Queensland Competition Authority

Position Paper

SEQ Long Term Regulatory Framework - Pricing Principles

March 2014

Level 27, 145 Ann Street, Brisbane Q 4000
GPO Box 2257, Brisbane Q 4001
Tel (07) 3222 0555
www.qca.org.au

The QCA wishes to acknowledge the contribution of the following staff to this report:

Geetu Anthonisz, Les Godfrey, Fifi Gosali, George Passmore, Matthew Rintoul, Rick Stankiewicz

SUBMISSIONS

This report is a draft only and is subject to revision. Public involvement is an important element of the decision-making processes of the Queensland Competition Authority (QCA). Therefore, submissions are invited from interested parties concerning its assessment of pricing principles for South East Queensland distribution/retail entities. We will take account of all submissions received.

Submissions, comments or inquiries regarding this paper should be directed to:

Queensland Competition Authority
GPO Box 2257
Brisbane QLD 4001

Telephone: (07) 3222 0555
Fax: (07) 3222 0599
Email: water@qca.org.au

The closing date for submissions is **30 June 2014**.

Confidentiality

In the interests of transparency and to promote informed discussion, the QCA would prefer submissions to be made publicly available wherever this is reasonable. However, if a person making a submission does not want that submission to be made public, that person should claim confidentiality in respect of the document (or any part of the document). Claims for confidentiality should be clearly noted on the front page of the submission and the relevant sections of the submission should be marked as confidential, so that the remainder of the document can be made publicly available. Where it is unclear why a submission has been marked "confidential", the status of the submission will be discussed with the person making the submission.

While the QCA will endeavour to identify and protect material claimed as confidential as well as exempt information and information disclosure of which would be contrary to the public interest (within the meaning of the *Right to Information Act 2009* (RTI)), we cannot guarantee that submissions will not be made publicly available.

Public access to submissions

Subject to any confidentiality constraints, submissions will be available for public inspection at the QCA's Brisbane office or on our website at www.qca.org.au. If you experience any difficulty gaining access to documents please contact us on (07) 3222 0555.

Information about the role and activities of the QCA, including copies of reports, papers and submissions can also be found on our website.

Table of Contents

EXECUTIVE SUMMARY

Under the Ministerial Direction (Appendix A) the QCA is directed to develop a regulatory framework for the SEQ distributor-retail entities to operate from 1 July 2015, and to set out pricing principles to apply to the industry. The pricing principles apply to the following distribution/retail services: water, sewerage, trade waste, recycled water (including sewer mining) services and stormwater re-use (including stormwater drainage) services.

It is recommended that, as part of the recommended annual performance monitoring framework, entities will initially need to establish that the recommended pricing principles are being applied and subsequently advise of any departures, the reasons for the departure and provide the supporting analysis.

General pricing objectives

The general objectives of the QCA follow from the requirements of the QCA Act. This requires the QCA to have regard to the protection of consumers from abuses of monopoly power, the promotion of competition, the efficient use of resources, and other relevant public interest concerns.

The Ministers' Direction includes an overarching regulatory objective to protect the long term interests of the users of SEQ water and sewerage services by ensuring the prices of these services reflect prudent and efficient costs, while promoting efficient investment in and use of these services, having regard to service reliability, safety and security over the long term.

In essence, the pricing of urban water, sewerage, trade waste, recycled water and stormwater re-use services provided by SEQ entities should:

(a) promote economic (allocative, productive and dynamic) efficiency

(b) ensure revenue adequacy – the business must have sufficient revenue to ensure the efficient delivery of water services

(c) promote the public interest –the pricing framework should accommodate concerns related to equity/fairness including those related to vulnerable customer groups

(d) be transparent, predictable, simple and cost effective to apply.

Pricing principles

The pricing principles outlined below are applicable to all services provided by the entities. They are consistent with the pricing principles previously established by the QCA (QCA 2000) and also reflect more recent work (QCA 2013). In particular circumstances their application needs to incorporate additional considerations and responses.

It is recommended that prices for all water supply and sewerage activities be forward-looking cost reflective and set according to marginal cost. Marginal cost pricing ensures that a consumer only purchases services where the value to the consumer is equal to or greater than the marginal cost of production, while ensuring that producers receive a return equivalent to the opportunity cost of supplying an additional unit of the service.

If implemented in conjunction with a fixed charge in a two-part tariff to ensure revenue adequacy, marginal cost pricing should meet the general pricing objectives.

Efficient prices (total charges including fixed and volumetric) should lie within the efficient pricing band - that is, between incremental cost as a minimum and the stand-alone cost of providing a customer or group of customers separately.

In most circumstances, efficient volumetric charges for water and sewerage and other services should reflect long run marginal cost (LRMC).

