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MANAGING WATER

Challenges in the Construction of the
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Global Directions towards creating
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PHOTO COURTESY OF Ir. FONG CHEW CHUNG

Perbadanan Bekalan Air Pulau Pinang

THE ROAD TO CORPORATISATION, PUBLIC LISTING & BEYOND

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General Manager,
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Often taken for granted, water is a necessity for life, and water supply is a critical factor for the development and evolution of every community.

The roots of water engineering in Penang can be traced back to 1805, when the first simple aqueduct water supply system was established to serve 10,000 people in George Town. At that time, Penang was a British colony with a thriving port, and this public utility system was the first of its kind to be established in Malaysia.

The availability of public water supply helped the state, and its people, to progress and prosper as a centre for entrepot until 1969, when Penang's free port status was rescinded.

Following this setback, Penang turned to industrialisation as its primary economic engine in the 1970s. Industrialisation marked the beginning of a new, and highly successful, chapter in Penang's history, and transformed its socio-economic landscape.

Driven by rapid developments in the manufacturing sector, as well as related growth in the tourism, services and logistics sectors, Penang further consolidated its position as the most progressive state in the northern region of Peninsular Malaysia, with a highly diverse population in terms of culture, ethnicity and religion.

However, there is a price to pay for such progress and prosperity – due to its small size and

geographic limitations, combined with population growth and escalating industrial water demand, Penang inevitably became a water-stressed state.

Water consumption shot up by 275% in 25 years, from 52,120,428m³ in 1973 to 195,668,297m³ in 1998. With catchments totalling only 6% of its total land area of 1,031 sq km, Penang needed an organisation to effectively manage its water supply in the 21st Century.

In 1999, Perbadanan Bekalan Air Pulau Pinang Sdn Bhd (PBAPP - the Penang Water Supply Corporation Pte Ltd) was incorporated to fulfil this need. The corporatisation of PBAPP heralded the beginning of a new era for sustainable, innovative and professional water supply management in Penang.





PBAPP sustains 100% urban and 99.7% rural water supply coverage in Penang.

As at December 31, 2012, registered water consumption has reached 290,625,401m³, representing a 48% growth in consumption since 1999 (195,801,494m³). Nevertheless, PBAPP continues to sustain 100% urban and 99.7% rural supply coverage, supplying tap water that complies to the Malaysian Ministry of Health's Quality Assurance Programme (QAP) for Drinking Water to 533,916 customers, 24 hours a day, 7 days a week.

CORPORATISATION & PUBLIC LISTING

Water supply-wise, the holistic and integrated

model of corporatisation of PBAPP has stood Penang in good stead since 1999. To this day, PBAPP's scope of activities encompasses the extraction and treatment of raw water, as well as the distribution and billing for treated water.

Corporatisation

This comprehensive business model places all the key responsibilities of water supply upon the shoulders of one entity that manages water supply in totality. As such, PBAPP is able to optimise resources, promote sustainability and prevent misalignments in operational priorities.

Managing water supply is a critical responsibility. Unlike other consumer products, water is a resource that is needed all the time by everyone for all the basic aspects of daily life, including drinking, cooking, cleaning and washing.

In effect, Penang's holistic corporatisation model makes PBAPP responsible, and answerable, to the end-consumers. Everyday, PBAPP has to "deliver", not only in terms of specific tasks such as water extraction, treatment and distribution, but in terms of ensuring that water flows from all taps when they are turned on.

Supply has to be readily available because interruptions would lead to widespread inconveniences, losses and emergencies. Repairs and rectification works have to be carried out promptly. While minimising service interruptions, PBAPP has to consistently plan and implement strategies, programmes and projects that ensure the sustainability of water supply in the future.

Moreover, from the financial standpoint, the very concept of corporatisation drives PBAPP to be financially independent. As PBAPP also has to generate sufficient funds to fulfil its responsibilities, its corporatisation also promotes sustainability, innovation and professionalism.

Public Listing

The second major step in PBAPP's early evolution was the establishment of PBA Holdings Bhd (PBAHB), a public company to serve as a vehicle for eventual public listing on the Main Board of Bursa Malaysia.

PBAHB was successfully listed on April 18, 2002 with PBAPP as its 100%-owned subsidiary. The allocation of "pink forms" to PBAPP employees and the domestic water consumers allowed them to "own" shares in Penang's water supply operator. As at December 2012, 28.5% of PBAHB shares are held by public investors, Penang water consumers and PBAPP employees.

