TRENCHLESS ASIA 2026
THAILAND

STRATEGIC APPLICATION OF TRENCHLESS TECHNOLOGIES IN WATER AND WASTEWATER

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- *STRATEGIC APPLICATION OF TRENCHLESS TECHNOLOGIES IN WATER AND WASTEWATER*

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Trenchless Technologies application in the Water and Sewerage Industry

Introduction

Trenchless technology also known as no-dig technology, refers to a range of techniques used to install, repair, or replace underground pipes without digging trenches.

In **pipeline installation**, trenchless technology can be used to install new pipelines without the need for extensive excavation work.

In **pipe rehabilitation**, trenchless technology can be used to repair or replace damaged sections of pipe without the need for excavation.

COMMON TRENCHLESS METHOD USED IN MALAYSIA

Method (typically used in Sewer in Malaysia)	
Rehabilitation Repair	Resin Patch Repair
	Top Hat Lateral Seal
Rehabilitation Renovation Structural	CIPP (Cure in Place Pipe Lining)
	Spiral wound lining
Rehabilitation Replacement	Pipe Bursting
New Installation Trenchless	Pipe Jacking
	Micro tunnelling
	Horizontal Directional Drilling (HDD)

Pipe Jacking

Horizontal Directional Drilling (HDD)

Trenchless Technologies Method

Conventional Method

Manual Excavation

Mechanized Excavation

Root Cutter

Resin Patch Repair

Cure in Place Pipe Lining (CIPP)

