The Averly Putrajaya Hotel ◆ 7 March 2019

NON-REVENUE WATER (NRW)

FORUM ON CHALLENGES AND WAY FORWARD

"APPRAISING CHALLENGES IN DEVELOPING NRW REDUCTION STRATEGY"

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PERSATUAN AIR MALAYSIA MALAYSIAN WATER ASSOCIATION

AKADEMI SAINS MALAYSIA

LOOKING BACK

The British left behind an effective system to maintain our water-works management well – in particular, field teams or crews for leak detection and other preventive measures. The system has become dormant since the 1980s.

Now, 40 years later, the State Governments may have to be COMMITTED to reactivate field teams for preventive measures as FIRST STEP to NRW REDUCTION STRATEGY with the support of SPAN.

STAR 23 February, 2019
Illegal Water Connection - - disconnection by SPAN, alerted by AIR SELANGOR

SYNOPSIS

- Over the years, the majority of complaints recorded (MWIG 2018) are pipe bursts, breakages and leakages. (Physical Losses)

→ A burst-driven renewal programme can achieve a reduction in burst frequencies leading to a reduction in rate of rise of leakages.

- Physical losses of water is 70% and Commercial losses is 30%.

→ Commercial losses include meter inaccuracies, water thefts, pilferages, pipe cleaning (scouring of pipelines)

- The impact of burst-driven mains renewal on operational costs of leakage management can bring economic benefit.

→ Can be costly. Not all pipes (mainly AC) need to be changed at one go.
As a strategy, O&M Section of the Utilities needs to be strengthened to assist in leak detection leading to decision in priority for pipe replacement.

[O&M – Operation and Maintenance]

Some of challenges envisaged in developing NRW Reduction Strategies:

- Allow in O&M cost to revitalise in-house "Ground Crews" to determine staged programme for pipe replacement, supervision of pipelaying and mains tapping tor meter connection and some features in Commercial Losses.
- Allow in project cost for inspection of pipes, specials, valves and meters by O&M staff before they are acceptable for use.

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1. EARLY YEARS ~ 1960s–1970s

The practice in 'Saving Water' (now specifically referred to as NRW) is not new: In the 1960s or earlier Engineering Ethics played a big role in training of Graduate Engineers, Technical Assistants, Technicians and Meter Readers in **WATER CONSERVATION.**

Many Government Water Supply Departments Operation and Maintenance (O&M) Section was well-managed and with adequate staffing, well-trained and supported by sufficient budget allocation.

Eg. In-house Team for:

- Leak Detection,
- Surprise check on illegal connections
- Tapping on mains for meter connections (departmental plumbers)
- Changing of water meters on a regular basis (every 5 years).

Water Losses in Kuala Lumpur and Petaling Jaya was kept low at 17% (Selangor Water Report 1969 by Binnie & Rakan) and Penang NRW in 1973 was 13.9% (Penang Island 7.9%). No early record for Melaka but understood to be less than 20% in 1971 when the Water Authority was formed.

1. EARLY YEARS ~ 1960s–1970s

Team Work was strongly encouraged among all staff members and with close relationship with:

- ✓ **District and land offices**
- ✓ **Local authorities**
- ✓ **Police department**
- ✓ **Forestry department**

As an illustration, photo of a Team (1967) made up of Waterworks Department staff drawn from all sections) and Forestry Department staff, Selangor after a Raid on illegal tin miners (dulang washing) in the Ampang Forest Reserve (Pollution of Water Source)

The Waterworks Team was also used for Leak Detection and other inspection works for Water Losses (incl. NRW)

2. THE IMPACT OF MALAYSIA'S RAPID DEVELOPMENT (1980s – 2000s)

In the 1980s, the country embarked on a programme of industrialisation.

There was a high demand of water from a new sector – the manufacturing industry.

