



WaterLoss2022

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Praha • Prague



To nELL and Back

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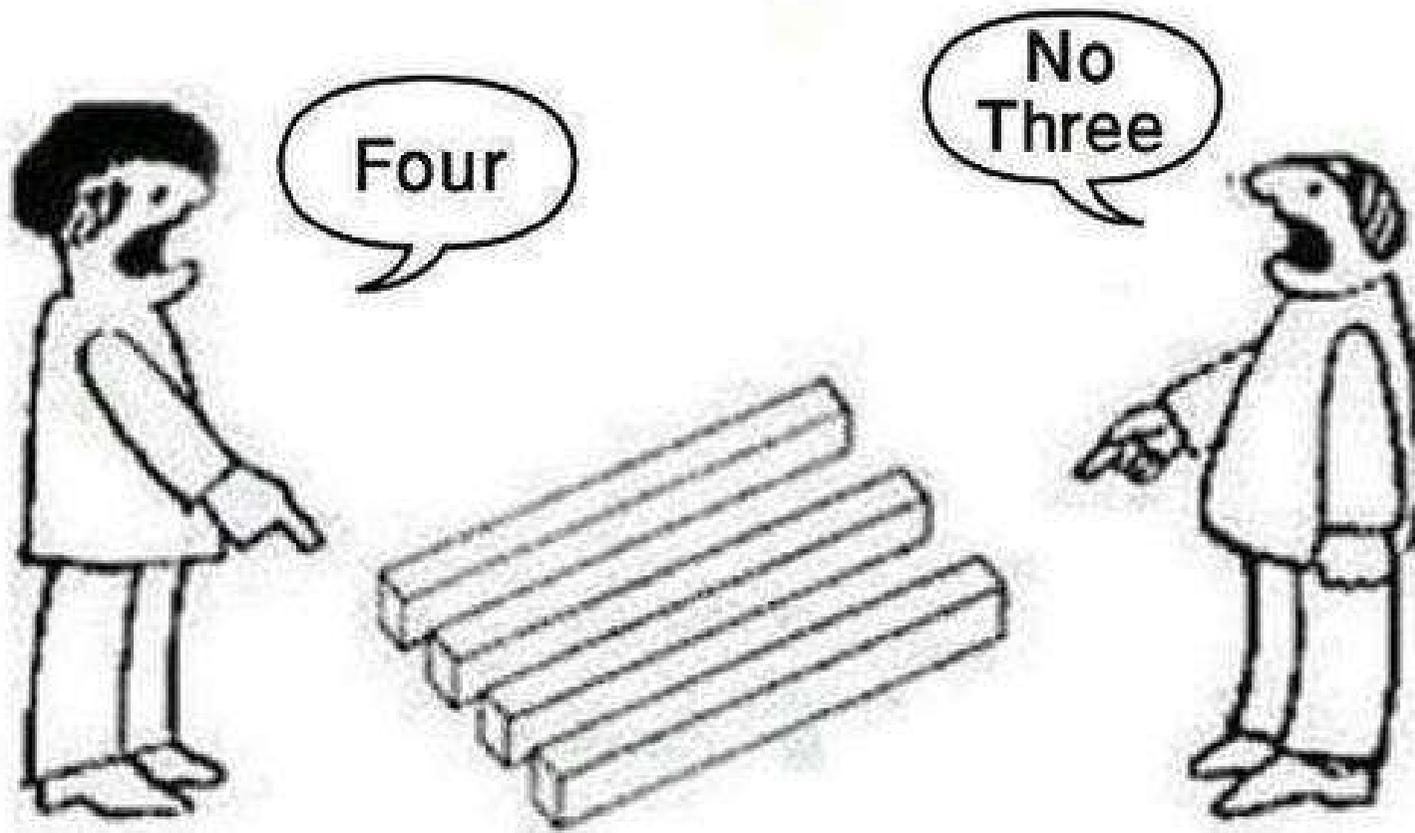
“Whether you think you can or can’t
You are usually right”. *Henry Ford*

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- If you think that you will not succeed, you won’t.
 - If you think you can , you will not let anything stand in your way.
 - Ell can be successful if applied with a vision for the future of the community benefits, and is a very professional approach
 - Ell applied for personal ambition, or an excuse of failing to manage well, will not serve communities, and will eventually be discarded as a failure.