LRMC includes all marginal operating costs (usually SRMC) and marginal capacity costs (MCC).

The MCC component of LRMC may be estimated using either the perturbation approach or the Average Incremental Cost (AIC) method over an appropriate planning horizon.

However, in some instances, when SRMC significantly exceeds LRMC (such as during droughts), SRMC should be considered. Such charging is often referred to as scarcity charging.

The general pricing objectives and pricing principles are summarised below.

Table 1 Summary of Draft Recommendations - General Pricing Objectives and Principles

		Draft Recommendations
Pricing Objectives	1.1	That pricing of urban water, sewerage, trade waste, recycled water and stormwater re-use services provided by SEQ entities: (a) promotes economic efficiency (b) ensures revenue adequacy (c) takes account of the public interest (including fairness and equity) (d) is transparent, predictable simple and cost effective to apply.
Pricing principles	1.2	Entities initially establish that the pricing principles are being applied and subsequently advise of any departures, the reasons for the departure and provide relevant supporting analysis.
	1.3	Pricing reflects marginal cost, together with a two part tariff where necessary to achieve revenue adequacy.
	1.4	Prices be set between incremental (marginal) cost and stand-alone cost.
	1.5	Prices reflect the LRMC of providing a particular service.
	1.6	Prices reflecting SRMC be considered when SRMC for a particular period significantly exceeds the LRMC (estimated for a longer period) for a particular service. This is sometimes referred to as scarcity charging.
	1.7	LRMC be estimated on the basis of the perturbation or AIC method.

Urban water

Demand forecasting

Estimates of demand are relevant for determining the LRMC-based volumetric tariffs.

Long term forecasts should reflect Government approved SEQ Water Strategy forecasts.

Over shorter periods, forecasting will still be required to be made by entities to estimate annual operating costs and in some cases to reconcile emerging trends with long term forecasts. The key determinants of demand for water include population growth (including residential and non-residential demand), the mix of connections, demand management policies, changes in consumer behaviour over time, pricing, seasonal and climatic factors and the level of system leakage.

While sophisticated techniques based on end use modelling are available, in SEQ, short term demand forecasts based on estimated water use per customer/connection and population forecasts (number of connections) continue to be used, and are appropriate, until there is a bounce-back to more stable post-drought levels of demand.

Entities should convene a working group, including the QCA, to review demand forecasting practices and demand elasticities.

Volumetric charges

LRMC pricing can at times result in relatively low volumetric charges, and there may be concerns that customers have less control over their bills. Nevertheless, pricing at LRMC reflects the cost of service delivery and ensures revenue risks for an entity are managed.

The QCA generally does not support adjustments to derive a pre-determined targeted balance between fixed and volumetric charges, unless there are clear objectives that cannot be otherwise achieved.

In rare circumstances when price is higher than average costs, short term over-recovery of revenues should be addressed by ex-post rebates, unlinked to volumetric charges - such adjustments can be made to the fixed charge.

Fixed charges

In a two-part tariff, fixed charges should be set to recover the maximum allowable revenue (MAR) not covered by the volumetric charge.

In SEQ fixed charges are typically set on a per connection basis for residential customers and cases by meter or connection size for non-residential customers.

Charges should be set so as not to encourage bypass or disconnection from the network by some customer groups, that is, charges should not exceed the stand-alone or by-pass price.

Inclining and declining block tariffs

Some entities use more complex multi-part or tiered volumetric tariff structures in place of a single volumetric charge. Inclining block tariffs (IBTs) are common in urban residential charges, including in SEQ (QUU, Unitywater and Redland City Council), while declining block tariffs (DBTs) are rarely used.

Multi-tiered volumetric tariffs are not consistent with economic efficiency as the tiers cannot all be consistent with either SRMC or LRMC of service delivery. They can make revenue forecasting complex, and may have unintended equity and fairness implications, for example, on large families.

The QCA recommends that IBTs and DBTs not be introduced in urban water pricing and where they are already in place, they be phased out over time to a single volumetric charge.

Location based or nodal pricing

The QCA supports tariff structures that reflect identifiable and substantial differences in costs of supply where it is practical and cost effective to differentiate charges. The main application for location-based charges is where there are well-defined zones or supply segments that have markedly higher (or lower) costs that can be easily identified. In areas where there are low cost alternatives, differentiated charges may be appropriate to avoid inefficient by-pass.

However, postage stamp tariffs will remain appropriate in most distribution/retail circumstances – to avoid equity and administrative problems that could arise with nodal or zonal prices.

Peak period and seasonal pricing

Peak period and seasonal pricing practices provide efficient market signals. They are desirable where practical and cost effective to implement. Efficiency gains can occur from peak shifting to manage delivery capacity constraints. The approach can present challenges for managing revenue adequacy given the revenue fluctuations involved.