Water demand for industrial and domestic use rose from 0.8 billion m^3 in 1980 to 3.5 billion m^3 in 2000, a significant 437% increase (20 years)

(Normal Planning Scenario 4-5% per year)

Source: SPAN and NWRS 2012

Water Supply Demand
1960s : 750 MLD
1980s : 2,000 MLD
2010s : 16,000 MLD
(about 21X)

Source: SPAN and NWRS 2012

Water Supply Coverage
1960s : 35%
1980s : 70%
2010s : 95%

Source: SPAN and NWRS 2012

Population Figures:
1960s : 8.5 M
1980s : 28 M
2010s : 30 M

Source: SPAN and NWRS 2012

Urban Population Growth
1960s : 3 M
1980s : 5 M
2010s : 20 M

Source: SPAN and NWRS 2012

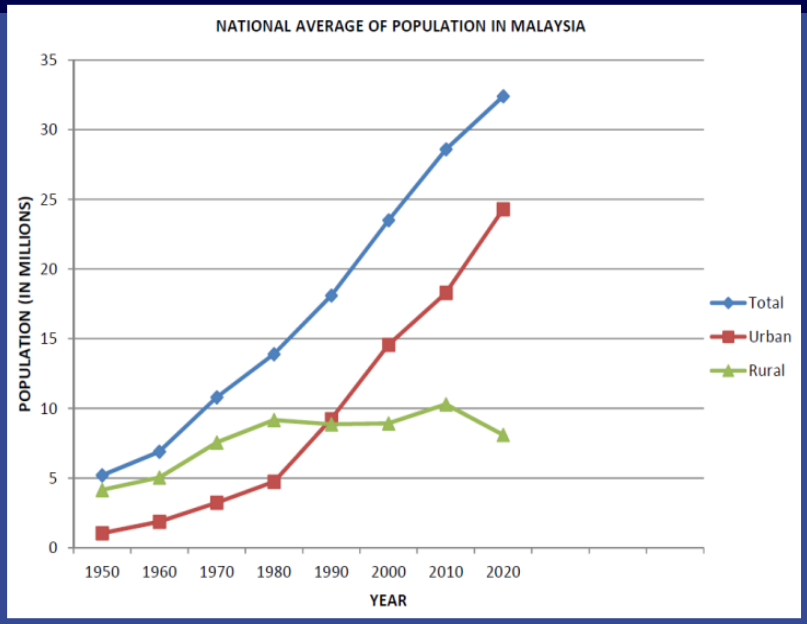
2. THE IMPACT OF MALAYSIA'S RAPID DEVELOPMENT (1980s – 2000s)

Prior to 1980s, although supply coverage was less than 70%, the NRW in most urban areas like Penang, Selangor and Melaka, was 20% or less (unofficial records).

By 1996, NRW increased sharply to 38% in 1996 (*Malaysian Water Industry Report, JKR*) – 3 States recorded more than 50% NRW.

Main Reason:

Although Malaysia has far exceeded the UN Target of Millennium Development Goals in Treated Water Supply, it is not strictly keeping to **SUSTAINABILITY EXPECTATIONS.**



Malaysia is on the verge of achieving a developed country status.
This has no full meaning unless.

Economic support for SUPPLY MANAGEMENT was in full swing at the expense of O&M services – NRW was practically neglected.

It is coupled with success in sustainable development – REDUCTION IN NRW to a reasonable % is one of the INDICATORS)

3. WHY DO UTILITIES STRUGGLE WITH NRW REDUCTION?

- Potential benefit to the nation with FULL NRW Reduction amounts to RM3.204 billion per year. If NRW is reduced to 25% (from current 35.2%), the amount of saving per year is approx RM907 million/year or 0.9 billion/year.

National NRW loss is 5,929 Mld (WIG 2017). More than water consumption in Johor, Selangor, Penang and Melaka combined (5,802 Mld)

- In spite of the potential benefits, many Water Utilities fail to address the issues effectively.