Meanwhile, SSI Incorporated, an investment arm of the Penang State Secretary's Office, is the majority shareholder. SSI also holds a "golden share" to further ensure the protection of public interest. This allows the Penang State Government to direct the management of PBAPP, via its majority holdings and golden share, for the benefit of the people.

Public listing, therefore, ensured a good balance in serving as a public-private enterprise. Through PBAHB, the public owns shares in PBAPP. At the same time, as the principal shareholder, the State Government acts to protect public interests. Moreover, public listing also drives PBAPP to operate in accordance to best practices in the corporate world, while adhering to the principles of good governance.

MANAGING CHANGE

Prior to PBAPP's corporatisation, water supply was managed by the Penang Water Authority (PWA), a state statutory body. All PWA staff were offered option papers, and 999 were absorbed into PBAPP.

All PBAPP employees were required to adjust to a private sector work culture, governed by reward for performance, efficiency and productivity. PBAPP embarked on a series of key management initiatives as part of its "managing change" strategy, including the:

- Creation of a clear corporate vision – "Meeting All Your Water Supply Needs";
- Introduction of result-driven mission – "PBAPP will be a leading organisation in water supply";
- Definition of the PBAPP commitment – "We will be environmentally sensitive, responsible, proactive, professional, innovative and committed to excellence and sustainable development. We will be responsible for the development of water supply and deliver the best possible service by being customer-oriented";
- Adoption of the following key corporate objectives – "Uninterrupted water supply; customer satisfaction; skilled, competent and motivated workforce; effective teamwork, timely and orderly development of water resources; productive utilisation of financial and other resources; continuous improvement on all fields; compliance with relevant legislations; and effective relations with government agencies and industrial organisations";
- Conceptualisation of a "water droplet" corporate logo to reflect PBAPP's identity, vision, mission commitment and objectives;



PBA

Perbadanan Bekalan Air
Pulau Pinang Sdn Bhd
(475961-X)

Meeting all your water supply needs

- Implementation of workshops, seminars, training programmes and teambuilding events to promote a corporate mindset, inculcate positive corporate values and enhance technical skills; and
- Corporate restructuring to clearly define and focus on all key areas of PBAPP's holistic business model; optimise operations, resources and management systems; and comply to relevant legislations and the best practices in corporate management:
 - four engineering departments (Operations, Production, Planning & Development, and Quality, Safety & Health);
 - five corporate departments (Corporate Services, Human Resource, Finance, Information Technology, and Internal Audit); and
 - two new departments were introduced in 2008 (Facilities and Customer Care).

As at December 2013, PBAPP operates with 11 departments reporting to the General Manager.

PEOPLE WITHIN A NEW CORPORATE CULTURE

Establishing and cultivating the right corporate culture put PBAPP on the right footing to serve as a leading organisation in water supply.

The PBA Way

The foundation of PBAPP's corporate culture is "The PBA Way", as in:

People we motivate (in reference to PBAPP personnel)

Best we deliver (in reference to systems)

Aim for excellence (with regard to customer satisfaction)

A.C.T.I.O.N.

Workshops were arranged from January to February 2003 for all executives and supervisory staff to embrace "The PBA Way", based on the following core values:

Accountability

Communication

Teamwork

Integrity

On-going Learning

New Ways for Improvement.

NEW IMPROVED SYSTEMS

Beyond changing mindsets and upgrading its operational structure, PBAPP implemented improved management systems, some of which were linked to specific global benchmarks:

ISO 9001 Quality Management System

In May and June 2003, PBAPP received company-wide ISO 9001:2000 certification for quality management from UKAS of the United Kingdom and



On November 21, 2013, Perbadanan Bekalan Air Pulau Pinang Sdn Bhd (PBAPP – the Penang Water Supply Corporation) received two inaugural KeTTHA Industry Awards (KIA) from the Ministry of Energy, Green Technology and Water, Malaysia.

In serving Penang, PBAPP does not expect to win awards. Nevertheless, the 2013 KIA “Efficiency Award” and “Water Operator of the Year” award do mark an important milestone for PBAPP as the licensed water operator that serves Penang.

2013 KeTTHA Industry Awards – “Efficiency Award” and “Water Operator of the Year.”

DAR of Germany. It was the first Malaysian water supply operator to receive international quality certifications encompassing a holistic scope in water supply, for the “treatment and supply of water with the provision of customer services.”

In 2009, PBAPP successfully “migrated” to the upgraded ISO 9001:2008 platform. To this day, PBAPP’s quality management systems are internationally certified.

