Ensuring Quality and Efficient Water and Sewerage Services

Strategy Paper

16

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I. INTRODUCTION

16.1 The provision of quality and efficient water and sewerage services is essential in ensuring a high quality of life and facilitating economic development. The aim of the Tenth Malaysia Plan (Tenth Plan), 2011-2015, in relation to the water services industry, was to improve and strengthen water supply and sewerage services to ensure its sustainability. Measures undertaken during the Tenth Plan period have produced positive results in terms of both coverage and quality of water supply and sewerage services. Nevertheless, water services continues to face issues related to supply and security, high non-revenue water (NRW) and low coverage in rural areas especially in Kelantan, Sabah and Sarawak. As for sewerage services, low coverage of connected services and non-compliance to environmental standards have hampered efforts to provide quality services and safeguard the environment.

16.2 The objective towards establishing a resilient and sustainable water services industry will be pursued in the Eleventh Malaysia Plan (Eleventh Plan), 2016-2020, with a focus on improving its connectivity and accessibility. Further emphasis will be given to improve management of supply and demand, enhance the resilience of the industry and reduce its dependence on the Government.

II. TENTH MALAYSIA PLAN, 2011-2015: PROGRESS

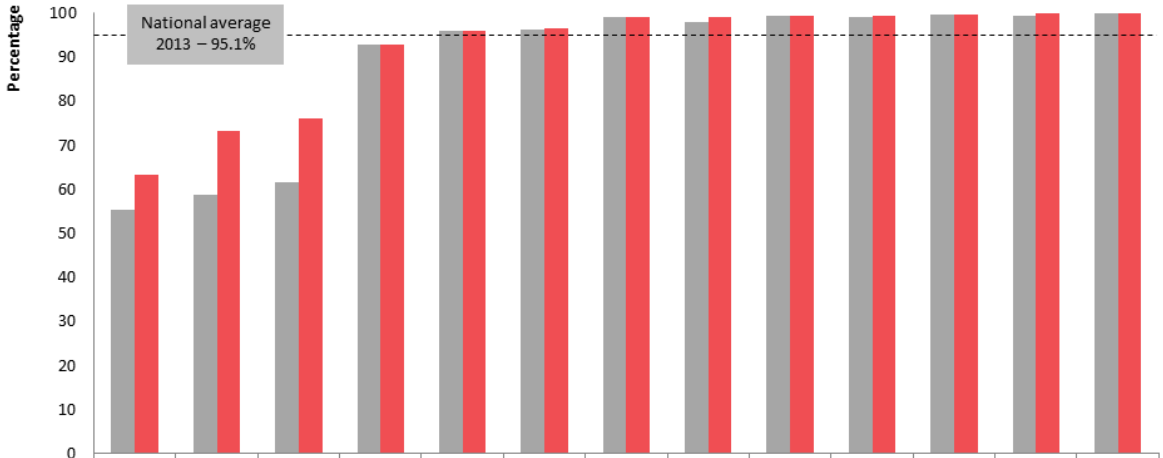
16.3 During the Tenth Plan, efforts were undertaken to expand the coverage of clean and treated water especially to rural areas in the east coast of Peninsula, Sabah and Sarawak. In addition, the Government has also undertaken construction and upgrading of sewerage facilities to improve quality of life.

Water Supply

16.4 More people are now enjoying clean and treated water supply. As of 2013, treated water supply covered 95.1% of the population as compared to 94.2% in 2010. The coverage is expected to reach 96% by end of 2015. Most states have recorded more than 99% coverage in urban areas except Kelantan, which recorded 59.5%. Meanwhile, rural coverage for Kelantan, Sabah and Sarawak remained below 80%, with Kelantan registering only 63% in 2013. The lower coverage in Kelantan was mainly due to preferences of people in using alternative sources such as tube wells and underground sources. For rural Sabah and Sarawak, geographical and agglomeration factors led to high infrastructure cost, resulting in low coverage. Water coverage by population served is shown in *Exhibit 16-1* for rural and *Exhibit 16-2* for urban.