There could be many reasons among which:

~ More focus given to industrial developments in the country to the detriment of NRW since the 1980s. There must be considered balance in investments for development and NRW implementation in budget consideration.

~ Lack of capacity – NRW requires a range of skilled staff – right down to ground crews, technicians, plumbers, etc. There is need for appropriate training materials, methods and institutions.

~ Understanding the NRW problem – junior engineers, technicians and ground crew must be trained, at least, in the first 8 years after graduation to be involved in field work.

Establish a "Water Industry Promotion Centre" or "Water Hub".

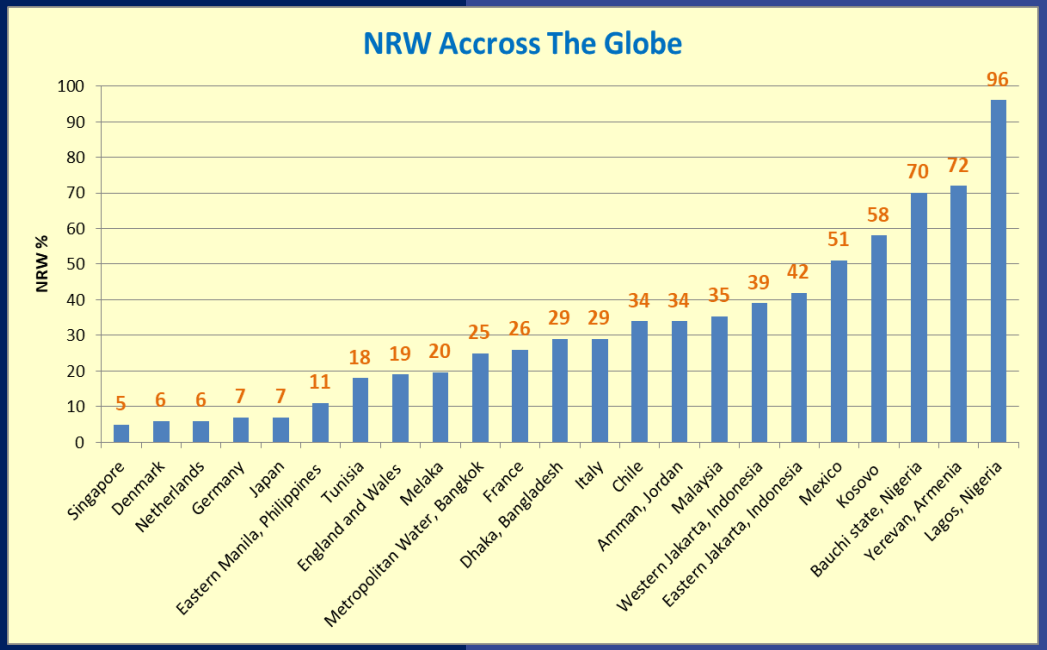
- "to provide institutional support to help water utilities and businesses achieve sustainable growth (incl. NRW improvements) and become the focal point for advanced technological innovation with specific direction for technology ownership …"

Source : Academy of Sciences Malaysia (ASM)

4. INTERNATIONAL BENCHMARKING

Among the advanced countries which have high standards in NRW are Singapore, Denmark, Netherlands, Germany, Japan, England and Wales and Tunisia.

International Benchmarking of NRW Level



Source:

International Benchmarking of NRW Level

Leakage Level	Percentage of utilities
>10%	2.5%
10-20%	8%
20-30%	23%
30-40%	28%
40-50%	18%
>50%	17%