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It is really confusing!!!

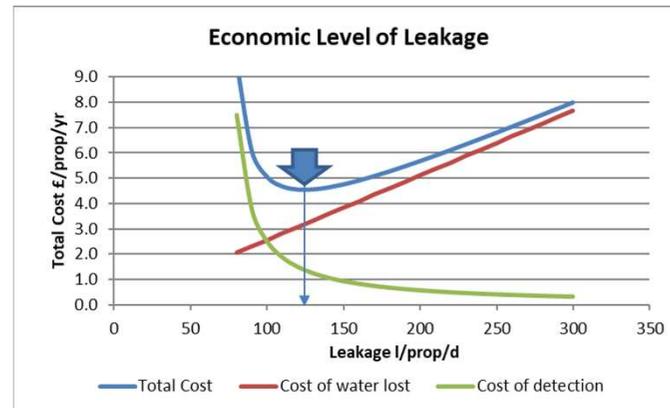


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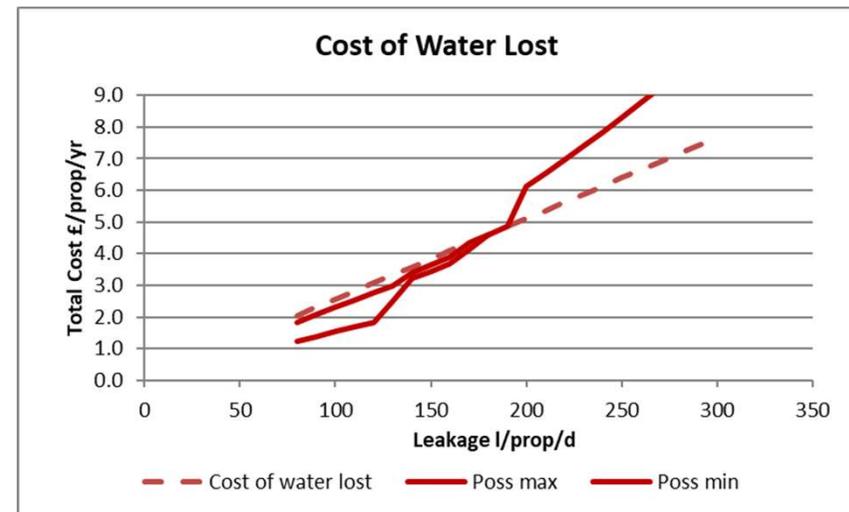
The Theory of Economic Leakage Levels

- Economic Level of Leakage: “The level of leakage where the cost of reducing leakage by one unit of water lost is equal (and opposite) to the cost of producing and distributing an additional unit of water”
- Easy!
- Or is it?



