Colloquium On Water Demand Management
Putra World Trade Centre, Kuala Lumpur

WATER DEMAND MANAGEMENT IN MALAYSIA THE BIG PICTURE

by
DATO' TEO YEN HUA
Chief Executive Officer
National Water Services Commission (SPAN)

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1. WHAT IS DEMAND MANAGEMENT?

- Purposeful and beneficial manipulation of the timing and level of usage
- Improvements to economic efficiencies are achieved when total benefits outweigh the total cost of implementation
- Evolved in the context of least-cost or integrated resource planning

2. PURPOSE OF WATER DEMAND STRATEGY

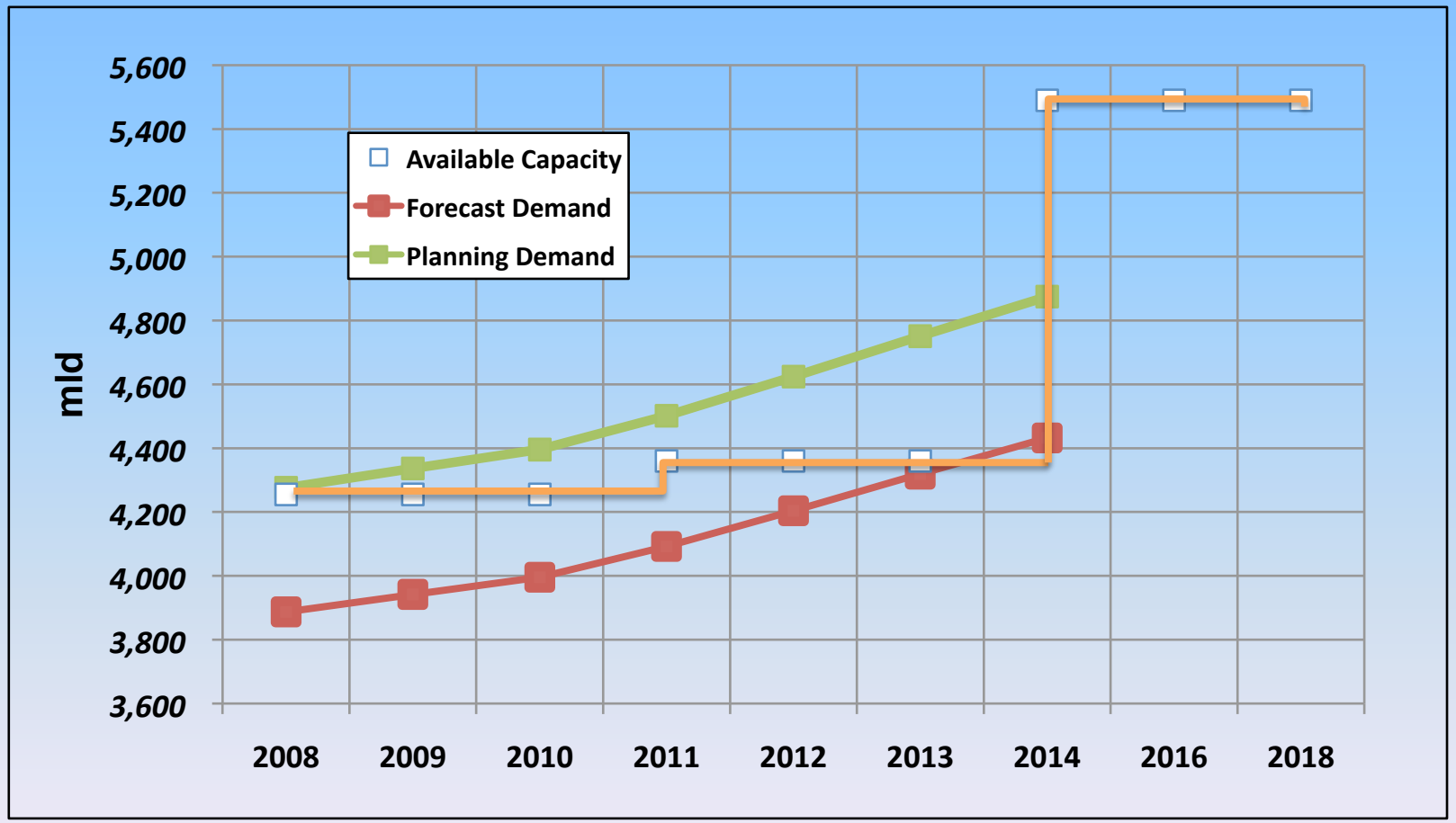
- To ensure long term balance between available water resources and water demand
- to postpone the need for expensive capital infrastructure projects for as long as it is economically viable
- to reduce water wastage and increase use efficiency
- Improve financial health of operators and keeping tariffs at affordable levels

3. CONSEQUENCES OF NOT HAVING WDS

- Risk of total demand exceeding available supply that may require long term water restriction
- Premature development of dams and treatment plants at significant costs
- Loss of income
- Direct cost of distribution losses will continue to increase