Robotic Cutter

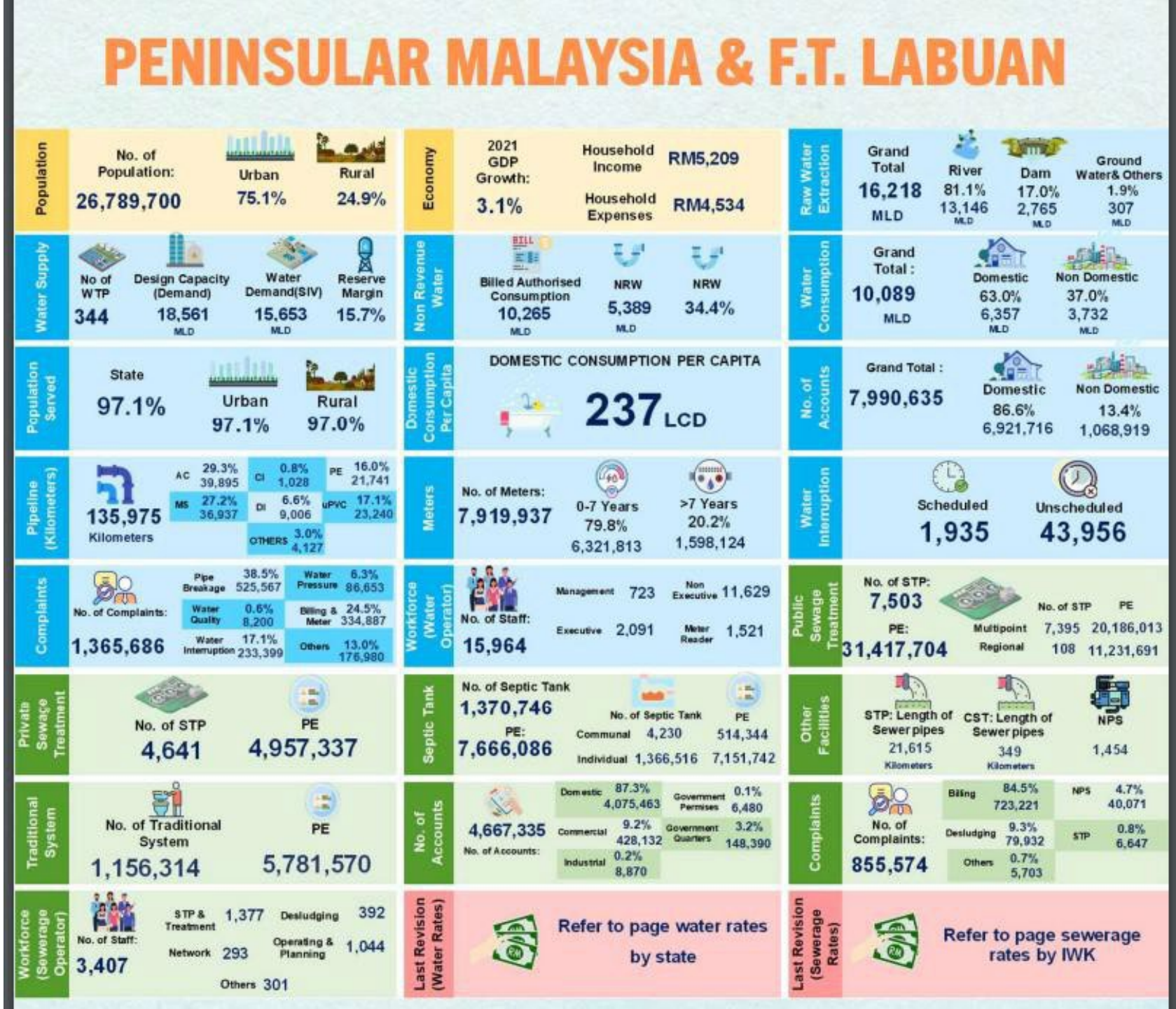
Top Hat

STRATEGIC APPLICATION OF TRENCHLESS TECHNOLOGIES IN WATER AND WASTEWATER

Malaysia Association for Trenchless Technologies

Snapshot statistics of water and sewerage sector in Malaysia

https://www.span.gov.my/article/view/water-sewerage-fact-book-2022



Strategic challenges

Water

NRW 35%

Old pipes AC > 40/50 yo

Pipe breakages and interruptions

Reserve margin 15% @ 2500MLD vs water lost via NRW 5400 MLD

Sewerage

High nos Multipoint STPs, private STPs, CST, IST

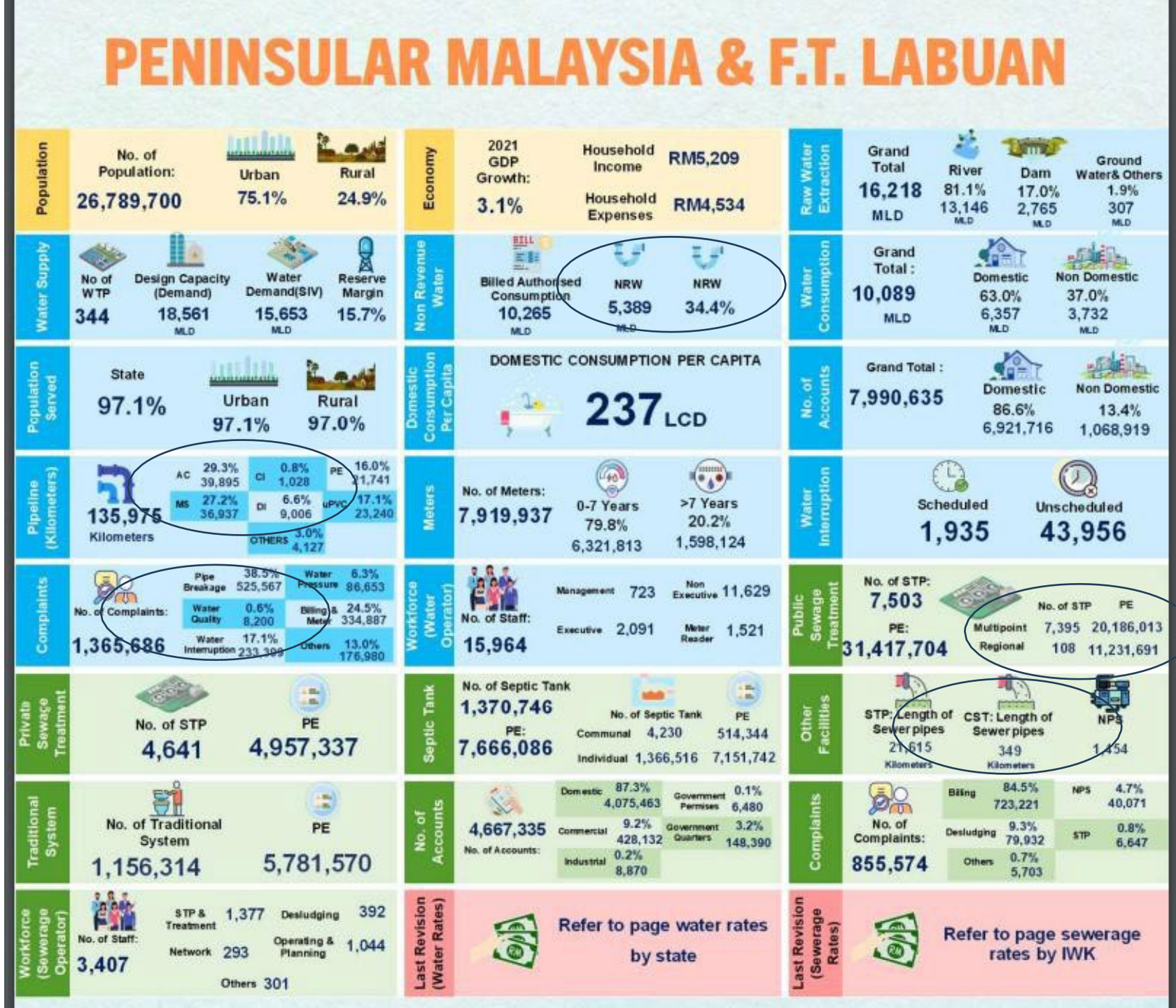
Private STPs and ISTs still ~ 30% of STPs