Time of day or seasonal charges should be considered for urban water services where these promote economic efficiency, and where practical and cost effective.

Self selecting tariffs

Self-selecting tariffs, or tariff menus, allow customers to choose from more than one pricing scheme in line with their circumstances. They are usually proposed to address equity objectives but can also promote economic efficiency. Allocative efficiency may be enhanced if prices reflect the respective values customers place on water supply.

Self-selecting tariffs generally involve greater revenue risk to the service provider as revenues will be more difficult to forecast. Where they are to be applied, they should be accompanied by strong customer engagement practices to ensure that there is sufficient information for customers to make choices.

Self-selecting tariff options should be considered where there is sufficient information for customers to make choices, provided they do not result in cross-subsidies.

Service quality differentials and interruptible tariffs

Similar to self-selecting tariffs, prices may be differentiated according to service quality standards - customers may be given the opportunity to choose a more reliable or high quality service at a higher price, and vice versa. Interruptible tariffs involve non-residential users taking a risk of occasional supply interruptions (full or partial) in exchange for lower tariffs.

Price/service quality tariff options are supported, provided prices reflect cost differentials. Such options also provide a means for users to signal their willingness to pay for different levels of reliability. They may however present challenges in ensuring revenue adequacy and appropriate allocation of costs between the service quality options.

Price/service quality tariff options be adopted, where material cost differentials are associated with different levels of service.

Metering and billing arrangements

Metering and billing arrangements should support the application of cost reflective prices.

A range of different circumstances are evident in retail-distribution activities. The recommendations relating to each are summarised below.

Tradeable water entitlements

An alternative to scarcity charging is to define and provide tradeable water entitlements to urban water customers, allowing a market mechanism for customers to trade surplus water requirements.

While there are potential allocative efficiency gains, these may be offset by transactions and administration costs. Tradeable urban water entitlements should be considered for large water users where the additional costs are considered to be offset by potential gains. The scope for urban trading between residential users in SEQ is considered limited at this stage.

Sewerage

Sewerage services include the collection, conveyance and treatment of wastewater and the disposal of the end products of the process. The volume and quality of sewage produced directly impacts on the network and cost of providing these services but is difficult to measure.

The demand for sewerage services can be assessed by reference to forecast growth in connections, linked to population growth.

Where a usage charge is used, based on a discharge or return factor, entities will need to forecast the discharge volumes taking into account property type and seasonal conditions.

For residential customers, sewerage charges should be based on a single part tariff with a fixed charge per customer or connection.

However, volumetric charges could be applied if LRMC is significant and if so, should be based on discharge or return factors linked to the LRMC of providing the water volumes.

Such circumstances are more likely to arise for non-residential customers. Where applicable, it is recommended that:

(a) fixed sewerage charges be based on the impact of the customer on the system. In the absence of direct metering, charges could be based on a reasonable proxy such as water connection size or type of business

(b) if appropriate, volumetric charges be applied based on relevant discharge factors established by customer type. Customers should be able to negotiate a variation in the discharge factor to take account of individual circumstances.

Trade waste

Trade waste is water-borne waste from business, trade or manufacturing premises that contains concentrations of pollutants that exceed a domestic equivalent.

The demand for trade waste services relates to growth in the commercial and industrial sector. Entities should consult with large customers to monitor any step changes in demand for trade waste services.

Pricing of trade waste services should be based on an 'impactor-pays' basis to recover costs relating to managing pollutant load and discharge into streams and rivers to avoid or minimise environmental and public health impacts. Trade waste charges should also be based on LRMC to reflect the costs of transport, treatment and disposal of trade waste, with variable charges based on the key cost drivers, typically volume of trade waste and load of pollutants.

Charges should be differentiated according to customer type and risk factors (volume and load and risk of contamination), and by location if cost effective.

Penalties for breaches of agreements or non-compliance provide incentives for customers to ensure that their outflows are within defined limits.

Recycled water

Recycling of water refers to the multiple use of water from wastewater or a stormwater system that has been treated to an appropriate quality standard for a further intended beneficial use.

The revenue requirement for recycled water services should be based on full cost recovery. This should be assessed by system-wide additional costs, taking account of total direct costs (infrastructure and operating), less avoided costs (for example, reduced disposal costs and deferral of augmentation) and less developer contributions.

Direct and avoidable costs should be allocated between relevant parties on a beneficiary pays basis.

Recycled water volumetric prices should reflect the LRMC for the established recycled water scheme and where possible, be based on the marginal operating costs less the marginal avoided costs.

Where the volumetric charge is then higher than the potable water volumetric charge, it may be necessary to reflect demand sensitivities to ensure demand clears supply.

If still required to ensure revenue adequacy, fixed charges in a two-part tariff should be set to recover remaining revenues, also subject to willingness to pay.