4. DEMAND – SUPPLY GAP (1)

SELANGOR – DEMAND & SUPPLY PROJECTION



Data source : SYABAS projection

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4. DEMAND – SUPPLY GAP (2)

Demand and supply gap mainly due to:

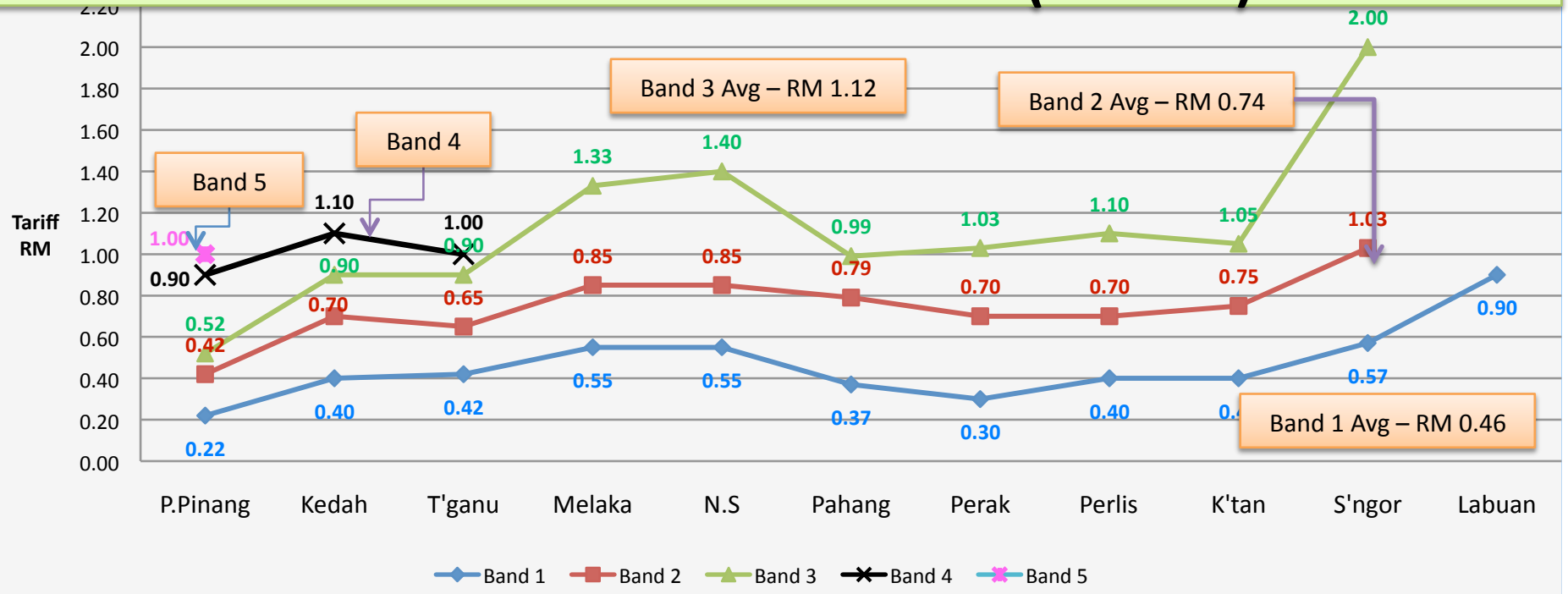
- Natural increase in demand due to population growth, urbanization and industrialization
- Loss of Water
  - Physical loss
  - Commercial loss
- Infrastructure built-up that lags behind demand

PER CAPITA USAGE BETWEEN 1998-2008

Water Supply Entities	Year (l/cap/d)										
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
JOHOR	176	185	310	293	187	191	199	201	204	206	207
KEDAH	192	184	281	305	238	323	232	232	234	244	236
KELANTAN	118	113	175	151	106	109	111	111	112	144	142
LABUAN	225	176	367	289	192	202	194	230	214	213	225
MELAKA	NA	172	372	389	194	225	205	210	213	265	268
N.SEMBILAN	175	107	329	327	198	202	197	362	379	237	239
PULAU PINANG	226	265	466	469	287	266	270	273	274	281	285
PAHANG	198	201	273	268	155	162	162	169	173	224	228
PERAK	188	191	251	266	210	213	216	216	216	217	218
PERLIS	211	166	243	261	223	215	228	224	226	215	229
SABAH	134	207	110	137	78	77	103	124	135	126	106
SARAWAK	NA	284	218	220	160	145	155	161	163	130	129
SELANGOR	228	235	319	323	217	194	208	244	212	232	234
TERENGGANU	144	174	288	317	177	180	184	183	187	195	189
NATIONAL AVERAGE	**185**	**190**	**282**	**287**	**187**	**184**	**171**	**172**	**172**	**206**	**205**
Data Source	**JBA, KeTTHA**		**MWIG 2003**		**MWIG 2005**		**MWIG 2006**	**MWIG 2007**		**MWIG 2009**	

