The Costs and the Benefits of WLR in the Context of Water Efficiency

- Forum d'information, dialogue et formation
"Réduction des Pertes en Eau" (RPE)

- Plan de modération
Burkina Faso 23 Février 2011
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Co-ordinator of the UN Water-DPC Working Group on Capacity Development for Water Efficiency

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What is UN-Water?

- UN-Water is an inter-agency mechanism formally established in 2003 by the United Nations High Level Committee on Programmes.

- It consists of over two dozen members and numerous partners. No single ‘lead agency’

- UN-Water strengthens coordination and coherence among UN entities and non-UN partners dealing with issues related to all aspects of freshwater and sanitation.

- It contributes to the agenda defined by the 2000 Millennium Declaration and the World Summit on Sustainable Development.

More information: www.unwater.org
UN-Water’s support programmes

• UN-Water has identified cross-cutting activities and, to implement a coordinated response, established support programmes:

  • World Water Assessment Programme (WWAP)
    – Perugia, Italy (hosted by UNESCO)

  • UN-Water Decade Programme on Capacity Development (UNW-DPC)
    – Bonn, Germany (hosted by UNU)

  • UN-Water Decade Programme on Advocacy and Communications (UNW-DPAC)
    – Zaragoza, Spain (hosted by UN-DESA)

  • Joint Monitoring Programme on Water Supply and Sanitation (JMP)
    – Geneva, Switzerland (hosted by WHO)
Enhance the credibility, coherence, and integrated effectiveness of the capacity development activities of UN-Water to strengthen the efforts to achieve the Millennium Development Goals related to water.
Together with UN-Water members and partners, UNW-DPC organizes direct trainings and trainings of trainers, produces high-level publications, and organizes workshops to disseminate knowledge to politicians, researchers, media and educators.
Foundation of the UN Water DPC Working Group on CD in Water Efficiency
Acknowledgement

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Project No. 25094

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- Project No. ASIE/2006/129-100

Project No. 1539

The author would like to thank these institutions for supporting the work on the important issue of water loss reduction.
1. Introduction √
2. WL-Figures
3. Profitability of WLR
4. Surplus Damages through Technical Losses
5. Surplus Damages through Administrative Losses
6. PR issues (why WLR is hard to "sell")
7. Capacity Development for WLR
Water Loss Figures from Different Countries

Source: BGW 2004 u.a.

Water losses in %

- Developing Countries: up to 90% or more
- East EU: 37%
- UK: 29%
- Italy: 27%
- France: 25%
- Danmark: 9%
- Germany: <8%

Source: BGW 2004 u.a.
Times Change, and so does the (assumed) WL-Optimum!

Whereas ± 15 % WL have been assumed the economic "Optimum" during the past decades, the updated, a present "Optimum" is significantly lower (depending on local conditions)

→ because of increased costs for supplied water (production + distribution), especially power

→ because of increased regional shortages and increased vulnerability to system failures and surplus damage of WL

→ because of improved technologies for WLR (leak detection, trenchless rehabilitation, automated metering, asset management etc.)
"Reasonable" Level of Leakage

German Standard DVGW W 392

<table>
<thead>
<tr>
<th>Water loss category</th>
<th>Approximate spec. water losses $q_{VR}$ in m³/h·km</th>
<th>Rough equivalent in %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>City</td>
<td>Town</td>
</tr>
<tr>
<td>Low water losses</td>
<td>&lt; 0.10</td>
<td>&lt; 0.07$^2$</td>
</tr>
<tr>
<td>Medium water losses</td>
<td>0.10 - 0.20</td>
<td>0.07 - 0.15$^3$</td>
</tr>
<tr>
<td>High water losses</td>
<td>&gt; 0.20$^5$</td>
<td>&gt; 0.15$^4$</td>
</tr>
</tbody>
</table>

Remarks
1) Hardly achievable
2) Very good maintenance, new systems
3) Achievable with technical/operational measures
4) Maintenance not efficiently performed
5) Maintenance or/and system in poor condition, if > 30
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The Cost Hierarchy of Water Production

€/m³

easy  medium  difficult  ReUse  DeSal  AtCo

WLR < 25%  WLR < 15%  WLR < 7%  WLR < 5%  WLR < 2%

0.2  0.5  0.8  1.0  1.2

conventional technologies

AtCo: atmospheric water condensation
Water Losses and Technical Failures cause High Surplus Production Costs

<table>
<thead>
<tr>
<th></th>
<th>Theoretical CAPEX</th>
<th>Leakage rate 45 %</th>
<th>Technical failure 30 %</th>
<th>Real CAPEX</th>
<th>Real Surplus Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 €/m³  =  1 €/1 000 l</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td></td>
<td></td>
<td></td>
<td>450 l lost</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>300 l lost</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>750 l lost</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td></td>
<td></td>
<td>1.15 €/m³  =  1.15 €/1 000 l</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td></td>
<td></td>
<td>60 l lost</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>80 l lost</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>140 l lost</td>
<td></td>
</tr>
</tbody>
</table>

Real CAPEX  =  1 € per 250 l  =  4 €/m³  plus Surplus Damages !!!