If the revenue requirement is still not achievable, unrecovered amounts should be allocated to potable and sewerage charges in proportion to avoided cost allocations (where it is possible to do so).

Charges should be periodically reviewed, as customer acceptance increases.

Sewer mining

Sewer mining is a form of recycling involving the extraction of raw sewage (or wastewater) from a point in the sewerage network for treatment and recycling.

Sewer mining charges should reflect any incremental costs of extraction from the system incurred by the sewerage service provider (equipment, pumping etc). Subject to the nature of the process, charges should include a share of common sewerage system costs, plus any transport and treatment costs for returns, less avoided costs. Charges may be negotiated between the provider and the sewer miner on a case-by-case basis.

Stormwater reuse and drainage

The principles for pricing of stormwater reuse pricing are the same pricing principles as recycled water.

For stormwater drainage services (provided by councils) rate-based charges remain appropriate, given that more complex charging structures are likely not cost effective. Charges should be transparently identified on customer bills.

Industry-wide pricing issues

Externality pricing

Externalities may be defined as the side effects or spill-overs of an activity that are typically excluded in decision making. They can be either positive (social benefit) or negative (social cost).

The inclusion of externality prices is supported where there are material impacts that can be valued accurately and cost effectively. Charges for externalities should avoid duplication with other mechanisms and should be transparent. Externality costs may be expected to vary according to volumes of water or sewerage and should therefore be included in volumetric charges.

The relevant authorities and Governments may consider implementing licences (for example bubble licences) and market mechanisms where the benefits are considered to justify the costs.

Third party access

Access pricing principles are required to apply where a third party seeks access to water, sewerage or other infrastructure owned and operated by an SEQ entity.

Access prices should be based on a cost of service method, taking account of any relevant share of joint or common costs.

An adjustment may be required where retail prices are averaged across user groups (postage stamp tariffs) to ensure that access prices do not result in an increase in the cost of service delivery for the remaining customers.

Cost allocation

The appropriate allocation of costs may be an issue in determining cost reflective pricing signals for the different services provided by the SEQ entities. Cost allocation may be a problem where there are joint or common costs that need to be allocated between services or between customer types.

Common costs should be allocated to services and customers on the basis of a reasonable attempt to identify a causal relationship between the costs incurred and the water or sewerage or other service performed. If a causal relationship cannot be established a reasonable cost allocator needs to be established (see Position Paper (QCA 2014)).

Price paths

Where prices need to increase substantially the entity needs to demonstrate the basis for the increase. Where price shocks potentially occur, entities should consider revenue neutral price paths.

Summary

The application of pricing principles is summarised in Table 2.

Annual information requirements will be developed in consultation with the entities.

Table 2 Summary of Draft Recommendations - Application of Pricing Principles

Chapter	***Topic***	***No***	***Draft Recommendation***
Urban Water	Demand forecasting	2.1	Long term forecasts used for capital planning be based on SEQ Water Strategy forecasts.
		2.2	Short term demand forecasts be based on estimated water use per customer/connection and population forecasts (number of connections) and take account of any bounce-back effect as well as local circumstances.
		2.3	Demand forecasting practices and alternative models (including demand elasticities) be reviewed by a working group including the entities, QCA and other relevant parties.
	Volumetric charges	2.4	The volumetric charge for urban water services should reflect LRMC.
		2.5	Where prices exceed average costs, short term over-recovery of revenues be addressed by ex-post rebates with adjustments made to the fixed charge.
	Fixed charges	2.6	Fixed charges for urban water services recover the maximum allowable revenue (MAR) not covered by the volumetric charge.
		2.7	Charges not encourage customers to bypass or disconnect from the network.
	Inclining and declining block tariffs	2.8	Inclining and declining block tariffs not be introduced, and where they are already in place be phased out over time to a single volumetric charge.
	Location-based or nodal pricing	2.9	Location-based charges for urban water services be applied where the location cost differences are material and where it is practical and cost effective.
	Peak period and seasonal charges	2.10	Time of day or seasonal charges be considered for urban water services where there are identified economic efficiency benefits and where practical and cost effective.
	Self-selecting tariffs	2.11	Self-selecting tariff options be considered where there is sufficient information for customers to make choices, provided they do not result in cross-subsidies or introduce unmanageable revenue risks for the entity.
	Service quality differentials and	2.12	Price/service quality tariff options be adopted, where material cost differentials are associated with different levels of service.