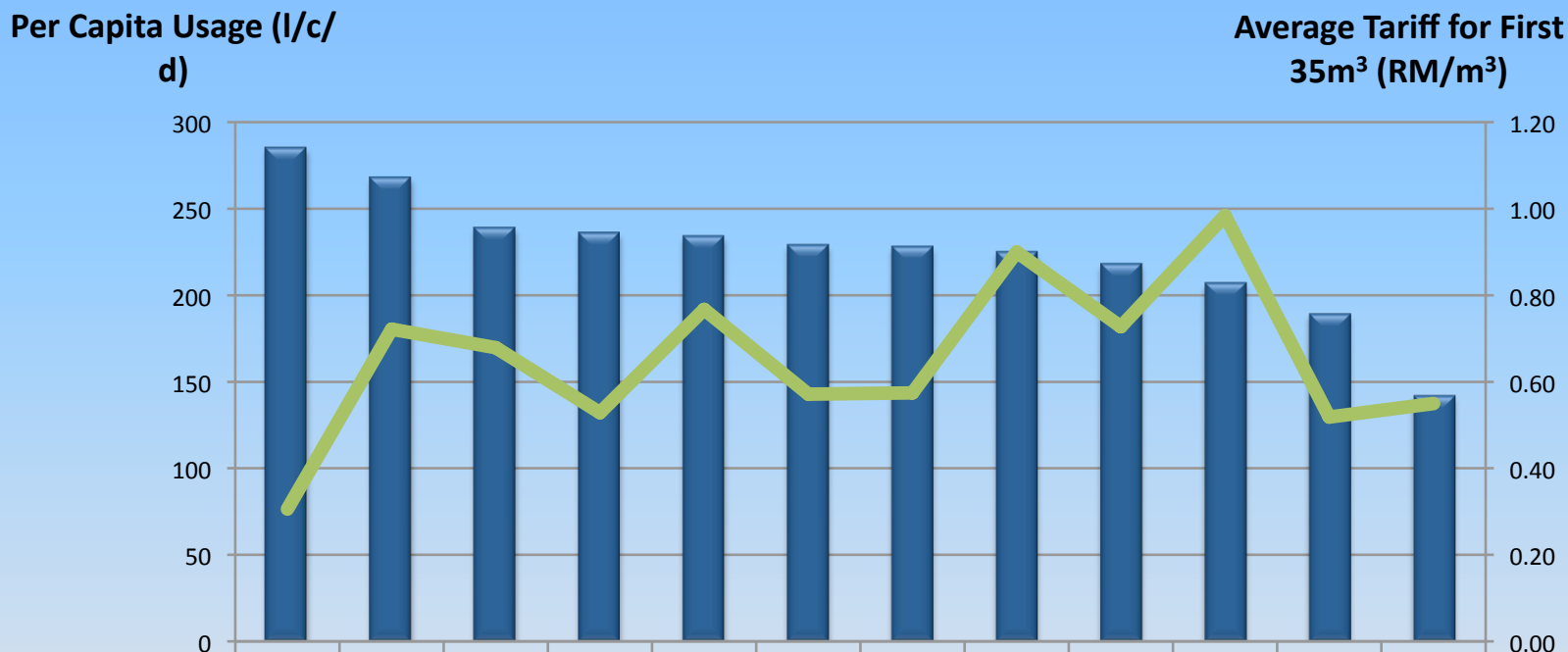
TARIFF STRUCTURE

DOMESTIC TARIFF RATE 2008 (RM/m³)



	P.Pinang	Kedah	T'ganu	Melaka	N.S	Pahang	Perak	Perlis	K'tan	S'ngor	Labuan
Band 1 (m³)	0-20	0-20	0-20	0-15	0-20	0-18	0-10	0-15	0-20	0-20	Every m³
Band 2 (m³)	20-40			15-40	21-35	18-45	11-20	15-40	20-40	21-35	
Band 3 (m³)	40-60	40-60	40-60	> 40	> 35	> 45	> 20	> 40	> 40	> 35	
Band 4 (m³)	60-200	> 60	> 60								
Band 5 (m³)	> 200										

AVERAGE TARIFF (RM/m$^{3)}$ AGAINST PER CAPITA USAGE (l/c/d) FOR 2008



	Pulau Pinang	Melaka	N. Sembilan	Kedah	Selangor	Perlis	Pahang	Labuan	Perak	Johor	T'ganu	Kelantan
Percapita Usage (l/c/d)	285	268	239	236	234	229	228	225	218	207	189	142
Avg Tariff for First 35m3 (RM/m3)	0.31	0.72	0.68	0.53	0.77	0.57	0.57	0.90	0.73	0.98	0.52	0.55