ISO 14001 Environmental Management System

On the environmental management front, PBAPP received its first international ISO 14001:2004 certification in 2005 for the “management and treatment of raw water and the supply of potable water” at the Batu Ferringhi Treatment Plant and the Teluk Bahang Dam.

Since then, the company has also received similar certifications for the Waterfall Treatment Plant (2007) and Air Itam Water Treatment Plant (2010). PBAPP is now working to acquire more ISO 14001:2004 certifications for the other key other water supply installations.

OHSAS 18001 Occupational Health & Safety Management System

Since PBAPP’s employees are its key resources in a critical service industry, the company also sought company-wide OHSAS 18001 certification to maximise employee safety. In March 2006, PBAPP received its OHSAS 18001:1999 certification from SGS International, with accreditation to Swiss Certification, for the “treatment and supply of water with provision of customer services.”

In 2008, the company successfully migrated to the upgraded OHSAS 18001:2007 platform.

MS ISO/IEC 17025:2005 Competence of Testing and Calibration Laboratories

In 2008, PBAPP received its MS ISO/IEC 17025 certification for its water testing laboratory at the Sungai Dua Water Treatment Plant.

MS ISO/IEC 27001:2007 Information Security Management System

The Sungai Dua Water Treatment Plant, Penang’s largest water treatment plant, is classified as

a national security asset. Accordingly, PBAPP acquired the MS/IEC 27001:2007 certification for its I.T. system to reinforce the security of its highly automated daily operations.

Integrated Revenue Management System (iRMS)

The iRMS is a proprietary on-line integrated billing system developed by PBAPP to facilitate efficient bill collection. Since 2002, the iRMS has facilitated online linkages amongst the Corporate Services, Finance, I.T. and Operations departments' e-databases to provide accurate status reviews and on-line updating of every single customer account. It also supports the success of PBAPP's Customer Care Centres and 24-hour Call Centre.

Strumap Geographical Information System (GIS)

In 2001, PBAPP began implementing its Strumap Geographical Information System (GIS). With online integration of engineering data, consumer data, aerial photography and a catchment area plan onto a "strategic network model", the system facilitates analyses of water demand, distribution network, leakages, supply interruptions and water source tracing, as well as water quality modelling.

Data from the system is also being used to manage and conserve gazetted catchment areas and safeguard raw water sources. Water catchments are the beginnings of the water supply value chain. PBAPP monitors water catchments in Penang by superimposing satellite photographs of land lots gazetted as catchments to detect encroachments or other illegal activities.

Water Supply (Catchment Area) Orders – Conservation of Catchments

PBAPP helped to draft the Water Supply (Catchment Area) Order 2004 under the Penang Water Supply Enactment 2004 that was published by the Penang State Government. This order is an environment-friendly legislation that bans all potentially destructive commercial activities in 62.9 sq. km of green hill areas and forestlands that have been delineated as water catchment areas. These areas are now "reserved" for eco-friendly activities such as camping, hiking, jungle trekking and bird watching, as well as the establishment of low-impact eco-tourism projects that allow people

to interact positively with the refreshing natural environment.

Protection of Penang's precious green areas was further enhanced by the Water Supply (Catchment Area) 2009, which states that low-impact eco-friendly and eco-tourism projects are allowed only in "downstream areas".

As these forestlands serve as critical green lungs which house the natural habitats for thousands of species of indigenous flora and fauna, the orders have effectively preserved the natural heritage of the state in the interests of sustaining continuous good water supply.

COMPETITIVE ADVANTAGES

As part of its commitment to continuous improvement in water supply, PBAPP also implemented the following programmes to consolidate its competitive advantages:

Uninterruptible Water Supply Programme (UWSP)

- Targeted at maximising customer satisfaction while minimising the adverse effects of supply interruptions, the UWSP's key elements include:
- Continuous on-going replacement of out-dated pipes that are prone to bursting;
- Scheduled supply interruptions from midnight to dawn;
- Expedite emergency repairs with the establishment of the 24-hour Call Centre;
- Completion of all emergency repair work within 24 hours;
- Utilisation of technology (where possible) to fit and join pipes without interrupting supply; and
- A materials committee to review and approve materials for use in water supply networks.

Non-Revenue Water (NRW) Management Programme

Effective NRW management is critical in a water-stressed state. PBAPP's NRW management methodologies include:

- Water Assets Management;
- Water Distribution Management;
- Customer Care Management;
- iRMS and GIS; and
- Human Capital Development.