Exhibit 16-1

The Percentage of Rural Water Supply Coverage by State, 2010 and 2013

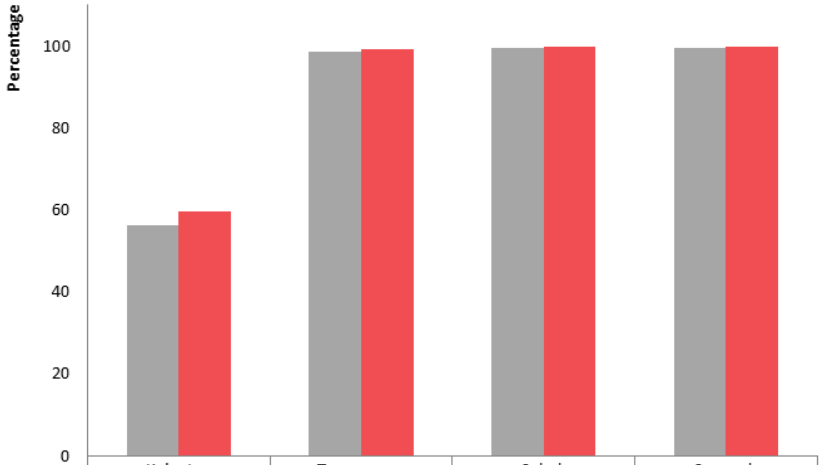


	Kelantan	Sabah	Sarawak	Terengganu	Pahang	Kedah	Perlis	Perak	Johor	Selangor	Pulau Pinang	N. Sembilan	FT Labuan
2010	55.2	58.6	61.7	92.7	96.0	96.3	99.0	98.0	99.5	99.0	99.7	99.5	100.0
2013	63.4	73.1	76.0	92.9	96.0	96.5	99.0	99.2	99.5	99.5	99.7	99.8	100.0

Note: Selangor includes FT Kuala Lumpur and FT Putrajaya
Source: Suruhanjaya Perkhidmatan Air Negara

Exhibit 16-2

The Percentage of Urban Water Supply Coverage by Selected State, 2010 and 2013



	Kelantan	Terengganu	Sabah	Sarawak
2010	56.2	98.6	99.5	99.5
2013	59.5	99.1	99.8	99.7

Source: Suruhanjaya Perkhidmatan Air Negara

16.5 Efforts to improve rural infrastructure have been undertaken extensively by the Government, which resulted in marked increase of treated water supply coverage. Kelantan recorded an increase of 8.2% from 55.2% in 2010 to 63.4% in 2013. Sabah and Sarawak also recorded an encouraging increase of 14.5% to 73.1% and 14.3% to 76% respectively. The increased coverage is a testimony of successful programmes and projects implemented at federal and state levels. An example of such programme is the National Key Results Area

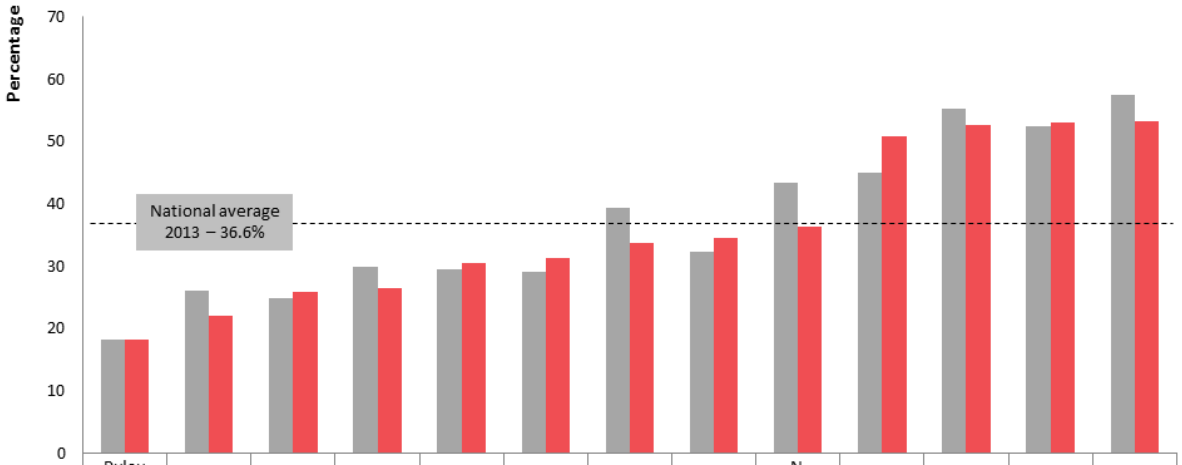
(NKRA) for Rural Basic Infrastructure where 320,000 homes were served with treated water supply as of 2014, exceeding the initial target of 300,000 homes.