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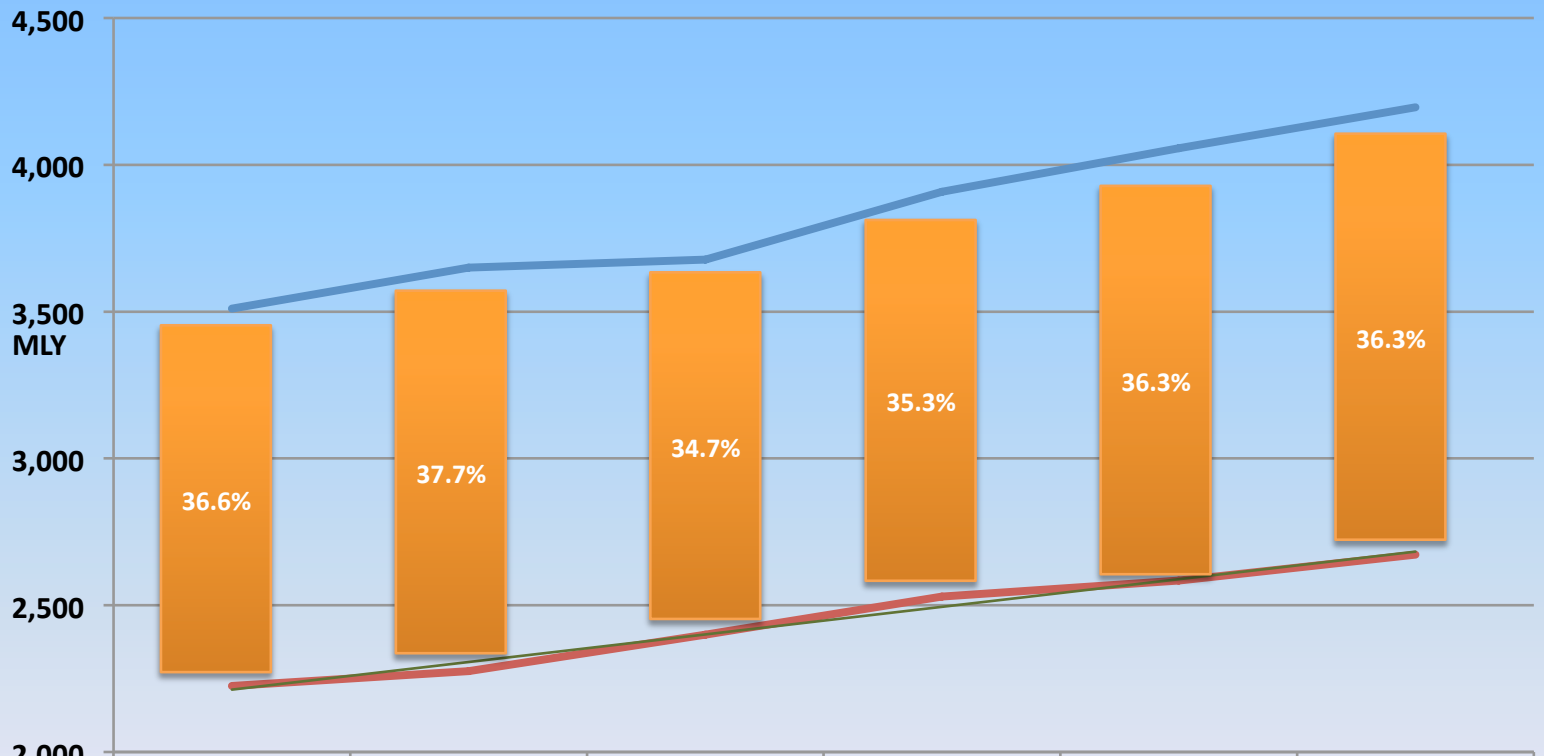
5. MANAGING NON REVENUE WATER LOSSES (1)

NRW% PENINSULAR MALAYSIA AND FT OF LABUAN BETWEEN 2003 AND 2008



	2003	2004	2005	2006	2007	2008
Production MLY	3,510	3,650	3,677	3,908	4,057	4,197
Consumption MLY	2,225	2,275	2,400	2,529	2,584	2,672