The key engineering elements of its NRW programme encompasses:

- Meter reading accuracy, meter accuracy and calibration;
- Meter management and meter replacement;
- Accurate measurements of production output;
- Monitoring and ensuring speedy pipe repairs;
- Managing an active leakage control program;
- Controlling materials for use in the distribution system;
- Pipe replacement;
- District metering for new housing projects;
- Zone metering for analysis of base night flows; and
- Active leakage control.

“Friendly, Caring, Responsive” (FCR) Customer Care Programme

With rapid technology advancements and increasing affluence, the 21st Century Penang community have become much more sophisticated and demanding. Since the 1990s, more and more people enjoy wider exposure to global developments and trends, via international travel, satellite TV and Internet connectivity. It follows naturally that their expectations of public services are higher than ever before. With this in mind, PBAPP implemented a Customer Care Management Programme to engage all water consumers positively, in the interests of establishing and sustaining good professional relationships based on mutual respect and understanding.

In October 2001, PBAPP launched a customer care unit to manage its Customer Care Centres (CCCs). In 2008, the unit was expanded to become a full-fledged department – the Customer Care Department – to reflect the growing importance of customer care in supporting the company’s operational and bill collection efficiencies, as well as its goal to provide a higher level of customer satisfaction.

With increased emphasis on customer care, PBAPP unveiled its “Friendly, Caring, Responsive” (FCR) branding in 2009. The key elements of the branding which drives PBAPP to meet customer expectations to this day include:



- International hand-sign for ‘okay’ with interlaid traditional Penang-style decorative motifs;
- Friendly service to address all customer transactions with one consultation;
- A caring approach in providing the best possible advice, assistance and solutions; and
- Regulated responsive actions to resolve all issues and complaints as promptly as possible.

PBAPP’s FCR Customer Care management programme encompasses the following initiatives.

Customer Care Centres (CCCs): As at December 2013, nine PBAPP CCCs are operating in strategic locations throughout Penang - Komtar, Rifle Range (Air Itam), Bayan Lepas, Balik Pulau, Kepala Batas, Taman Selat, Prai Industrial Park,



PBAPP's newest Customer Centre on Level 4, Komtar.

Bukit Mertajam and Jawi. Equipped with on-line “Customer Help Desks” (I.T. systems with real-time links to the databases of the Corporate Services, Finance, Information Technology and Operations departments), PBAPP customer care personnel are able to address 20 types of customer transactions on-the-spot. Besides water bill collection, the CCCs also handle payments for bills issued by Tenaga Nasional, Telekom Malaysia, the Penang Development Corporation, the Penang Municipal Council and the Seberang Prai Municipal Council.

PBAPP's newest CCC is the upgraded Komtar CCC was opened in October 2013. It is conveniently located on Level 4 of George Town's most recognisable landmark, and is part of an integrated operations hub that also houses the I.T. Department, the Planning & Development Department and Internal Audit Department.

24-hour Call Centre (CC) – Tel No. 04 509 6 509: Since December 2002, PBAPP has provided a 24-hour Call Centre (CC) service to all its customers. By dialling tel. no. 04 509 6 509 at any time, from anywhere, consumers can seek assistance, file a report, request or complaint. The CC is always open and manned by personnel who operate the I.T-driven “Customer Help Desks” to provide assistance or answers promptly.

Corporate Website (www.pba.com.my) & Email Address (consumer@pba.com.my): PBAPP's corporate website has been online since August 2003, serving as a virtual repository of key information about water supply in Penang and PBAPP. Over and above sharing information, the website also features a “login” feature that allows registered Penang water consumers to check the status of their water bill account online. Moreover, www.pba.com.my also “broadcasts” the latest news on developments such as supply interruptions and PBAPP tenders. Alongside the website, PBAPP has also been promoting a corporate email address for consumers use in addressing email queries - consumer@pba.com.my.

PBAPP Online: In 2011, PBAPP launched the “PBAPP Online” e-payment programme that allows customers to settle their water bills online via e-banking. As at December 2013, e-banking facilities have been established with 9 banks – AmBank, Bank Rakyat, BSN, CIMB, HSBC, Maybank, Public Bank, RHB and UOB – as well as with PosOnline (Pos Malaysia) and MBF Online (for MBF credit cardholders). Effectively, the “PBAPP Online” programme allows PBAPP customers to pay their bills from wherever they are, whenever they want, so long as they have an Internet connection, a PC/tablet/smartphone and a compatible e-banking account.