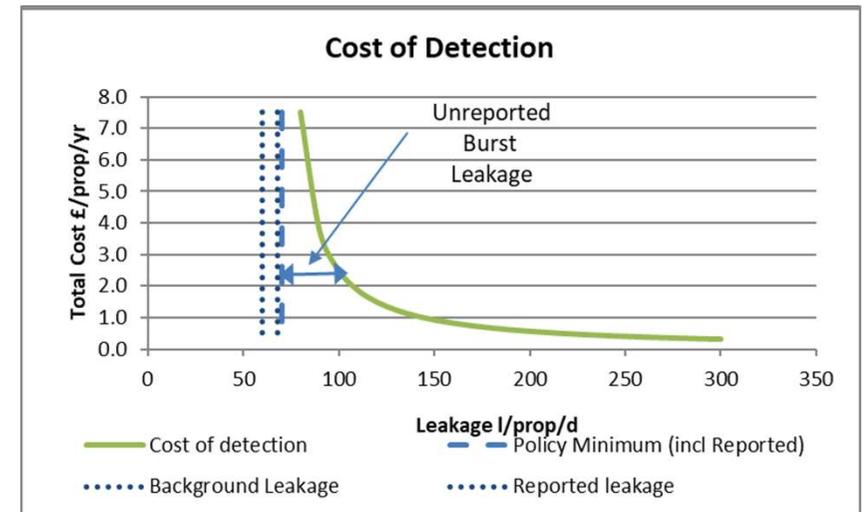
Cost of water lost

- **Total cost:**
 - Chemicals
 - Electricity at treatment works
 - Sludge disposal
 - Pumping from treatment works
 - Pumping within distribution network
- Often assumed to be linear - derived by annual cost/annual supplied
- **But often not linear – higher supply levels may mean the source utilises pumped storage from another river or lake**
- Pumping within network distribution can be very complicated with pumping to only some areas – but the potential for leakage reduction unlikely to be evenly spread
- These are only variable costs because it is considered that the study is only at the margin of current supply
- But if you are reducing leakage significantly you should consider fixed costs such as men or even shutting a water resource and associated treatment works down entirely



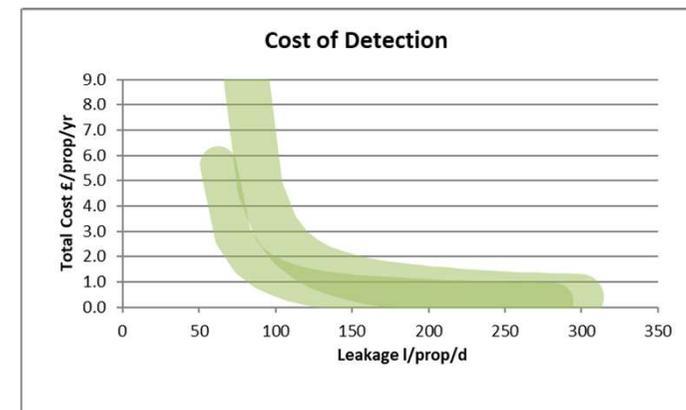
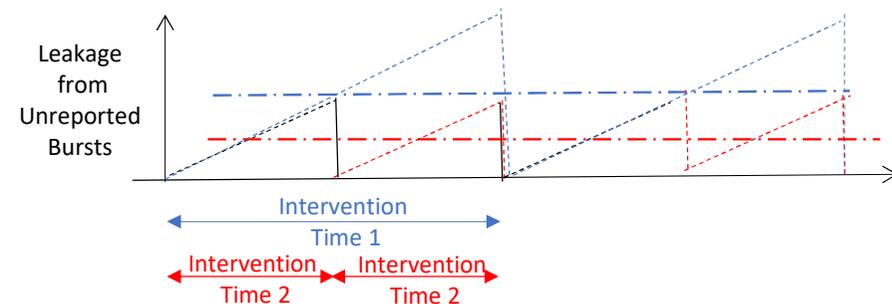
Cost of leak detection

- The Active Leakage Control (ALC) curve does not tend to zero leakage as more detection effort is deployed
- The offset (blue dashed line) is the level of leakage irrespective of the number of detection resources deployed (sometimes called Policy Minimum). It is made up of:
 - background leakage (very significant proportion)
 - leakage from reported burst (about 10% of background)
 - fixed element of leakage from unreported bursts (very small)
- By definition we can't find background leakage so this can't be reduced BUT is all this true background leakage?
 - Could be leaks that have been running for decades – private fire mains, abandoned mains, awkward areas to sound
 - Check using IWA estimates of unavoidable background leakage
 - Carry out intensive surveys – step tests, integrity checks
- Leakage from reported bursts is fixed by the level of reporting and the inspection and repair time
 - The latter two can be improved (slightly)
 - The former can be impacted on by “getting” onto leaks earlier (before the customers reports them) – more resources and newer technology (AI, alarm management, smart sensors)
- That just leaves leakage from unreported bursts