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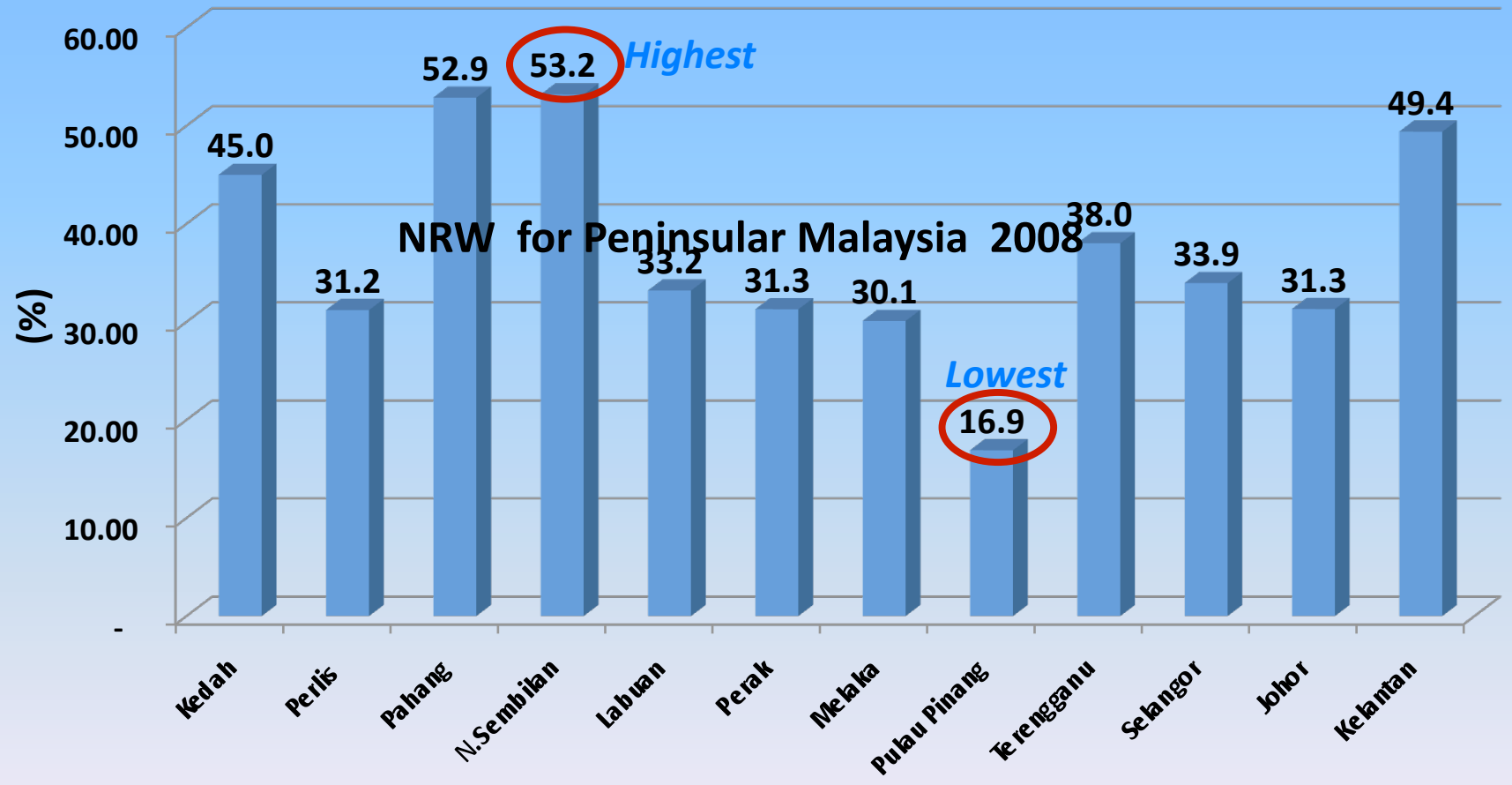
5. MANAGING NON REVENUE WATER LOSSES (2)

NRW FOR PENINSULAR MALAYSIA 2008



Current average NRW is 36%

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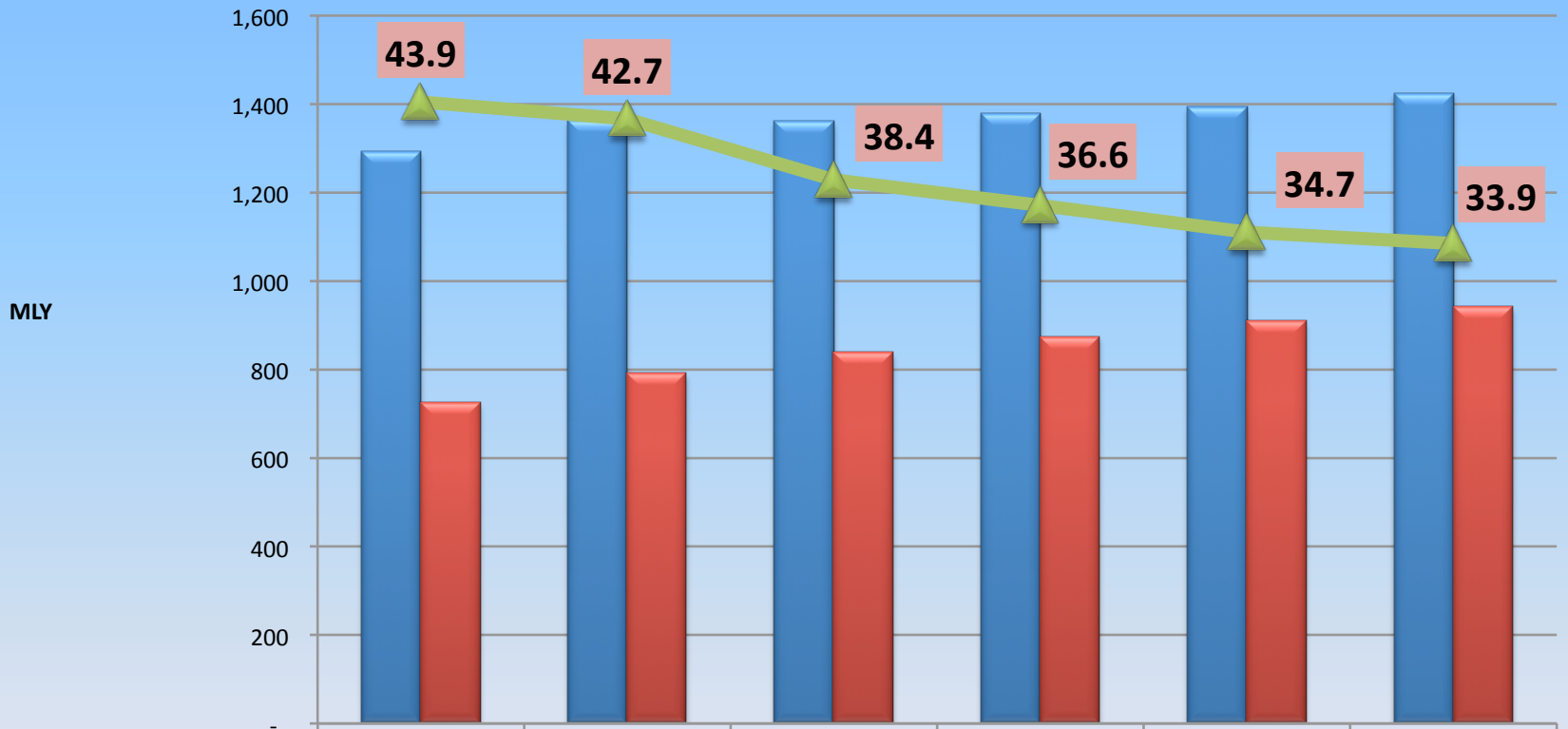
5. MANAGING NON REVENUE WATER LOSSES (3)