16.6 During the Tenth Plan period, construction and upgrading works on new and existing infrastructure were also carried out to ensure continuity of supply and services to meet increasing demand. As of 2013, 24 new treatment plants were completed and commissioned while 38 treatment plants were upgraded. These projects resulted in the increase of design production capacity up to 18,421 million litre per day (mld). Currently, these plants produce 15,536 mld. In addition, the use of horizontal collector wells as part of the raw water intake system was also successfully implemented for the Jeli Water Treatment Plant in Kelantan. The introduction of this intake system brought added value such as improvements in turbidity quality by more than 50 times; reduction of chemical use in treatment process up to 70%; reduction in cost of electricity by 25%, which reduced the overall operation costs by 70%.

16.7 Despite efforts to improve the management of water supply and its distribution, the percentage of NRW increased. In 2013, the national average for NRW was 36.6% as compared to 36.3% in 2010. In some states, the rate was much higher at 62.4% in Perlis, 53.2% in Sabah and 50.9% in Kedah, as shown in *Exhibit 16-3*. During the plan period, the major infrastructure works to comprehensively address the problem were replacement of 10,000 water meters and 4,288 kilometres of pipes as well as implementation of 36 district metering zones.

Exhibit 16-3

Non-Revenue Water in 2010 and 2013



	Pulau Pinang	Melaka	FT Labuan	Johor	Perak	Sarawak	Terengganu	Selangor	N. Sembilan	Kedah	Pahang	Kelantan	Sabah
2010	18.2	26	24.9	29.9	29.4	29	39.4	32.4	43.4	44.9	55.3	52.4	57.4
2013	18.2	22.1	25.9	26.4	30.4	31.3	33.8	34.5	36.3	50.9	52.7	53.1	53.2

Note: Selangor includes FT Kuala Lumpur and FT Putrajaya
Source: Suruhanjaya Perkhidmatan Air Negara

Sewerage

16.8 In the Tenth Plan period, the Government continued to pursue its agenda in restructuring the industry to make it sustainable and less dependent on Government. Three major initiatives were endorsed as follows:

- Establishment of a National Sewerage Company (NASCo)
- Revisiting the sewerage tariff policy
- Financing capital expenditure through privatisation

16.9 The total population equivalent (PE) is expected to increase from 37.7 million in 2010 to 40.7 million by 2015, as shown in *Exhibit 16-4*. During the same period, connected accounts with grid services are expected to reach 3.4 million with handling capacity of 26.1 million PE. This represents 63.0% of total national current PE by grid services. Seven states registered more than the national average with the Federal Territory of Putrajaya achieving 100% coverage, and nine others states remained below national average, as shown in *Exhibit 16-5*.