Impacting on leakage from unreported bursts

- We all (hopefully) familiar with the theory behind leakage detection – Graph 1
- Leaks break out (relatively) randomly with time, minimum night flow increases with time, we go in and do a survey, find all the leaks, get them repaired and then leakage comes back down to where it was before (blue dots)
- If we put twice as many technicians on the ground then we reduce the time between surveys by half (red dots)
- Average unreported burst leakage would reduce by half (blue chain line to red chain line)
- We therefore get the “inverse” curve – green line on Graph 2
- BUT:
 - Leak breakout varies due to weather factors
 - We don't find all leaks when we do a survey
 - We don't get them all repaired with equal importance and response time
- So there is uncertainty over the cost of detection
- Combine with the uncertainty of whether policy minimum is truly all background and the uncertainty of the ALC curve itself is significant



But that is only half the story

Other options of reducing leakage

- We know pressure management is the most cost effective way of reducing leakage (once you have a modicum of proactive leakage detection):
 - Reduces background leakage (only way)
 - Reduces the flow rates from leaks
 - Reduces the break out of new leaks
- Pressure management would shrink all elements of the active leakage control curve
- Pressure management also extends asset life, so reduction of depreciation needs to be included in cost benefits
- So pressure management **MUST** be included in any analysis of ELL
- Other options: smart metering, rehabilitation (mains and SERVICES)

The supply v demand balance

- If the supply demand balance is precarious then it may be worth while reducing leakage further to avoid developing a new resource
- This brings in the concept of the **value** of water rather than the **cost** of water



The Historic Steps Towards ELL

- Report 26 (UK) which brought all technical water loss issues into a planned approach
- IWA Water Loss Group Commencing
- ILI (Infrastructure Leakage Index), a technical development step to give a different perspective of the accuracy of water losses and move away from %'s .
- Pressure management and flow modulation, another technical development that proved it has a direct influence on losses,
- A vast range of technical developments from the 1980's onwards in leak identification and detection, ie data logging for pressure and flow, leak noise correlation, sound logging , hydraulic modelling and active asset management technical advances.
- *ALL THE ABOVE PROVED TO BE GREAT TECHNICAL AND PROCESS ADVANCEMENTS WITH MANY WATER BUSINESSES ADOPTING SOME CHANGES, BUT MANY STILL RESISTING CHANGE, OR MINIMISING THEIR ACTIVITIES.*
- The IWA Water Loss Specialist Group developed and studied all the best ways of reducing losses, and developed other brainstorming specialist groups



Brainstorming began with the IWA ELL Noisy Party Group

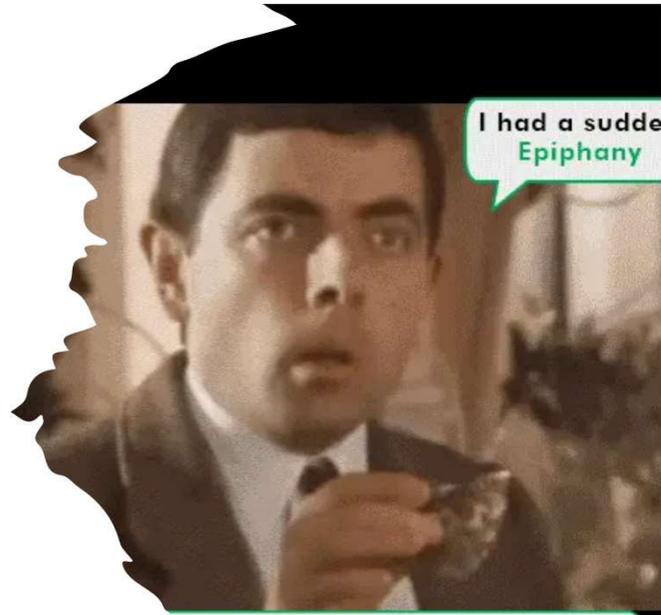


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Epiphany: Meaning and example



experience of a sudden realization, आविर्भाव)

When ELL was first introduced it was treated by many water companies as though it was an Epiphany , as a new business tool that directors of boards could be persuaded to alter strategy , commission ALC, Pressure Management, and Water Loss Audits.

