

# Recommendations for Initial Non-Revenue Water Assessment

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# Urban water losses in Asia

Region	Non-Revenue Water		Physical Losses	Comm. Losses	NRW	Value
	%	(million m3/day)	(billion m3/year)			billion USD/year
Central and West Asia	40%	5.2	1.4	0.5	1.9	0.6
East Asia	25%	34.8	9.5	3.2	12.7	3.8
Middle East	30%	12.5	3.4	1.1	4.5	1.4
South Asia	35%	12.7	3.5	1.2	4.7	1.4
South East Asia	35%	13.0	3.6	1.3	4.9	1.5
<b>Total Asia</b>		<b>78.3</b>	<b>21.4</b>	<b>7.3</b>	<b>28.7</b>	<b>8.6</b>

# 21 billion cubic meters per year are ....

- equivalent to 58 million m<sup>3</sup> per day
- extracted from the environment, treated and pumped – but not used
- physically lost by Asia's water utilities
- enough to supply 230 million people
- causing a significant waste of energy and chemicals

# First Step – assess your problem

- Ideally: establish a water balance and calculate physical and commercial loss performance indicators
- But: this is often not done and the only available information is NRW expressed as % of system input
- % NRW is always a poor PI – but can be super misleading in intermittent supply situations
- Problem: IWA did not recommend a simple PI for NRW

	Performance Indicator
<b>Non-Revenue Water</b>	???
<b>Real (Physical) Losses</b>	<b>Litres/connection/day (w.s.p.)</b> <b>ILI (Infrastructure Leakage Index)</b>
<b>Apparent (Commercial) Losses</b>	<b>Litres/connection/day (w.s.p.)</b> <b>% of Authorized Consumption</b>

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# A quick assessment – simple but much better than % NRW

- For parameters need to be known:
  - average daily volume of NRW
  - average supply time
  - average pressure
  - number of service connections
- Calculate NRW in l/conn./day (and adjust for intermittent supply)
- But what does the number tell us?

# The starting point: Physical Loss Target Matrix

Technical Performance Category		ILI	Physical Losses [Litres/connection/day] (when the system is pressurised) at an average pressure of:				
			10 m (15 psi)	20 m (30 psi)	30 m (45 psi)	40 m (60psi)	50 m (75psi)
High Income Countries	A	1 - 2		< 50	< 75	< 100	< 125
	B	2 - 4		50-100	75-150	100-200	125-250
	C	4 - 8		100-200	150-300	200-400	250-500
	D	> 8		> 200	> 300	> 400	> 500
Low and Middle Income Countries	A	1 - 4	< 50	< 100	< 150	< 200	< 250
	B	4 - 8	50-100	100-200	150-300	200-400	250-500
	C	8 - 16	100-200	200-400	300-600	400-800	500-1000
	D	> 16	> 200	> 400	> 600	> 800	> 1000

# The NEW Physical Loss Matrix

Technical performance category		ILI	Physical Losses in Litres/connection/day when the system is pressurized at an average pressure of:				
			10 m	20 m	30 m	40 m	50 m
High Income countries	A1	< 1.5		< 25	< 40	< 50	< 60
	A2	1.5 - 2		25-50	40-75	50-100	60-125
	B	2 - 4		50-100	75-150	100-200	125-250
	C	4 - 8		100-200	150-300	200-400	250-500
	D	> 8		> 200	> 300	> 400	> 500
Low and Middle Income Countries	A1	< 2	< 25	< 50	< 75	< 100	< 125
	A2	2 - 4	25-50	50-100	75-150	100-200	125-250
	B	4 - 8	50-100	100-200	150-300	200-400	250-500
	C	8 -16	100-200	200-400	300-600	400-800	500-1,000
	D	> 16	> 200	> 400	> 600	> 800	> 1,000

# Commercial loss allowances High Income Countries

Category	Commercial Losses	
	% of Authorized Consumption	Litres/connection/day
A1	< 2.5%	< 25
A2	2.5% - 5%	25 - 50
B	5% - 10%	50 - 100
C	10% - 15%	100 - 150
D	> 15%	> 150

# Commercial loss allowances

## Low and Middle Income Countries

Commercial Losses				
Category	Provision for meter under-registration and data handling errors	Additional provision for water theft	Total	l/conn./d
A1	< 2.5%	< 0.5%	< 3%	< 30
A2	2.5% - 5%	0.5% - 1%	3% - 6%	30 - 60
B	5% - 10%	1% - 2%	6% - 12%	60 - 120
C	10% - 15%	2% - 5%	12% - 20%	120 - 200
D	> 15%	> 5%	> 20%	> 200

# The International NRW Target Matrix

NRW Management Performance category		Non-Revenue Water in Liters/connection/day when the system is pressurized at an average pressure of:				
		10 m (15 psi)	20 m (30 psi)	30 m (45 psi)	40 m (60psi)	50 m (75 psi)
High Income Countries	A1		< 50	< 65	< 75	< 85
	A2		50-100	65-125	75-150	85-175
	B		100-200	125-250	150-300	175-350
	C		200-350	250-450	300-550	350-650
	D		> 350	> 450	> 550	> 650
Low and Middle Income Countries	A1	<55	<80	<105	<130	< 155
	A2	55-110	80-160	105-210	130-260	155-310
	B	110-220	160-320	210-420	260-520	310-620
	C	220-400	320-600	420-800	520-1000	620-1200
	D	> 400	> 600	> 800	> 1000	> 1200

- **Category A1:** World class NRW management performance; the potential for further NRW reductions is small unless there is still potential for pressure reduction or accuracy improvement of large customer meters
- **Category A2:** Further NRW reduction may be uneconomic unless there are water shortages or very high water tariffs; a detailed water audit is required to identify cost-effective improvements

- **Category B:** Potential for marked improvements; establish a water balance to quantify the components of NRW; consider pressure management, better active leakage control practices, and better network maintenance; improve customer meter management, review meter reading, data handling and billing processed and identify improvement potentials
- **Category C:** Poor NRW record; tolerable only if water is plentiful and cheap; even then, analyze level and causes of NRW and intensify NRW reduction efforts
- **Category D:** Highly inefficient; a comprehensive NRW reduction program is imperative and high-priority

- The suggested Initial NRW Assessment method provides valuable first information
- The International NRW Target Matrix has the potential to become a commonly used reference table
- The method and matrix might be another small step away from the common use of % NRW

## New Sources of Water

1. New Dams
2. River Sharing
3. Rain Water Harvesting
4. Desalination
5. Icebergs

JUST PLUG THE LEAKS!!