NRW% FOR SELANGOR BETWEEN 2003 AND 2008



	2003	2004	2005	2006	2007	2008
Production	1,291	1,364	1,361	1,378	1,392	1,423
Metered Consumption	724	791	838	873	908	940
NRW%	43.9	42.7	38.4	36.6	34.7	33.9

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5. MANAGING NON REVENUE WATER LOSSES (4)

- Under the 9th Malaysian Plan it is targeted to reduce NRW to 25% by 2015
- The NRW is influenced by
  - Deterioration of pipe network
  - System pressure
  - Metering inaccuracies & billing inefficiencies
  - Illegal connections
- As water resources get more limited we need to emphasize on reducing NRW volumes

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5. MANAGING NON REVENUE WATER LOSSES (5)

- Based on total volume of water produced in year 2008 at **4,196,000 MLY** and a national average NRW of **36.3%**, the total volume of water that does not bring in revenue is **1,524,000MLY**
- Loss of revenue as a result of leakages:
  - For physical losses **(1,220,000 MLY)** - based on unit production costs of the respective states or the bulk supply rate whichever is applicable, the approximate loss in additional operating expenditure is **RM434 million**
  - For commercial losses **(304,000 MLY)** – based on average tariff* of the respective states, the approximate loss in revenue is **RM325 million**

*based on first 35 m^3 for domestic
first 500 m^3 for commercial

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WHAT IS THE SAVING IN ACHIEVING THE NATIONAL AVERAGE NRW OF 25% by 2015?

- To reduce the national average NRW of **36%** to **25%** would put back a total of **475,000* MLY** into the system for consumption and giving an extra revenue of approximately **RM488 million**
  - For physical losses **(380,000 MLY)** - the approximate revenue put back into the system is **RM390 million**
  - For commercial losses **(95,000 MLY)** - the approximate additional gain in revenue is **RM98 million**
- From the reduction of NRW, it is estimated that about **RM 1.67 billion** would be saved from CAPEX works for water treatment plants

* Based on 2008 production

5. MANAGING NON REVENUE WATER LOSSES (6)

STRATEGIES TO ADDRESS NRW

Over the years NRW levels in various states are becoming a matter of concern, and a need to identify level of leakage/ NRW through the use of water audit/water balance. Some strategies to address the problem are:

- Meter replacement program – need to be developed in early stages, particularly for large industrial users where old mechanical meters under-records to varying degrees typically 3 to 15%
- Based on age profile of the 6.0 million meters in the country, 1.5 million meters are above 7 years and need to be changed
- It is estimated that about RM75 million need to be spent on meter change program in the immediate term

5. MANAGING NON REVENUE WATER LOSSES (7)

STRATEGIES TO ADDRESS NRW

- Understand the importance of water losses and its multi-dimensional issues
- Establish common NRW definition and computation
- Setting KPI for NRW reduction
- Link asset replacement program to the leakage control strategy
- GIS for distribution mapping and consumers profile

5. MANAGING NON REVENUE WATER LOSSES (8)

STRATEGIES TO ADDRESS NRW

- Establish DMZ
  - Measuring flow and verify consumption
  - Leak detection and repair
  - pressure management
- Use of SCADA and telemetry system at reservoirs in monitoring reservoirs levels
- Systems maintenance
  - meter accuracy testing
  - valve servicing program