Chapter	Topic	No	Draft Recommendation
	interruptible tariffs		
	Metering and billing arrangements	2.13	Individual metering of flats and units be adopted where economic and practical.
		2.14	Where water is separately metered, and where practical, tenants be billed the fixed and variable charges for water and sewerage.
		2.15	Customers with unmetered connections be charged a deemed amount for usage, reflecting average use for similar property types.
		2.16	Customers with unmetered connections be given the option of paying for meter installation.
		2.17	For vacant land where water services are available for connection, the water access charge that applies to connected properties (the relevant domestic or commercial charge) be applied.
		2.18	Concessions and rebates: (a) reflect a generally consistent approach between the entities (b) be set to apply to either the fixed charge or as a total direct adjustment to the gross invoice amount (c) be capped so as not to subsidise discretionary use (d) be transparent with acknowledgement of the source of, and purpose for, particular concessions/rebates.
		2.19	Concessions associated with excess water use caused by leaks, be determined by the entities in consultation with customers.
		2.20	Hardship arrangements be consistent with legislative and operating requirements and avoid cross-subsidies where practical.
		2.21	Meter-reading and billing be undertaken at least quarterly.
	Tradeable water entitlements	2.22	Tradeable urban water entitlements be considered only where the efficiency gains are sufficient to justify the administration and transactions costs.
Sewerage	Demand forecasting	3.1	Demand for sewerage services be based on forecast growth in connections, linked to population growth.
	Efficient pricing	3.2	For residential customers: (a) sewerage charges be based on a single part tariff with a fixed charge per customer or connection (b) volumetric charges (based on discharge factors) be applied where the LRMC is significant and should be based on discharge or return factors linked to the LRMC of providing the water volumes.
		3.3	For non-residential customers: (a) fixed sewerage charges be based on the impact of the customer on the system. In the absence of direct metering, water connection size is considered a reasonable proxy (b) if appropriate, volumetric charges be applied based on relevant discharge factors established by customer type. Customers should be able to negotiate a variation in the discharge factor.
		3.4	Nodal pricing for sewerage services be applied where cost effective.
Trade waste	Demand forecasting	4.1	Where the customer base changes in line with growth, trend information be used to provide reasonable forecasts of demand for trade waste services.
		4.2	Entities consult with large customers to monitor any step changes in demand

Chapter	Topic	No	Draft Recommendation
			for trade waste services.
	Efficient pricing	4.3	Trade waste prices be based on the impactor pays principle.
		4.4	Charges be based on the LRMC of transport, treatment and disposal of trade waste, with variable charges based on volume and contaminant load.
		4.5	Specific charges for the management of trade waste services (inspection and monitoring) be applied on a cost reflective basis.
		4.6	Charges be differentiated according to customer type and risk factors, and by location (as part of risk assessments) if considered cost effective.
	Compliance	4.7	Consistent with regulations, entities apply penalty charges for non-compliance and recover the efficient costs associated with breaches.
Recycled water	Efficient pricing	5.1	The revenue requirement for recycled water services be based on the total additional cost of recycling less avoided costs and less developer contributions.
		5.2	Direct and avoidable costs be allocated between relevant parties on a beneficiary pays basis.
		5.3	Recycled water volumetric prices be based on LRMC for the established recycled water scheme where possible, less marginal avoided costs. Where the volumetric charge is then higher than the potable water volumetric charge, it may be necessary to reflect demand sensitivities to ensure demand clears supply.
		5.4	If still required to ensure revenue adequacy, fixed charges in a two-part tariff be set to recover remaining revenues, also subject to willingness to pay.
		5.5	If the revenue requirement is still not achievable, unrecovered amounts be allocated to potable and sewerage charges in proportion to avoided cost allocations.
		5.6	Charges be periodically reviewed, as customer acceptance increases.
	Sewer mining	5.7	Charges for sewer mining be set on a case-by-case basis to reflect relevant direct costs, a share of sewerage system common costs, service costs for any returns, less avoided/avoidable costs.
Stormwater reuse		6.1	Stormwater reuse pricing be subject to the same pricing principles as recycled water.
Stormwater drainage		6.2	Rate-based charges be used for recovery of stormwater drainage costs.
		6.3	Charges for stormwater drainage be transparently identified on customer bills.
Industry-wide issues	Externality pricing	7.1	The inclusion of externality prices be supported where material impacts can be valued accurately and cost effectively.
		7.2	Prices incorporating estimates of externalities avoid duplication with other mechanisms and be transparent.
		7.3	Licences and market mechanisms (where practical) be considered by Government where the benefits are considered to justify the costs.
	Third party access	7.4	Third party access prices be based on the cost of service methodology, and take account of relevant joint or common costs. Any departure from this methodology (such as applying the retail minus methodology) is to be justified.
		7.5	Where retail prices are averaged across user groups (postage stamp tariffs) an adjustment apply to ensure that access prices do not result in increased costs of service delivery for remaining customers.
	Cost allocation	7.6	Common costs be allocated to services and customers on the basis of a causal

Chapter	Topic	No	Draft Recommendation
			relationship between the costs incurred and the water, sewerage, recycled water or other service performed.
		7.7	If a causal relationship cannot be established between costs incurred and the relevant service, a reasonable cost allocator needs to be established.
	Price paths	7.8	Price paths be applied where there are substantial price increases, having regard to customers' ability to pay and the impacts on the service provider's financial viability.
		7.9	Price paths be set on a revenue neutral basis.