Exhibit 16-4

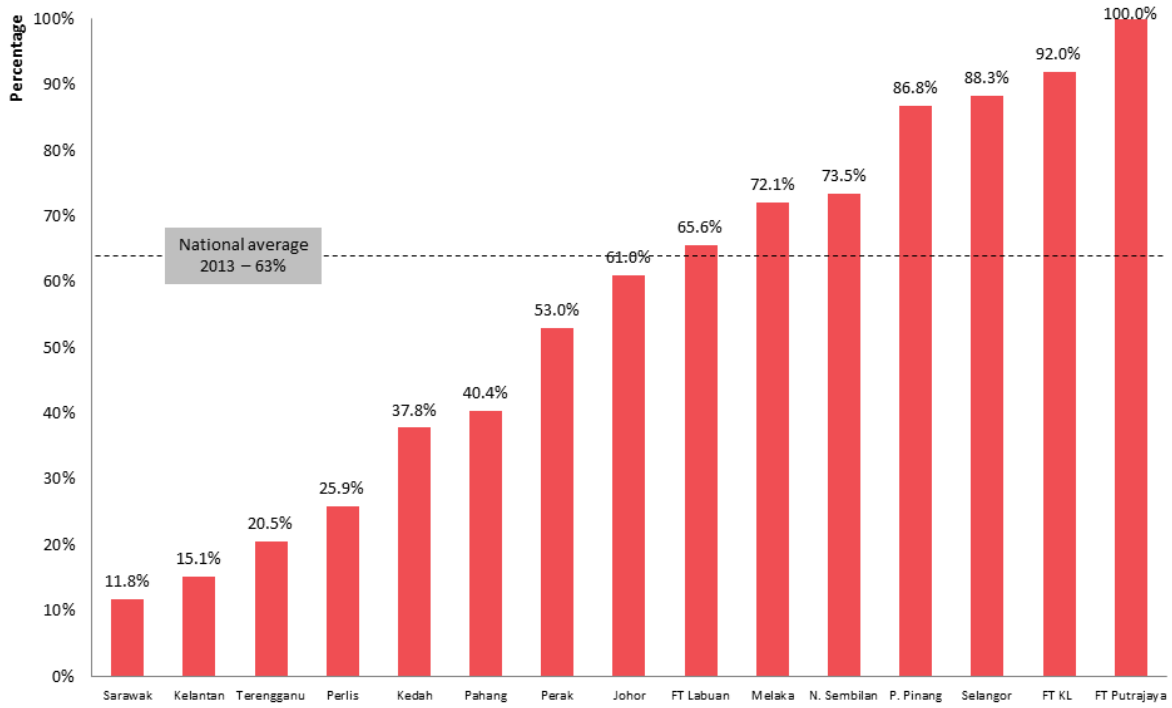
Sewerage Systems Capacity, 2010 – 2013

Sewerage Systems	2010			2013		
	Quantity	PE	%	Quantity	PE	%
Connected Services						
Public Treatment Plant	5,845	19,658,783	*54.0*	6,258	21,792,168	*56.0*
Private Treatment Plant	2,453	2,766,906	*8.0*	2,911	2,801,326	*7.0*
Sub-total	8,298	22,425,689	*62.0*	9,169	24,593,494	*63.0*
Non-Connected Systems						
Communal Septic Tank	4,450	547,734	*2.0*	4,461	535,042	*1.0*
Individual Septic Tank	1,624,047	8,235,365	*23.0*	1,708,226	8,676,962	*22.0*
Pour Flush	1,011,713	5,058,563	*14.0*	1,011,713	5,058,563	*13.0*
Sub - total	2,640,210	13,841,662	38.0	2,724,400	14,270,567	37.0
Total	**2,640,210**	**13,841,662**	***38.0***	**2,724,400**	**14,270,567**	***37.0***

Note: Data excludes Sabah

Source: Economi Planning Unit and Suruhanjaya Perkhidmatan Air Negara

Exhibit 16-5
Coverage of Connected Population Equivalent by States, 2013



Note: Data excludes Sabah
Source: Economi Planning Unit and Suruhanjaya Perkhidmatan Air Negara

16.10 In the Tenth Malaysia Plan, projects worth RM10.3 billion were approved to modernise sewerage infrastructure. Regional and centralised plants were developed to rationalise small and community level sewage treatment plants (STPs). As of 2013, 227 small STPs were rationalised. As part of the Greater Kuala Lumpur/Klang Valley (GKL/KV) initiative, RM5.6 billion was allocated to improve sewerage infrastructure to contribute to better liveable environment in this region. Allocation was also given to improve sewerage infrastructure especially for main urban conurbations, such as Penang, Kuching and Iskandar Malaysia.

III. ISSUES AND CHALLENGES

16.11 The provision of quality water and sewerage services has become more challenging due to rapid urbanisation and economic development. Added to this challenge is the need to comprehensively restructure these services in terms of industry structure and their regulatory policy to be in line with current requirements and market needs.

Water Supply

16.12 Four main challenges faced in the provision of efficient water services are reliability of water supply, high NRW, lack of industry sustainability and limited coverage of treated water especially for rural areas.