Real CAPEX  =  1.15 € per 860 l  =  1.33 €/m³
General Formula for the Valuation of Supply Water

\[ P = A \times \left( \frac{20}{q} \right) \frac{\ln\left(\frac{A}{T}\right)}{\ln\left(\frac{q_{IST}}{20}\right)} \]

Valid between 30 l/C/d \( \leq q_{IST} \leq 280 \) l/C/d:

\[ P = A - \sqrt{\frac{q' \times \Delta}{q_{IST}}} \]

\( P \) = shadow price [\$/m³]
\( q \) = specific consumption [\$/m³]
\( q' = q - 20 \) [l/C/d]
\( q_{IST} \) = current specific consumption [l/C/d]
\( q'_{IST} = q_{IST} - 20 \) [l/C/d]
\( A \) = alternative water procurement cost at 20 l/C/d [\$/m³]
\( T \) = representative tariff price [\$/m³]
\( \Delta = A - T \) [\$/m³]
Industrial Water Demand Curves for Mining in the Middle Olifants, RSA

(Source: BMBF/IEEM/ZEF 2009)
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Compensation Costs of Water Supply Shortages

Customers surplus Expenses:
~ US$ 200 invest p.e.
= ca. US$ 0.5/m³

[HanNoi North, 2006]
Damages through Technical Losses

\[ \text{Accumulated Costs of Damage with Emergency-Repairs-Only strategy} \]

Renovation Jam

\[ 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \text{ year} \]

\[ \] $\]

- Normal Curve for regular rehabilitation and structural maintenance according to technical lifetime of pipe networks
- ACD Curve for ERO strategy (no structural maintenance or preventive rehabilitations); in the first years, less expenses and little damage costs; i.e. cost advantage compared to normal curve. On the long run (by latest after 10 years of operations) much higher costs for ERO than for good maintenance (normal curve)
Spectacular BURST LEAKAGE

Bursts are large, reported fairly quickly and therefore do not leak for long
Surplus Costs: Reduced Lifetime of Buildings
Surplus Costs: Accidental Damages
Surplus Costs: Surface Washout plus Accidental Damage
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Surplus Economical Damages through WL

ADMINISTRATIVE LOSSES

- excessive consumption  Soweto Washing Machine
- illegal water trafficking  Cochabamba
- unwillingness to pay / to charge  Saigon central

⇒ financial destabilisation of Water Utilities
⇒ non-sustainable water services!
Admin Losses: 1 Illegal Connection
Admin Losses: 2 Illegal Connections
Admin Losses: Many Illegal Connections
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Beautiful: Sewer Chamber Cologne
Attractive: Sewer Junction Berlin
Why WLR is not PR-attractive

• WLR activities are either invisible to the public, or disturbing.

• Today's politicians will be made responsible for costs & disturbances of WLR, whereas the benefits are for tomorrow.

• Serious "package solutions", for easy handling by the client, are not yet strong on the market.

• Lobbying powers are focused rather on large investments (desalinations, dams), than on WLR as business target.
Commercial Loans Available
The GCPF to Accomplish
Donor Grants and Soft Loans, even Replace Equity Capital

Global Climate Partnership Fund ("the Fund")
Indicative Term Sheet

Direct and indirect investments into renewable energy and energy efficiency projects

<table>
<thead>
<tr>
<th>Fund Sponsors</th>
<th>German government, KfW, EIB (likely), IFC (likely)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fund Investors</td>
<td>Deutsche Bank, private sector investors</td>
</tr>
<tr>
<td>Investment Purpose</td>
<td>Projects will receive debt or equity investments for energy efficiency and renewable energy projects with the goal of reducing greenhouse gas emissions (in the case of energy efficiency projects by at least 20%)</td>
</tr>
<tr>
<td>Geographical Scope</td>
<td>2010: Brazil, Chile, China, India, Indonesia, Mexico, Morocco, Philippines, South Africa, Tunisia, Turkey, Ukraine, Vietnam</td>
</tr>
<tr>
<td></td>
<td>2011 onwards: all countries which are eligible for investments by the World Bank Group (most emerging and developing countries)</td>
</tr>
</tbody>
</table>

Professor Rudolph GmbH International Water Consultants assigned as Technical Advisor for Deutsche Bank

⇒ mail@professor-rudolph.de
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What CEO‘s from Large Water Utilities, responsible for mio 22 customers in 4 regions worldwide, consider as **pre-condition for good utility management** in priority ranking, from lowest (5) to highest (1) [IEEM, survey IV 2009]

1. Know-How (➞ **Capacity Development**)
2. Technologies (➞ adapted, appropriate)
4. Political Support (➞ empowered decisions, execution)
5. Budget (➞ must cover necessary activities)
Different Types of Capacities Needed for WLR
Accomplishing ongoing activities (➔ GIZ, VAG, IWA...), UNW is considering to focus on economics & finance, addressing politicians, treasurers, NGOs which are influencing investment priorities and deciding about budgets.
UNW-DPC Publications on EWE, WLR
A New UNW-DPC Book for the WorldWaterDay to be presented 21 March in Capetown

CAPACITY DEVELOPMENT FOR WATER EFFICIENCY IN URBAN, AGRICULTURAL AND INDUSTRIAL SYSTEMS

Management and Operations of Water Loss Reduction
Merci!
Thank you!

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