1 GENERAL PRICING PRINCIPLES

1.1 Introduction

Under the Ministerial Direction (Appendix A) the QCA is directed to develop a regulatory framework for the SEQ distributor-retail entities to operate from 1 July 2015, and to set out pricing principles to apply to the industry. These pricing principles are to apply to the entities for the following services: water, sewerage, trade waste, recycled water (including sewer mining) services and stormwater re-use (including stormwater drainage) services)[1].

The Ministers' Direction includes an overarching regulatory objective to protect the long term interests of the users of SEQ water and sewerage services by ensuring the prices of these services reflect prudent and efficient costs. The QCA is also required to allow for the management of price shocks for customers including price paths within and across regulatory periods where appropriate, changes in pricing policies including tariff structures and the provision and treatment of subsidies.

1.2 The regulatory framework

In a separate Position Paper (QCA 2014), the QCA has proposed a light-handed regulatory framework to apply to the SEQ water distribution-retail entities from 1 July 2015. This framework requires the entities to annually report on changes in prices/revenues (against CPI-X), as well as performance in service quality, investment strategies and customer engagement.

As part of the light handed framework, the QCA also proposes to monitor the entities for consistency with the general pricing principles and their application to urban water and sewerage services.

It is recommended that entities will initially need to establish that the pricing principles are being applied and subsequently advise of any departures, the reasons for the departure and provide the supporting analysis.

Performance against the recommended pricing principles will be taken into account should any such review be triggered as a result of price/revenue or service quality concerns.

An information template will be developed in consultation with the entities which identifies the annual information requirements.

Overview

For the purposes of this report, the QCA's pricing principles are addressed according to:

(a) the relevant general pricing objectives

(b) pricing principles

(c) the application of the pricing principles to

- (i) urban water supply
- (ii) sewerage services

[1] The Pricing Principles do not apply to developer (or infrastructure) charges as the Ministers' Direction Notice is silent on their consideration. The QCA acknowledges that (at the time of writing) separate pricing arrangements apply.

(iii) trade waste services

(iv) recycled water services

(v) stormwater re-use (and drainage) services.

1.3 General pricing objectives

National commitments and positions

Under the NWI governments committed in 2004 (NWC 2004) to best practice water pricing to:

(a) promote economically efficient and sustainable use of water resources, water infrastructure assets and government resources devoted to the management of water

(b) ensure sufficient revenue streams to allow efficient delivery of the required services

(c) facilitate the efficient functioning of water markets, in both rural and urban settings

(d) give effect to the principle of user-pays and achieve pricing transparency in respect of water storage and delivery in irrigation systems and cost recovery for water planning and management

(e) avoid perverse or unintended pricing outcomes.

In 2010, the NWC undertook a stock-take of State approaches to water charging and identified areas of differences in approaches to: recovering capital expenditure; setting urban water tariffs; and recovering the costs of water planning and management. The NWI pricing principles were then further developed to address these issues.

The PC (2011) identified economic efficiency as the overarching objective for urban water pricing. The PC considered that most distributional issues are best dealt with outside the urban water sector through for example, taxation and social security systems.

Other jurisdictions

In other jurisdictions, economic regulators typically cite the objectives of economic efficiency, revenue adequacy, equity or fairness, transparency, competitive neutrality and compliance with national water agreements.

Specific objectives are set out in legislation or other instruments. They relate to such issues as the protection of consumers from monopoly power, the appropriate rate of return on public sector assets, impacts on the environment and sustainable water use, demand management, social impacts and standards of service, impact of carbon pricing, impact on Government financial targets and social impacts, compliance costs, avoidance of regulatory duplication, and the impact of change of prices for customers (NSW Government - IPART Act 1992; Victorian Government - Water Industry Regulatory Order 2012; ERA 2013; SA Government - ESC Act 2002; Tasmanian Government - Tasmania Water and Sewerage Industry Act 2008).

SEQ entities

According to QUU (2012), prior to the formation of QUU, the participating councils of QUU agreed to a set of pricing principles which have continued to be applied by the entities. These are principles of:

(a) efficient pricing - prices are cost reflective, forward looking and provide signals to customers as to the costs of future investment in infrastructure to meet changes in demand

(b) revenue adequacy - prices cover the costs of producing and delivering services, including a return on capital invested. Marginal costs of production provide a guide to efficient variable prices but are not sufficient to ensure revenue adequacy. A fixed charge is applied to recover adequate revenue

(c) equity and social welfare - equity is considered including horizontal equity, vertical equity and inter-temporal equity

(d) environmental and resource impact - the influence of price on consumer behaviour, the flow-on impacts on the environment and the use of scarce resources

(e) administrative practicality - prices administratively feasible, and not impose undue information management or systems costs

(f) easily understood - simpler rather than complex price structures to maximise awareness by consumers.