RSTP catchment half of Multipoint system

Pollution loading to rivers

Regional STP system to be expanded

- RSTPS planned and to be built in matured urban areas
- network system 22K vs 135k in water



EVOLUTION OF SEWAGE TREATMENT TECHNOLOGIES

Simple Filtration | Basic Sanitation | Conventional Treatment | Advanced Treatment | Sustainable Technology

Sewer system implementation

within premise

open excavation by developers

short distance jacking

2004-2007 Pantai trunk mains (13km)

2000s - sewer rehabilitation G packages via CIPP

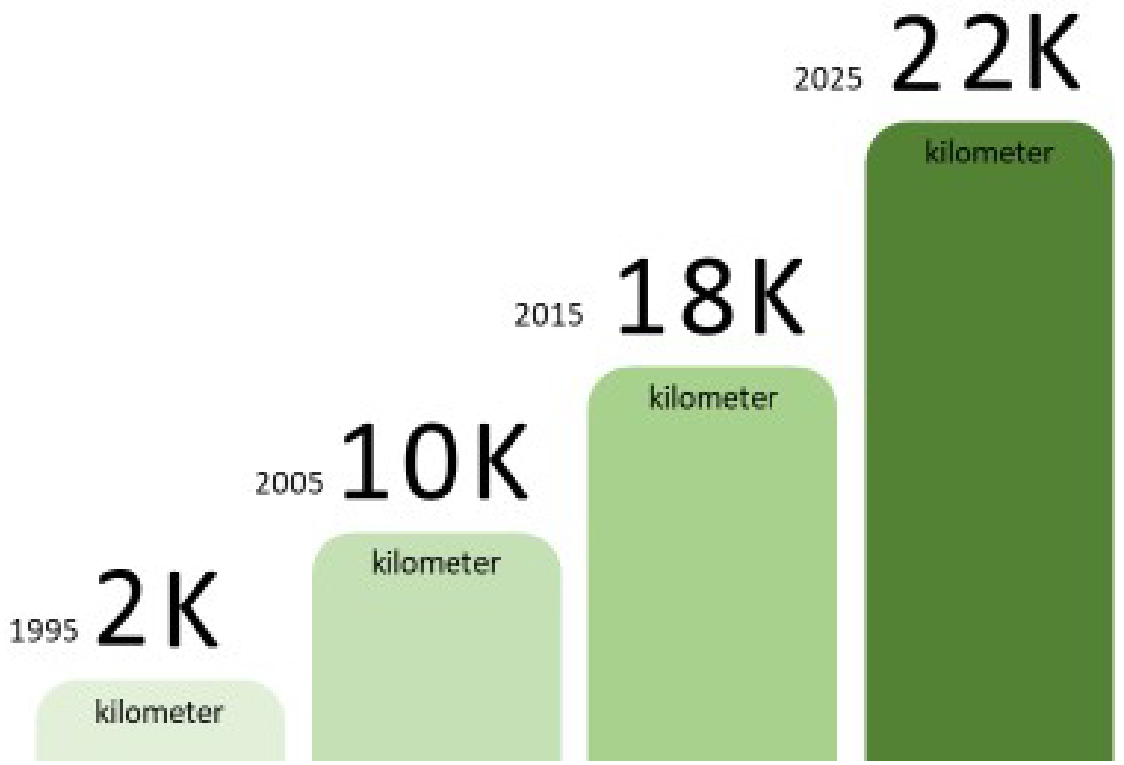
2012 - ongoing GKL RoL centralised systems (>200km new lines, 45km rehab CIPP)