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6. OTHER WATER DEMAND MANAGEMENT STRATEGIES (1)

WATER PRICING AND TARIF

- Different tariff rate and structure in different states
- Some states have tariff structures that begin with 0-15m³, 0-20m³ etc
- Subsidy for hardcore poor at lifeline band
- Punitive tariff structure for high users where tariff for lifeline band is to be kept low and thereafter punitive rates be imposed to encourage water conservation
- Tariff increase as an economic tool to achieve ultimate full cost recovery

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6. OTHER WATER DEMAND MANAGEMENT STRATEGIES (2)

NEW WATER SUPPLY RULES

- Under WSIA 2006 - Section 180, SPAN are empowered to make new water supply rules
- SPAN is drafting new Water Supply Rules to replace existing State Water Supply Rules
- The Water Supply Rule will prescribe the minimum engineering standards, specifications and level of service to be applied to all stakeholders, developers, contractors, consultants, plumbers and others in the planning, design, construction, operation and maintenance of water distribution and internal plumbing systems.
- Scheduled to be gazetted early 2010
- New Water Supply Rules also addresses water conservation measures which includes:
  - Mandatory installation of dual-flush WC cistern
  - Plumbing requirements for rainwater harvesting

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6. OTHER WATER DEMAND MANAGEMENT STRATEGIES (3)

REVISION OF WATER SUPPLY RULES

- Water Supply Rules can be reviewed from time to time to include other water conservation/demand management practices:
  - Installations of water efficient fittings (e.g. taps, shower heads, urinals)
  - Installations of water saving devices (e.g. water saving bags, constant flow regulators, thimbles)
  - Use of water efficient washing machines
  - Introduction of water efficiency labelling scheme
  - registration of water efficient products
    - ✓ As practised by developed countries e.g. Singapore

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6. OTHER WATER DEMAND MANAGEMENT STRATEGIES (4)

- Water Efficiency Plan
  - Promote non-domestic high volume user to develop and implement Water Efficiency Plan
    - Industries, Government buildings, Hospitals, Mosques
    - Universities, School, Hotels, Commercial buildings (e.g. Shopping complexes)
- Water Reuse and Recycle
  - Wastewater can be reused for non-domestic purposes such as landscape irrigation and Industrial
  - IWK is carrying out R & D on reuse of wastewater from big sewerage treatment plants

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6. OTHER WATER DEMAND MANAGEMENT STRATEGIES (5)

- Awareness program
  - Public campaign to educate consumers in reducing water wastage
  - Water Forum established under WSIA in July 2008 plays prominent role in promoting public awareness in water conservation
  - Mass media participation as a communication platform in disseminating information to the public and encourage changes in consumer behavior on water usage

7. CONCLUSION

Good water demand management can

- ensure appropriate and timely financial deployment for water infra-structure development
- achieve efficient use of water resources by managing balance between supply and water demand
- increase in resource use efficiency that could conserve and increase the sustainability of long term resource availability

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Water Restructuring Progress

State	Licence issued	Corporatization	Transfer of Assets and Liabilities	
			Completed	On-going negotiations
Melaka	**To be issued**	√ (before WSIA)	√	
N. Sembilan	√	√	√	
Johor	√	Privatized	√	
Selangor		Privatized		√
Pahang		Approved by Federal Government but not implemented		√
Perlis		In the process of getting Federal Government's approval		√
Kedah		In the process of getting Federal Government's approval		√
Perak		In the process		√
Terengganu		√ (before WSIA)		
Kelantan	**To be issued**	Privatized		√
Pulau Pinang		√ (before WSIA)		√
Labuan		In the process		

PUB SINGAPORE'S "WATER EFFICIENCY LABELLING SCHEME"

PRODUCTS/FITTINGS	FLOW RATE/ FLUSH CAPACITY REQUIREMENTS			
Under Mandatory WELS	**Zero Tick** ✗	**Good** ✓	**Very Good** ✓✓	**Excellent** ✓✓✓
Shower Taps & Mixers (Pressure Range from 0.5 to 5.5 bar)	> 9 litres/min	> 7 to 9 litres/min	> 5 to 7 litres/min	5 litres/min or less
Basin Taps & Mixers (Pressure Range from 0.5 to 5.5 bars)	> 6 litres/min	> 4 to 6 litres/min	> 2 to 4 litres/min	2 litres/min or less
Sink/Bib Taps & Mixers (Pressure Range from 0.5 to 5.5 bars)	> 8 litres/min	> 6 to 8 litres/min	> 4 to 6 litres/min	4 litres/min or less
Flushing Cisterns (Per Flush)	NA	Dual Flush > 4 to 4.5 litres (full flush) > 2.5 to 3 litres (reduced flush)	Dual Flush > 3.5 to 4.0 litres (full flush) > 2.5 to 3 litres (reduced flush)	Dual Flush 3.5 litres or less(++) (full flush) 2.5 litres or less (reduced flush)
Urinals & Urinal Flush Valve (Per Flush)	NA	> 1 to 1.5 litres	> 0.5 to 1 litres	0.5 litres or less(++) or waterless urinals
Under Voluntary WELS	**Zero Tick** ✗	**Good** ✓	**Very Good** ✓✓	**Excellent** ✓✓✓
Showerheads (Pressure Range from 0.5 to 5.5 bars)	NA	> 7 to 9 litres/min	> 5 to 7 litres/min	5 litres/min or less
Clothes Washing Machines (Per Washload)	NA	> 12 to 15 litres/kg	> 9 to 12 litres/kg	9 litres/kg or less