PBAPP Prepaid: 2011 also saw the launching of the auto-debit “PBAPP Prepaid” facility that allows water consumers to pay ahead for water bills, thereby reducing the risks of defaulting on payments and having their meters clamped. “PBAPP Prepaid” payments can be made at PBAPP customer service centres or via “PBAPP Online” e-banking facilities at any time, to the customer's convenience. In fact, any payment made above a monthly bill will be captured as “credits” that would then be automatically drawn down with each billing cycle.

One-Stop Office Complexes (OOCs): To serve more effectively and react promptly to customer needs in high growth areas, PBAPP established One-Stop Office Complexes (OOCs) that are similar in form and function to district police stations. Each OOC is a self-contained and stand-alone “nerve centre” that can provide a range of comprehensive services, swiftly and directly.

Typically, an OOC would house a Customer Care Centre, an Operations Centre, store facilities and quarters. There are currently 4 PBAPP OOCs, located at Rifle Range (Air Itam), Prai, Kepala Batas and Jawi.

SATISFYING CUSTOMER NEEDS

The following table summarises PBAPP’s key performance indicators (KPIs) in serving as Penang’s licensed water operator in 2012:

KPIs		Penang	National Average*
1.	Percentage of Urban Population Served	100.0%	96.9%
2.	Percentage of Rural Population Served	99.7%	90.7%
3.	Network Density (km of pipeline per sq km of area)	3.93	1.65
4.	Domestic Population Served (per km of pipeline)	391	206
5.	Average No. of Connections per Employee	445	354
6.	Non-Revenue Water	17.6%	36.4%
7.	Average Domestic Water Tariff (RM/m ³) – First 35m ³	0.31	0.66
8.	Average Industry Water Tariff (RM/m ³) – First 500m ³	1.19	1.45

* National average statistics as reported in the Malaysia Water Industry Guide 2013.

In accordance to its ISO9001 commitment towards continuous improvement, PBAPP also commissions independent bi-annual public opinion polls (POPs) to gather direct feedback from water consumers in Penang. In the 2012 POP, the Penang Institute of Integrity (INPPI) interviewed 130 trade/industry consumers and 1,650 domestic

consumers. Tables 1 and 2 summarise the key results.

STRATEGIC INITIATIVES TOWARDS 2050

Looking ahead, Penang’s water demand will continue to escalate in tandem with population growth as well as increasing economic activities. In 2012, Penang’s water demand was 984 million litres per day (MLD). Projections indicate that by 2050, it will increase to 1,884 MLD. Bearing in mind Penang’s inherent geographic limitations, and the related issue of limited water resources, PBAPP has outlined the following five key initiatives to sustain continuous good water supply in a water-stressed state in the future.

Implementing Holistic NRW Management

Traditionally, NRW management in Malaysia is focuses primarily on methodologies and programmes at water treatment plants, distribution systems and meter positions. Reviewing the water supply value chain in totality, PBAPP plans to expand the scope of its NRW management initiatives into the following new focus areas:

- Water catchments;
- Raw water supply systems – dams, canals, mains, pumping stations and intakes; and
- Internal reticulation systems – as related to the regulation of pipes and fittings, pumps, roof-top tanks and suction tanks.

The goal is to sustain the lowest NRW percentage in Malaysia, not only in existing NRW focus areas, but throughout the water supply value chain.

Raising the Value of Water (Tariffs & Water Conservation Surcharge - WCS)

Penang’s domestic water tariffs are sustained as the lowest in Malaysia via cross-subsidies from trade consumption earnings. Although sustaining low water tariffs is a noble social initiative and consumer-friendly measure, primarily for the benefit of the lower income group, the unfortunate “by-product” is high domestic consumption.

In July 2013, Penang’s average per capita domestic consumption reached the level of 302 litres/capita/day (l/c/d) as compared to the national average of 212 l/c/d in 2012. As high domestic consumption does not augur well for

Table 1: Rating of TAP WATER QUALITY

	Very Good	Good	Average	Poor	Very Poor	Total
Domestic Consumers	10%	59%	21%	9%	1%	100%
Trade Consumers	11%	69%	11%	7%	2%	100%

Table 2: Rating of PBAPP SERVICE

	Very Good	Good	Average	Poor	Very Poor	Total
Domestic Consumers	16%	65%	16%	2%	1%	100%
Trade Consumers	11%	77%	12%	-	-	100%

The Teluk Bahang Dam, one of Penang's three major dams, overlooks the Teluk Bahang coastline.



water conservation efforts, PBAPP has to gradually raise the value of water towards 2050 to convince water consumers to value it as an important resource that should be used wisely.