2015-2018 PD sewer extn 10km

2015 – Papan 1 (85km)
2017 – Papan 3 (75km)
2018 – Kuantan CSTP (60km)

Growth of sewer pipelines through trenchless technologies application

Malaysia's sewerage infrastructure has expanded significantly over the past few decades. As of January 2025, the national sewerage operator, **Indah Water Konsortium (IWK)**, manages approximately **22,000 kilometers** of sewer pipelines, a substantial increase from **2,317 kilometers** in 1994



Pantai 2 regional STP – 1.4million PE

IWK chief executive officer Faizal Othman said the move was possible because P2STP has recently adopted the Advance Anaerobic-Anoxic-Oxic (Advance AAO) process. — fotoBERNAMA

Langat Centralised Sewage Treatment Plant (CSTP) – 920K PE

- The project includes laying approximately 105 km of a sewer network of different pipe sizes.
- The works include the underground installation of sewers with sizes ranging from 225 mm to 1800 mm diameter, in challenging ground conditions.
- ND1800 mm curved microtunnel, for a total length of 726 m: a record for the country, which is inscribed in the Malaysia Book of Records
- longest ND1800 mm sewer laid by microtunnelling in rock, a 515-m long, s-curved ND1800 drive crossing a granite formation (160 Mpa)

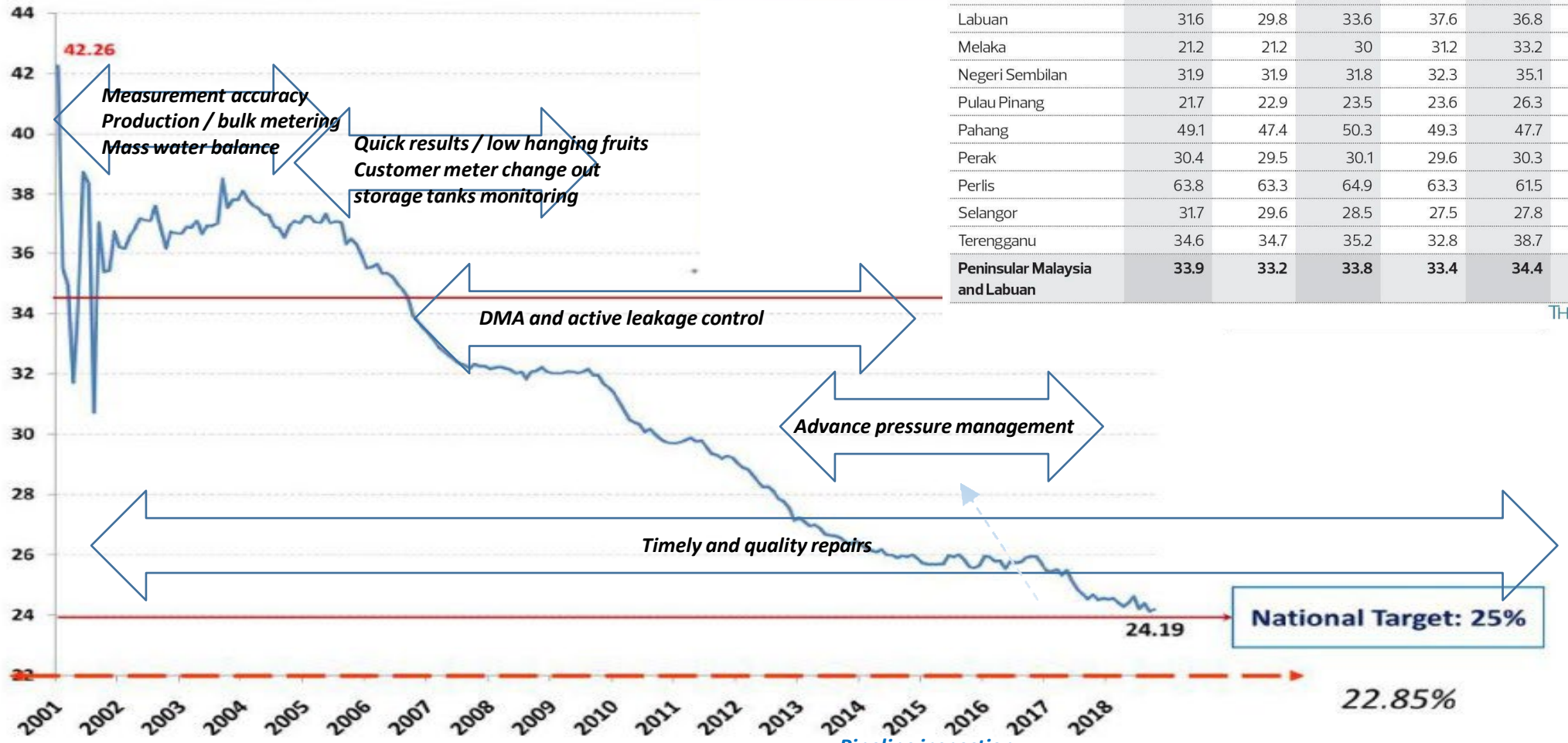
Non Revenue water reduction levels

NATIONAL WATER SERVICES COMISSION (SPAN)

Non-revenue water level by state (%)

STATE/FEDERAL TERRITORY	2018	2019	2020	2021	2022	2023
Johor	24.8	24.9	26.7	25.1	26.3	25
Kedah	48.5	48.5	48.4	49.9	51.5	50.7
Kelantan	49.3	50.8	51.7	52.6	53.7	54.5
Labuan	31.6	29.8	33.6	37.6	36.8	37.6
Melaka	21.2	21.2	30	31.2	33.2	35.1
Negeri Sembilan	31.9	31.9	31.8	32.3	35.1	38.9
Pulau Pinang	21.7	22.9	23.5	23.6	26.3	26.8
Pahang	49.1	47.4	50.3	49.3	47.7	47.7
Perak	30.4	29.5	30.1	29.6	30.3	30.2
Perlis	63.8	63.3	64.9	63.3	61.5	64.5
Selangor	31.7	29.6	28.5	27.5	27.8	27.8
Terengganu	34.6	34.7	35.2	32.8	38.7	40.1
Peninsular Malaysia and Labuan	**33.9**	**33.2**	**33.8**	**33.4**	**34.4**	**34.6**

THE EDGE



Pipeline inspection

- ***Identify defects - mains leak detection methods (underwater CCTV, smart balls etc)***
- ***Pipe condition assessment***