Stakeholder Submissions

QUU (2013c) submitted that a common issue is conflicting objectives. The QCA's review should consider how these conflicting objectives should be dealt with.

QCA analysis

The general objectives of the QCA follow from the requirements of the QCA Act. This requires the QCA to have regard to the protection of consumers from abuses of monopoly power, the promotion of competition, the efficient use of resources, and other relevant public interest concerns.

The Ministers' Direction includes an overarching regulatory objective to protect the long term interests of the users of SEQ water and sewerage services by ensuring the prices of these services reflect prudent and efficient costs, while promoting efficient investment in and use of these services, having regard to service reliability, safety and security over the long term.

Economic efficiency

Economic efficiency is usually considered in three contexts (QCA 2013):

(a) allocative efficiency - requires allocating scarce resources to their most highly valued uses

(b) productive efficiency - requires that output is produced at minimum cost

(c) dynamic efficiency - the achievement of allocative and productive efficiency over time, including the timely and profitable introduction of new processes, systems and services.

These efficiency objectives are generally achieved where prices:

(a) are cost reflective - that is, they reflect the costs of providing the service (at a specified standard) including a return on capital invested

(b) are forward looking - that is, they represent the least cost way of providing the requisite level of service over the relevant planning period.

To establish efficient costs, the allocation of risk is relevant. For regulated firms, the regulator needs to ensure that risk is allocated to the party best able to manage those risks. This needs to take into account the risk preferences of the parties and the relative costs of managing risks (QCA 2013). The regulator can allocate risk through the choice of a pricing structure and/or a form of regulation, and the approach has implications for estimating the return on capital (see separate Position Papers dealing with the Regulatory Framework (QCA 2014) and WACC (forthcoming).

Revenue adequacy

Revenue adequacy or sufficiency (cost recovery) is a key principle underlying any pricing framework, requiring that a water provider achieve sufficient revenue to ensure the efficient delivery of water services and the ability to invest in asset maintenance and expansion.

In technical terms, the expected present value of the future cash flows of the regulated firm should equal, or not exceed, the value of initial investment, using a discount rate that reflects the opportunity cost of the investment (NPV=0 principle) (QCA 2013).

To ensure the prices of services reflect the level of prudent and efficient costs, prices/revenues should be set so as not to generate monopoly profits.

Public interest (including fairness)

Broader public interest matters (including fairness and equity) are also relevant in setting prices and are required to be taken into account by the QCA (QCA Act 1997).

Matters relevant to the public interest are also identified in the QCA Act 1997. In practice, these could include ensuring customer engagement and taking account of reliability, safety and security as noted in the Ministerial Direction as well as considering environmental and regional impacts.

Any pricing structure that is thought to be equitable is likely to be interpreted differently by different stakeholders. Relevant issues are the management of potential price shocks for customers, effects of pricing policies on vulnerable groups, and implications of subsidies and cross-subsidies.

The QCA (2013) noted that in many cases, prices that satisfy the efficiency objective are also seen as 'fair'. The 'user pays' or 'impactor pays' principle of cost recovery is consistent with the proposition that it is fair for a user of a service, or an individual that causes costs to be incurred (the impactor), to pay for the relevant costs. The 'impactor pays' principle is particularly relevant when considering externalities (see Chapter 7).

The 'beneficiary pays' principle may also be considered in determining who should pay for a particular service. Beneficiaries may include individuals that are not direct users or customers. For example, the beneficiaries of recycled water services may include the wider community not just the direct users of recycled water.

The QCA's Statement of regulatory pricing principles (QCA 2013) addresses equity and fairness issues in detail. It noted that key considerations in considering equity and fairness issues are:

(a) consistency with prior 'reference' transactions. Customers have a perception of fairness based on context and 'reference transactions' informed by market prices and previous transactions. Prices should be consistent with customers' reasonable understanding of how prices are set before investments are made

(b) proportionality principle - under this principle, customers in similar circumstances should be treated equally (horizontal equity)and individuals in different circumstances should be treated in proportion to their differences (vertical equity). This can allow for social objectives, such as specific pricing arrangements for disadvantaged customers

(c) rationale for subsidies. Where there are subsidies (or cross-subsidies), the rationale for these needs to be transparent.

Equity and fairness issues also arise in relation to how common costs are allocated to different customer groups (for example between water and sewerage services or between residential and non-residential customers). These are discussed in Chapter 7.