As at 2013, PBAPP uses two main mechanisms to manage the value of water:

- Water tariffs – the last water tariff review was in 2009. The tariff increase was 27%, affecting only trade/industry consumers;
- Water Conservation Surcharge (WCS) – the WCS is the first surcharge of its kind to be introduced in Malaysia in 2009 to motivate domestic consumers to save water and use it wisely at home. The initial value of the WCS was RM0.24 per 1,000 litres, applicable only for domestic consumption above 35m³ per month.

However, after almost three years, it was found that the RM0.24 premium was not significant enough to motivate domestic water conservation. As such, in 2013, the WCS value was increased to RM0.48 per 1,000 litres, applicable only for domestic consumption above 35m³ per month. PBAPP statistics show that seven of every 10 households in Penang did not have to pay the WCS in 2012 because they used less than 35m³ per month. Only 28% of high volume domestic consumers were subject to the WCS – and they have the option of avoiding the WCS by simply reducing their consumption.

Towards the 2050 timeframe, PBAPP plans to price domestic water supply at its true value. The business plan for the future is to eventually supply domestic water at cost and to generate sufficient revenue from trade water consumption to consistently improve or upgrade infrastructure.

It has been proven worldwide that one of the key motivating factors for water conservation is setting the correct value for water. Once water is “valued” by consumers, they will use it wisely. As and when consumers use water wisely, they will inevitably support the drive towards sustainable water supply in Penang.

Increasing Public Awareness & Participation

Increased public awareness and participation is critical to the success of sustainable water supply management in Penang. As a public utility company, PBAPP will continue to reach out and communicate

with the people, water consumers, government and non-government organisations regularly.

PBAPP has been opening and communicating through as many channels as possible, since 1999, to get the right messages across, including:

- Website postings – www.pbapp.com.my;
- YouTube postings;
- Public Advisories from its 24-hour Call Centre and Customer Care Centres;
- Multilingual News Releases – press releases and press conferences;
- Annual “World Water Day” commemorations,
- Participation in Conferences, Forums, Workshops and Dialogues; and
- Multilingual Advertisements and Publications.

Promoting Water Saving Devices (WSDs)

Since WSDs are fittings, equipment and machines that promote water saving by automatically reducing flow, the promotion of these devices will have a significant impact on water conservation. While water saving practices may require lifestyle adjustments, WSDs represent “fit-and-forget” technologies that reduce water flow effortlessly.

In this context, WSDs present a more “user-friendly” option for water conservation. To promote the usage of WSDs, mandatory or voluntary rating schemes have already been implemented in Australia, Hong Kong, New Zealand, Singapore, the United Kingdom and the USA to increase public awareness. In Malaysia, SPAN (the National Water Services Commission) has already launched its “water efficient product” labelling scheme.

In Penang, PBAPP intends to actively publicise the importance and significance of WSDs and promote installation of such devices in all new property development projects. PBAPP’s WSD campaign will also encourage as many water consumers as possible to purchase and use WSDs – including tap equipment, shower systems, toilet/urinal equipment, washing machines and dishwashers.

Developing an Additional Water Resource

As at 2013, about 80% of Penang’s raw water is drawn from Sungai Muda, a resource that it shares with its neighbouring state of Kedah. Projections

indicate that this river can only adequately meet Penang's raw water needs until 2020. Without another raw water resource, it is impossible for PBAPP to sustain continuous good water supply until 2050.

In fact, PBAPP has identified a second raw water resource for Penang – the Perak River in the neighbouring state of Perak. Penang's proposal for tapping this additional resource involves the pumping of raw water from this river through a new water tunnel built across the highlands. The water will then be discharged into the Ijok River, a tributary of Sungai Kerian, at the southern border of Penang, for drawing and treatment in PBAPP-managed plants.

As Penang has migrated to the National Water Services Re-Structuring Scheme in 2011, the funding for this proposed inter-state "Sungai Perak Transfer Water Resources Scheme" is to be borne by the Federal Government, while Penang will have to invest in the treatment works.

As Penang is an island state, PBAPP will also explore the viability of saltwater desalination, as implemented successfully in Singapore. Although desalination costs will undoubtedly be higher, the application of this technology may well guarantee self-sufficiency for Penang well into the future, without the inherent risks and threats of inter-state water dependency. ■



PBAPP strives to manage water supply sustainably for Penang's future.