6. OTHER WATER DEMAND MANAGEMENT STRATEGIES (3)

- Dual Flush Cistern
  - Identified as an effective water conservation measure since 1990s
  - Cabinet through Ministry of Housing and Local Government (KPKT) had issued circulars in year 2000 to all State Governments and Local Authorities on installation of single 6 litres flush or dual 6/3 litres flush WC cistern as water conservation measure
    - Immediate installation for all government buildings
    - Installation for private buildings as of 1 June 2002
  - As it is an option, use of dual flush cistern is not common.
  - SPAN has organized consultations with stakeholders (developers, government agencies, water operators and manufacturers) on use of dual flush WC cistern
  - Under the new Water Supply Rules, installation of dual flush WC cistern will be **mandatory** for new housing schemes and other types of buildings effective from **1 January 2012**

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6. OTHER WATER DEMAND MANAGEMENT STRATEGIES (3)

- Dual Flush Cistern (Contd..)
  - Estimate of average daily domestic use
    - Toilet 30%
    - Bath / Shower 28%
    - Clothes Washing 20%
    - Cleaning 15%
    - Cooking / Drinking 4%
    - Leaks 2%
  - Estimated savings if dual-flush cistern (6/3 litres) is to be used
    - Single Flush 6 litres
      5 x 6 lit = 30 lit
    - Dual Flush 6 / 3 litres
      1 x 6 lit (Full Flush) = 6 lit
      4 x 3 lit (Reduced Flush) = 12 lit
      Total = 18 lit (Savings of 12 litres or 12 % of average daily consumption)
  - Estimated savings in consumption (2008 figures)
    - Domestic Consumption = 12% of 5,481 MLD = 658 MLD
      or Overall Consumption = 658 / 8,362 MLD = **7.8%**

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6. OTHER WATER DEMAND MANAGEMENT STRATEGIES (3)

- Dual Flush Cistern (Contd..)
  - Another direct benefit of installing dual–flush cistern is lower volume of wastewater which results in lower pumping cost in the operation of sewerage system.

TARIFF STRUCTURE

DOMESTIC TARIFF RATE 2008 (RM/m³)

Consumption Level	m³/month	State Water Authority										Concession Company		Total
		Pulau Pinang	Melaka	Negeri Sembilan	Pahang	Perak	Kedah	Perlis	Labuan	Kelantan	Terengganu	Johor	Selangor	
1	0-10					0.3								1
	0-15		0.55					0.40				0.38		3
	0-18				0.37									1
	0-20	0.22		0.55			0.40			0.40	0.42		0.57	6
	Every m³								0.90					1
2	11-20					0.70								1
	15-40		0.85					0.70						2
	16-30											1.31		1
	18-45				0.79									1
	20-40	0.42					0.70			0.75	0.65			4
	21-35			0.85									1.03	2
3	> 20					1.03								1
	31-45											1.82		1
	> 35			1.40									2.00	2
	40-60	0.52					0.90				0.90			3
	> 40		1.33					1.10		1.05				3
	> 45				0.99									1
4	46-100											2.20		1
	60-200	0.90												1
	> 60						1.10				1.00			2
5	> 100											2.23		1
	> 200	1.00												1
Minimum Payment		2.50	4.00	5.00	3.00	3.00	3.20	4.00	4.00	4.00	4.00	4.00	6.00	12

TARIFF STRUCTURE

COMMERCIAL TARIFF RATE 2008 (RM/m³)

Consumption Level	m³/month	State Water Authority										Concession Company		Total
		Pulau Pinang	Melaka	Negeri Sembilan	Pahang	Perak	Kedah	Perlis	Labuan	Kelantan	Terengganu	Johor	Selangor	
1	0-10					1.20								1
	0-20	0.52										2.22		2
	0-35			1.50									2.07	2
	0-70										0.95			1
	0-227				0.92									1
	0-10,000						1.20							1
	Any Usage		1.47					1.30	0.90	1.25				4
2	> 20											2.96		1
	> 35			1.60									2.28	2
	> 70										1.15			1
	> 227				0.84									1
	10-50,000						1.40							1
	11-20					1.40								1
	20-40	0.70												1
3	> 20					1.61								1
	> 50,000						1.80							1
	40-200	0.90												1
4	> 200	1.00												1
Minimum Payment		10.00	15.00	15.00	30.00	12.00	10.00	5.00	4.00	12.50	15.00	18.48	36.00	24