- ***AI Driven predictive modelling***
- ***Digital Twins***

Pipeline rehabilitation strategies

- ***Alternatives/complement to pipe replacement programme***
- ***Pipe repairs rehab (CIPP, slip lining etc)***

Non Revenue water – key issues for pipeline rehabilitation

Material	Total Length (km)	0–20 yrs	20–40 yrs	40–60 yrs	>60 yrs
AC	44,282	0	4,400	31,000	8,900
MS	29,372	8,800	14,700	5,300	600
HDPE/PE	22,111	15,500	6,600	0	0
uPVC	18,683	5,600	10,300	2,800	0
DI/CI	9,885	2,000	4,000	2,400	1,500
Others	2,942	1,500	900	400	100
Total	**127,275**	**33,400**	**40,900**	**41,900**	**11,100**

key findings

- Approximately **53,000 km (42%)** of Malaysia's network is likely **older than 40 years**. This is consistent with reports that nearly one-third of the network consists of AC pipes beyond their intended service life.
- AC pipes are the dominant ageing asset. Recent reports indicate **39,287 km of AC pipe** are already beyond their 30-year design life, with many over 50 years old.
- New replacements are primarily **HDPE, ductile iron, and mild steel**, meaning most network growth during the last two decades falls into those materials.
- In Selangor alone, roughly **5,000 km of AC pipe** remain in service after replacement efforts.

‘USEFUL LIFE’ SHORTER THAN IT SHOULD BE

Average Pipe Age in Municipal Systems

- **Drinking water systems**: ~45–50 years on average
- **Wastewater systems**: ~30–40 years on average
- **Stormwater systems**: Varies widely, often older and less maintained

Air Selangor, the primary water services provider for Selangor, Kuala Lumpur, and Putrajaya, has identified that approximately **55% of damaged pipes due to aging were installed in the 1980s**. This indicates that a significant portion of the infrastructure is over 40 years old. Hydro Hub | Air Selangor

Pipe Replacement Programme: To address this, Air Selangor initiated a 30-year Pipe Replacement Programme in 2016, aiming to replace over **5,600 kilometers of old pipes**. As of March 2024, they have successfully replaced **636.55 kilometers**. Hydro Hub | Air Selangor+1Hydro Hub | Air Selangor+1

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