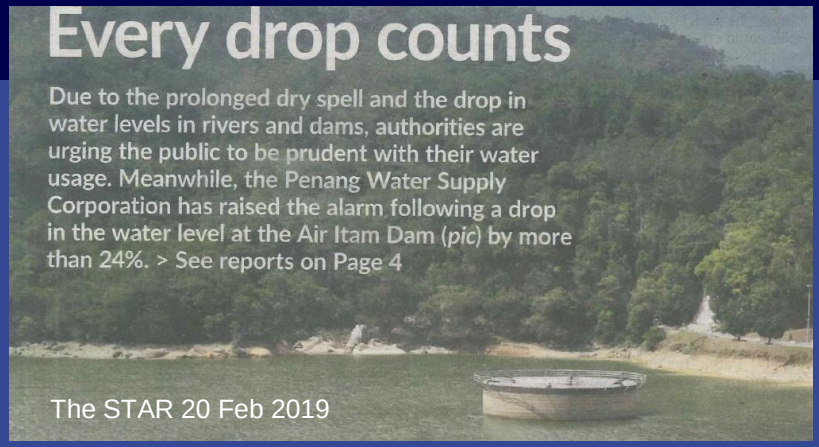
Source:

Malaysia is among the countries where 28% of utilities are within 30-40% Leakage Level.

(OUR TARGET should be among the 8% with Leakage Level 10-20% by 2050)

5 NRW REDUCTION CHALLENGES

Every drop counts - the public must be encouraged to be prudent in keeping NRW in check at all times.



Challenges in NRW Reduction

- Main focus at the moment – mass main renewal programme, in particular AC pipes. Water meters need to be changed on a regular basis (every 5 years). (8,056,061 in total in 2017 of which 1,421,930 are more than 7 years – MWIG 2018)

Nearly 27% in the distribution system, or 41,560 km – require costly investments - not necessary to replace all AC pipes.

- However, a clear vision would emerge in having a POLICY to serve NRW well.

The Policy needs to :

~ set its purpose and to resonate with the people – winning over community support, so that people will willingly cooperate and report on water wastages, leakages., overflows from reservoirs and tanks and water theft, etc.

~ set a condition that water contractors and plumbers (with licenses from SPAN) must be made to value their work with pride and prestige.

Operators to set up a special NRW Section to deal with such matters as:

- Project Funding for NRW (related to revised Tariff)
- Adequate manpower in the NRW Section provided with capacity building and professional development.
- The staff will also be required to undertake supervisory services on a full time or 'spot check' basis on pipe laying by contractors and tapping for pipe connections to meters by plumbers..

CONCLUDING THOUGHTS

"PREVENTION IS BETTER THAN CURE"

Therefore.

- **O&M Culture must be revisited and nurtured for reduction in NRW, in harmony with Economic Development.**
- **O&M Section of Water Utilities to be strengthened with revitalised NRW Section (Reminiscent of pre-1980s). O&M Budget to include allocation for NRW work**
- **Development Budget to include allocation for inspection of pipes, specials, valves and meters before they are approved for use. Reuse of meters is encouraged: to be recalibrated by approved bodies.**
- **To achieve "Operation Excellence" level there should not be shortage of trained manpower. The ratio of trained manpower to consumer connections was suggested to be in the order of 1 to 450-500 (*Academy of Sciences Malaysia WDM Report 2015*) subject to size of the area, level of outsourcing of work and automation of the facilities.**
- **To establish a "Water Industry Promotion Centre" or "Water Hub" to support water utilities and businesses achieve sustainable growth (inc NRW improvements).**
- **Supervision of pipelaying work and tapping for water meter connection to be solely the responsibility of the State Water Utilities or Operators.**
- **MOST OF ALL, what is really needed is leadership by example by politicians and the Governments to grasp the scale of water management and stepping up to the challenge of NRW.**

IWA WATER BALANCE

Authorized Consumption	Billed meter consumption	**Revenue Water**
	Billed unmetered consumption	
	Unbilled Metered Consumption	**Non Revenue Water**
	Unbilled Unmetered Consumption	
Water Losses	Commercial Losses	
	Leakage and Overflows from the Utilities Storage Tanks	
	Leakage on transmission and reticulation main	
	Leakage on Service Connections up to the Customer Meter	

Terima Kasih

Acknowledgement:
Thanks to SPAN, ASM and MWA for the cooperation in the preparation of this presentation