- This was initially good for both the water industry and water loss practitioners. However many individuals also saw it as an opportunity to move away from good practice.

ELL has often been abused

- The integrity factor, related to personal ambitions, or simply to do nothing different than they have always done.
- "If you do what you have always done, you always get what you always got!" (Stuart Trow)
- Unfortunately there is too much calibration required (otherwise known as fiddle factors), and some water companies used this to look better than they are.
- Some water company reports show an ELL having been achieved simply due to manipulating the factors.
- Auditors should be appointed by government, just as annual external finance audits are in some countries, otherwise there will be no worthy accreditation of the results.





The ELL Excuse

- I know we have some leaks but
- We have already met our ELL !
- It will cost you customer more if you want uneconomic results
- It will cost you more
- IT WILL COST YOU MORE !
- No mention of fudging the figures
- No mention of spending more on PR than on ALC
- Even used as an excuse for taking excessive time to repair leaks that are showing.



Recommendations to come back from ELL

Technical

- The evaluation of ELL is very data hungry and the accuracy is heavily impacted on such things as:
 - Lack of information on key items
 - Pressure, connections, properties, supply pipe lengths
 - Uncertainties in the data
 - The uncertainty of leakage detection process
 - Lack of knowledge on possible pressure management schemes
- Calibration against current performance runs the risk of ratifying current practice and processes and rather than challenging them
- The accuracy of any ELL assessment will gradually improve with time, as data is collected and validated
- Don't pretend you can evaluate an ELL to 2 significant figures for at least 10 years
- Use a twin track approach in developing a leakage strategy:
 - Carry out basic activities on the ground to control leakage using basic/simple measures to judge performance (e.g. I/prop/d, CRLI)
 - Carry out actions to improve data quality and increase data knowledge

Managerial

- IWA has lost some leadership recognition due to ELL being discredited, and needs a new driver for an Epiphany change, and a re-evaluation of drivers for change.
- Board directors are usually only in place for 5 years, therefore they have a preference to look good quickly rather than implement long term plans, therefore they need to see some immediate targets.
- Auditing of water companies, councils, corporations or authorities should have their water loss results audited by Government appointed independent auditors.
- IWA consultants should prepare to be qualified and registered auditors for Governments.
- IWA can be a well needed *Leaders For Success* providing they have the drive to achieve success.



The Journey to ELL

- Did you know that heaven and hell are actually right next to each other?
- They are separated by a big trunk main with a fence on both sides.
- Well, one day hell was having a big party and it got a little out of hand.
- God heard the ruckus and arrived to find his fence completely smashed by the wild partiers.
- He called the devil over and said "Look, Satan, you have to rebuild this fence." Satan agreed.
- The next day God noticed that the devil had completely rebuilt the fence...but it was 2 feet further into heaven than before.



The Journey to ELL

- "Satan!" beckoned God.
- "You have to take that fence down and put it back where it belongs!"
- Yeah !!! Well what if I don't?" replied the devil.
- "I'll get a water engineer to open that trunk main and flood the whole of hell if I have to," answered God.
- "Ha Ha Sure," laughed Satan.
- "And where do you think you are going to find a water engineer?"



They are all in ELL

Farewell from Tim and Dave



See you
there !!

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References :Stuart Trow, Allan Lambert, R. McKenzie, Roland Leimberger, Jo Parker, Marco Fantozzie, Jurica Kovac

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