Reliability of Water Supply

16.13 More than 90% of water supply in Malaysia is from rivers. Therefore optimisation of the yields from unregulated flows of rivers is crucial in water supply management. The National Water Resource Study, 2000-2050 (Reviewed 2012) by the National Hydraulic Research Institute of Malaysia (NAHRIM) identified five states, namely Kedah, Melaka, Perlis, Pulau Pinang and Selangor, as vulnerable and had begun to experience deficit of unregulated river flows, since 2010. This is further compounded by pollution of rivers where sewage contributed 47.8%. In addition, changing rainfall patterns and rising sea levels have also impacted water sources.

16.14 The development of new areas and expansion in economic activities have increased demand for water supply. The expansion of water supply infrastructure is unable to meet this growing demand, particularly in water deficit areas with rapid development.

High NRW

16.15 In 2013, NRW recorded 36.6% which was considerably higher than that of Bangkok, Thailand at 25%, France at 26% and Singapore at 5%. This NRW losses was equivalent to 5,694 mld, which cost the industry RM2.5 billion to produce. Commercial losses, old network of pipes and poor workmanship by contractors especially in new development areas were the main reasons for NRW losses. In addition, water operators lacked the capacity to effectively manage NRW.

Lack of Industry Sustainability

16.16 Currently, water services are not self-sustaining due to high operations cost, low tariffs and dated technology. These have affected water services expansion plans and maintenance, leading to inefficiency. In addition, five states namely Kedah, Kelantan, Pahang, Selangor and Terengganu have yet to migrate to the new licensing regime, which promotes full cost recovery, as prescribed in the Water Services Industry Act (WSIA) 2006.

Limited Coverage of Clean and Treated Water

16.17 Water supply coverage in the rural areas of Kelantan, Sabah and Sarawak is lower than the national average of 92.5%. This is due to their remoteness locations, low population density, difficult terrain and poor infrastructure access, which requires high cost in providing water supply. Low economies of scale poses further challenges in commissioning services equivalent to that provided in urban areas.

Sewerage

16.18 The sewerage industry is facing the lack of sustainability as a result of high operation and maintenance costs, and environmental threats from non-connected systems.

High Operational and Maintenance Cost

16.19 As of 2014, service operators manage about 6,000 plants with an expected annual increase of 200 sewerage treatment plants. Each plant incurs an annual operations and maintenance cost of about RM1 million to RM3 million, which is a financial burden to the operators given that revenue from sewerage tariffs are below operational costs. In addition, it is more costly to maintain old treatment plants.

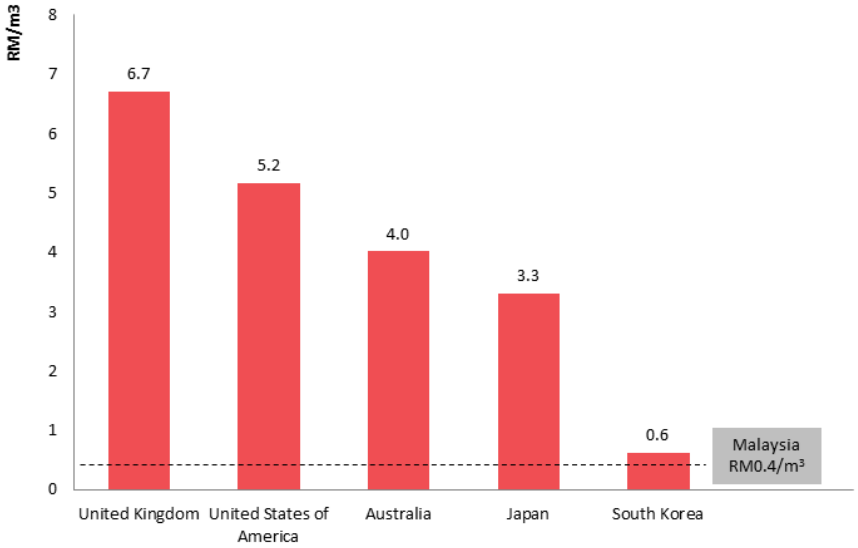
Environmental Threats from Non-Connected Systems

16.20 Although poorly maintained connected sewerage facilities contribute about 47.8% of water pollution point sources, greater environmental and health concerns arise from non-connected systems such as septic tank and pour flush systems. These systems represent 37% of total PE and are not regulated under the EQA 1974. These systems, mostly found in suburban and rural areas, discharge untreated effluent and sludge directly into water bodies.

