.2 to 0.8 L/s/km

Estimated flow of leak

Read meter

Ref night flow: 0.2 to 0.8 L/s/km
Leak detection

Correlation

Mobile or permanent prelocation:

Direct listening

Helium tracking:

Purge Manomètre
Point d'injection
GIS viewer for permanent prelocation

New 01/2013
Knowledge Transfer

**Sectorisation:**
- Design of zones and areas
- Measurement: flowmeters and pressure loggers
- Flow monitoring (analysis)
- Check water tightness of zones by pressure drop test
- Valve operation for step test

**Leak Detection**
Geophone
Correlator
Prelocation
Helium tracking
The flow of water delivered to the network is monitored and followed up every day.

Each night the SCADA system calculates the minimum night flow of all the distribution zones.

The MNF$_{2012}$ was reduced by ~ 200 L/s compared with MNF$_{2009}$, despite the increase of consumption.
Water Meter Test Bench:

2010, Lydec obtains the ISO 17025 Laboratory Accreditation

Each year ~ 30000 meters are replaced following:

- Meter replacement program: age of the meter, brand, tests…
- After meter defect or dysfunction
- Specific replacement program with electro magnetic flow meter on big customer.
Suez Environnement Research Center (C.I.R.S.E.E) leads a research program on PE Pipe ageing.

LYDEC participated to this program sending samples to the CIRSEE PE Test Bench and collecting data on field.

Leaking connection diagnosis:

Assessment form:
More than 1500 filled (field feedback)

Analysis:
+ de 80% of leaks on LDPE (cracks)

Action plan:
Replace all connections (different from HDPE) at first leak
In 2010, LYDEC built a new laboratory for Pipe Assessment Condition (corrosion, ageing...)

The life expectancy of each pipe is evaluated measuring on sample:

- Thickness of the metallic pipe: $C_{\text{max}}^{\text{Inside}} + C_{\text{max}}^{\text{Outside}}$
- Environmental condition (soil, backfill...)

All the data collected and sample tested are registered in the GIS and allow to plan the pipe renewal program.
GIS: leaks report

GIS is not only a tool for asset management.

Important to report data on customers, complains, operations, repairs...

Leaks are reported in the GIS.
Very useful for:
- Leak detection
- Pipe renewal program
Commercial losses

The NRW reduction action plan related to commercial losses involves most of the directorate of the company.

All actions are followed up through a committee with indicators and benchmarking: frauds, reading, etc.

Specific actions launched on:

- Fire hydrants
- Stand pipe (spring)
- Watering meters
- Big consumers
## Action Plan 2012 – 2015:

<table>
<thead>
<tr>
<th><strong>Physical losses:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Modulation:</strong></td>
<td>+ 500 km and dynamic control</td>
</tr>
<tr>
<td><strong>Sectorisation:</strong></td>
<td>Full network with permanent monitoring (120 meter points for av. 50 zones)</td>
</tr>
<tr>
<td><strong>Leak Detection:</strong></td>
<td>Permanent prelocation (400 units) Helium, hydrophones, Sahara®, SmartBall® on feeders</td>
</tr>
</tbody>
</table>

| **Metering losses:** |  |
|----------------------|  |
| **Small meter:**     | 20 000 meter replaced / year |
| **Big meter:**       | + 100 Electro Magnetic Flowmeter |

| **Asset management:** |  |
|-----------------------|  |
| **Assessment:**       | Casablanca Water Master plan |
| **Renewal program:**  | 10500 connections / year 45 km of network / year |

| **Commercial losses:** |  |
|------------------------|  |
| **Reading and billing:** | focus on violation and defective meter to replace 10 000 meters / year |

| **Action plan management:** |  |
|----------------------------|  |
|                           | Aquacircle Forecast, Optiflux, Aquadvance |