Lack of Sustainability

16.21 For the past 10 years, service operators have received financial assistance both in the form of subsidies and soft loans as their revenue is inadequate. The current tariff is low at RM0.40/m^3 compared with the United Kingdom at RM6.70/m^3 and the United States of America at RM5.17/m^3, as shown in *Exhibit 16-6*.

Exhibit 16-6
Tariff Comparison between Selected Countries, 2014



Source: Indah Water Konsortium Sdn. Bhd.

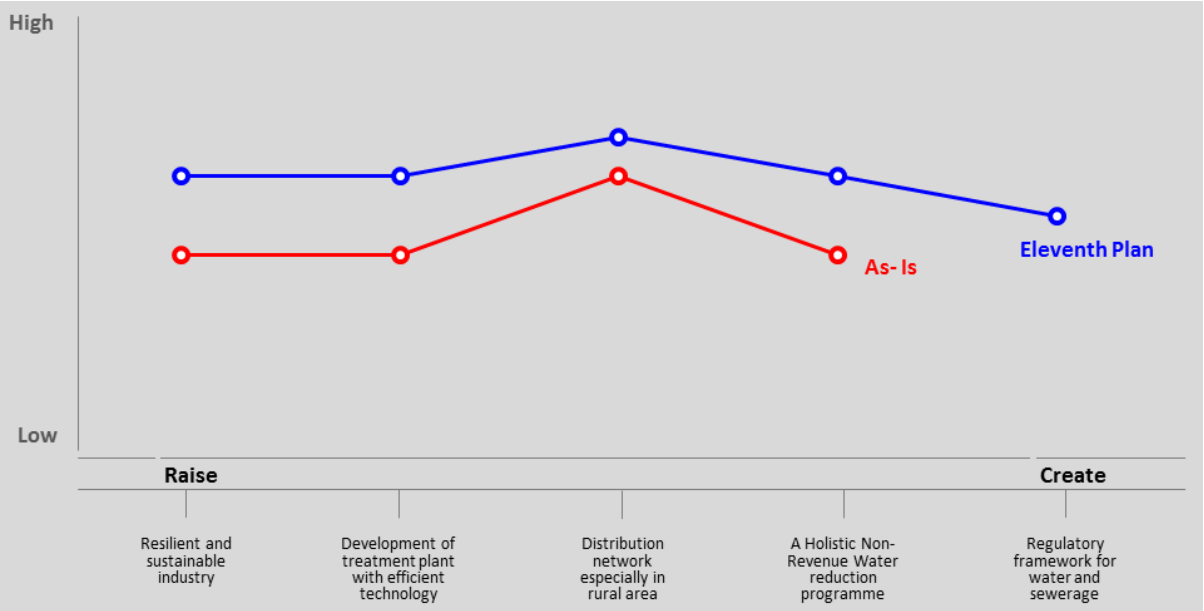
IV. ELEVENTH MALAYSIA PLAN, 2016-2020: WAY FORWARD

16.22 The Eleventh Plan will continue to focus on improving quality and efficiency of the water services industry towards protection of long-term financial sustainability and enable continuous renewal. These will serve as a strong foundation in achieving targets of 99% clean and treated water while reducing NRW to 25%. The Government also aims to increase coverage of sewerage connected services up to 80% for main urban cities. To achieve these targets, four initiatives have been identified as follows:

- Raising the financial sustainability of the water services industry
- Expanding network and treatment plant capacity through infrastructure investment and use of efficient technology
- Increasing efficiency and productivity of water and sewerage services
- Strengthening the regulatory framework of the water services industry

16.23 These initiatives will be implemented through strategies as shown in *Exhibit 16-7*:

Exhibit 16-7
Strategy Canvas for Water Services Industry



Raising the Financial Sustainability of the Water Services Industry

16.24 Strategies will be undertaken to increase revenue and reduce operating costs. In this regard, initiatives will include strengthening tariff setting mechanism, implementing joint billing for water and sewerage and promoting industry sustainability.

Strengthening the Tariff Setting Mechanism

16.25 Under the Plan, water tariff and operation cost increases will be streamlined using better tariff setting mechanisms. Under this mechanism, capital expenditure for water distribution will be financed by the Perbadanan Aset Air Berhad (PAAB), reducing the amount of financial support required from the Government. The Facility Agreement with the operators will be used as a tool by PAAB to facilitate recovery of capital as well as marginal cost of operations and maintenance. This will ultimately ensure that water services operators are financially sustainable.

16.26 Suruhanjaya Perkhidmatan Air Negara (SPAN) will be tasked to undertake the implementation of a holistic tariff setting mechanism for sewerage services to reflect actual operational costs. An increase in revenue will help service operators cover operational cost. This will ensure that service operators are able to carry out scheduled maintenance, minimising incidences of non-compliance and safeguarding the environment. The tariff will be reviewed every three years for economic viability.

Implementation of Joint Billing for Water and Sewerage Services

16.27 WSIA aims to integrate both water and sewerage services as a single industry. Towards this end, a joint billing exercise between water and sewerage services will be implemented based on volumetric formula for sewerage tariffs. In joint billing, the charges will be based on actual water consumption as opposed to the current fixed rates. This is expected to increase collection rates by 20% to 30% for sewerage services, allowing operators to be financially sustainable.

Promoting Greater Efficiency in Financial and Operational Management of Operators

16.28 Governance of the industry will be strengthened by improving the efficiency of financial and operational management of the operators. Among others, a rationalisation programme of sewerage treatment plants will ensure the plants are economic to maintain. Privatisation will be explored as an alternative source of funding for sewerage infrastructure development. Service operators will also be encouraged to further improve their operations through the introduction of efficient standard operating procedures. In addition, waste to wealth initiatives will be actively promoted for sewerage operators through specific guidelines.

Expanding Network and Treatment Plant Capacity Through Infrastructure Investment and Use of Efficient Technology

16.29 The Government will continue to enhance the capacity of treatment plants by developing new treatment plants, increasing reserve margin water supply, coverage of clean and treated water and expanding connected sewerage services in rural areas.

Developing New Treatment Plants

16.30 The Government will ensure water supply sustainability, especially in stressed areas, by constructing new treatment plants or upgrading existing ones. Focus will be given to states which have water supply reserve margin of less than 10% such as Kedah (0%), Selangor (4.5%) and Negeri Sembilan (7.5%). With the completion of the Langat 2 Water Treatment Plant (WTP), the water supply reserve margin for Selangor will reach 14%. Similarly, the upgrading of the Kulim Hi-Tech WTP and Batu Kitang WTP will increase reserve margins for the Kulim Hi-Tech Industrial Park to 10% and Kuching, 13%.

Increasing Clean and Treated Water Coverage

16.31 The Government aims to have 99% of the population served by clean and treated water by 2020. Alternative water supply systems such as rain water harvesting, tube wells and gravity feed systems will be expanded in rural areas- particularly in Kelantan, Pahang, Sabah and Sarawak. Efforts to expand connected water supply coverage in these states will continue, supplemented by these alternative systems. These systems will be tailored to local requirements, geographical considerations while emphasising cost effectiveness. Rain water harvesting systems will be adopted in remote areas with high rainfall while gravity feed systems will be adopted in highland areas with limited access.

Expanding Connected Sewerage Services in Rural Areas

16.32 Connected sewerage services will be extended to rural areas through solutions tailored for population agglomerations of less than 5,000 people. This will reduce the use of individual septic tank and pour flush systems which are both major threats to the environment and public health, resulting in a two million population equivalent reduction. Priority will be given to areas bordering water sources and polluted rivers.

Increasing Efficiency and Productivity of Water and Sewerage Services

16.33 The efficiency of water and sewerage services will be increased through the implementation of a holistic Non-Revenue Water Reduction Programme as well as rationalisation and upgrading of sewage treatment plants.

Implementing a Holistic Non-Revenue Water Reduction Programme

16.34 During the Eleventh Plan, NRW will be reduced from 36.6% in 2013 to 25%, with the implementation of a holistic programme. The reduction of 11% NRW will result in a potential revenue of up to RM410 million annually by saving 1,710 mld of water loss. One of the initiatives is to develop comprehensive district metering zones, which also include meter and pipe replacement programmes and pressure control management. The implementation of district metering zones will help operators manage consumer accounts efficiently and curb NRW. Enforcement on illegal tapping will also be given priority. Regulations to require contractors to only use trained workers in pipe works will be enforced.

Rationalising and Upgrading Sewage Treatment Plants

16.35 In the Eleventh Plan, 3,000 small inefficient sewage treatment plants will be rationalised through the construction of regional centralised plants with larger capacities and more efficient technologies. These plants will be considered for areas that have sufficient demand. In areas where such plants are not feasible, existing treatment plants will be upgraded with new mechanical and electrical components to ensure effluent levels are compliant with standards. This rationalisation is expected to reduce electricity cost and manpower requirement by 50%. Alternative financing methods based on privatisation concepts will be continued as a source of funding.

Strengthening the Regulatory Framework of the Water Services Industry

16.36 A comprehensive policy will be developed to guide the water services industry towards sustainability. This comprehensive policy will include the development of the National Sewerage Master Plan and a water demand management master plan.

Establishing a Water Demand Management Master Plan

16.37 The Ministry of Energy, Green Technology and Water (*KeTTHA)* will develop a master plan on water demand management for water supply, which will enable better demand management and provide tools to forecast water demand. Priority will be given to reduce the use of treated water for non-potable uses by using alternative water sources such as rain water harvesting, storm water and treated waste water. The revision of tariffs will also be used as a water demand management tool. In addition, communications, public awareness and education programmes will be intensified to promote the efficient and prudent use of water. Water demand management is further explained in *Box 16-1*.

Box 16-1
Demand Management for Water Supply

Water Demand Management aims at making the **best use of available water and water infrastructure that already exists** by better management. It also promotes a **fair and equitable distribution of water use**, and **increases water productivity** that ultimately supports sustainable development.

Water Demand Management initiatives cut across various areas, namely legislative and legal, technology, operation and management, and social perspectives. These initiatives include:

- Tariff setting mechanism
- Optimising water footprint database
- Addressing NRW
- Efficient treatment and reticulation systems
- Public awareness, education and communication programmes
- Rules and regulation that promotes efficiency and mitigate wastage
- Use of grey water to reduce dependency on fresh water
- Promoting efficient use of appliances especially in new buildings such as rain water harvesting and storm water systems

Note: Grey water is defined as waste water stream generated from household or office building except for the waste water from toilet. Sources of grey water include sinks, showers and baths, clothes washing machines and dishwashers.

Developing the National Sewerage Master Plan

16.38 Suruhanjaya Perkhidmatan Air Negara will develop the National Sewerage Master Plan to provide integrated and holistic long term policy directions and strategic shifts for the sewerage services industry. The master plan will include strategic plans on identification of catchment areas, rationalisation of treatment plants and funding mechanisms. It will also provide appropriate strategies to encourage migration from individual septic tank and pour flush systems to standardised treatment systems, to minimise pollution.

Promoting Waste to Wealth for Sewerage

16.39 Initiatives based on the concept of waste to wealth will be actively promoted for sewerage service operators. These operators will be encouraged to tap sewage by-products. Guidelines will be introduced under the National Sewerage Master Plan to lay necessary requirements to support these initiatives. In addition, service operators will be encouraged to strengthen their standard operating procedures.

V. CONCLUSION

16.40 The Eleventh Plan will focus on establishing a resilient and sustainable water services industry ensuring coverage and accessibility. Efforts to improve quality of services, demand and supply management, operational and financial efficiency will be undertaken to ensure people have access to clean, reliable and affordable water. Through these efforts, the Government will ensure that the coverage of clean and treated water reach 99% while NRW is reduced to 25% by 2020. The provision of quality and efficient water supply and sewerage services will facilitate economic growth and contribute to the well-being of the people.