Where legislation or government directions specify a particular equity or other social goal, reference to economic efficiency impacts will provide an estimate of the cost of pursuing the broader public interest matters.

However, unless otherwise directed by government, the QCA will treat economic efficiency as the primary objective of economic regulation. This reflects the interpretation that economic efficiency represents the overall public interest under the assumption that social concerns are being addressed by other government policies and activities (QCA 2013).

Regulatory governance and practice

Transparency of the methodology for determining prices is necessary to ensure stakeholder confidence and consistency with public policy and regulatory objectives. Price setting also needs to be transparent so that customers understand charges and their implications.

Predictability and stability promote confidence. Also relevant is the practicability of proposed principles in that they need to be administratively simple to implement and minimise compliance costs as much as possible given other objectives (QCA 2013).

In general, more complex tariff structures will involve additional costs which are in effect passed on to customers. An evaluation of the costs and benefits of a particular change in pricing policies will require some judgement by the entity.

Summary of principles

The pricing principles outlined below are applicable to all services provided by the entities. They are consistent with the pricing principles previously established by the QCA (QCA 2000) and also reflect more recent work (QCA 2013). In particular circumstances their application needs to incorporate additional considerations and responses.

In summary, prices of water, sewerage and other services delivered to the customer should:

(a) promote economic (allocative, productive and dynamic) efficiency. Prices should be cost reflective, forward-looking, promote sustainable investment and ensure regulatory efficiency

(b) ensure revenue adequacy – the business must have sufficient revenue to ensure the efficient delivery of water services

(c) promote the public interest – the pricing framework should accommodate concerns related to equity/fairness including those related to vulnerable customer groups

(d) be transparent, predictable, simple and cost effective to apply.

The above pricing principles are consistent with those agreed by the participating councils. Should there be a conflict between objectives the QCA proposes to focus on efficiency as this provides a benchmark to assess the cost of achieving non-efficiency objectives (that is their opportunity cost).

Draft Recommendation

1.1 The pricing of urban water, sewerage, trade waste, recycled water and stormwater re-use services provided by SEQ entities:

(a) promotes economic efficiency

(b) ensures revenue adequacy

(c) takes account of the public interest (including fairness and equity)

(d) is transparent, predictable, simple and cost effective to apply.

1.4 Pricing principles

1.4.1 Key issues

There is a range of alternative approaches to pricing for application to water and related services to achieve the proposed objectives of economic efficiency and revenue adequacy.

Average cost pricing

Average cost pricing (or fully distributed cost methods) derives an average cost per customer.

Marginal cost pricing

Marginal cost pricing sets prices equal to the increase in total cost resulting from producing an extra unit of output.

The nature of water businesses is that in most instances average costs decrease as the use of water infrastructure increases. As a result, marginal cost pricing may fall short of cost recovery.

A two-part tariff which incorporates a marginal cost based volumetric charge to meet efficiency objectives, plus a fixed charge to ensure revenue adequacy, is thus typically adopted.

Ramsey pricing

Ramsey pricing divides customers into separate groups and charges a different price depending on their responsiveness to a change in price. Customers with a high responsiveness to price changes (elastic demand) would have a lower price and customers with a low responsiveness to price (inelastic demand) would have a higher price.

Ramsey pricing can be used in conjunction with marginal cost pricing, with varying mark-ups on the marginal cost based usage charge based on elasticity.

The efficient pricing band

The efficient pricing band (Baumol and Bradford 1970) provides guidance for setting prices to avoid inefficient outcomes. Essentially, prices in total should be set within a band, defined as:

(a) stand-alone cost as the upper bound. This is the cost of providing the service to customers if the service was provided separately from the rest of the entity's operations

(b) incremental cost of providing services to customers or groups of customers as the lower bound. This generally reflects the marginal cost for an additional unit of demand. It may also be measured as the cost that would be avoided (avoidable cost) to the entity if the customer was not serviced.

National commitments and positions

The 1994 COAG Agreement and NWI (2004) promoted consumption-based pricing of water infrastructure services to facilitate efficient water use.

The NWC (2010) proposed that unattributable joint costs should be allocated such that total charges to a customer must not exceed stand-alone cost or be less than avoidable cost where it is practicable to do so.

PC (2011) suggested different pricing frameworks for the different water supply activities. Specifically:

(a) for distribution, that network costs are driven by number of customers as the system is usually designed to service the peak demand of the customers serviced. As no future capital upgrades or expansions are envisaged, a volumetric charge is not appropriate [as it is negligible and no additional capacity is required]. Costs should be set as a fixed charge per connection

(b) for retail, that efficient retail water prices will reflect the sum of efficient bulk, transmission and distribution prices. Retail-specific costs of metering, billing and complaint handling are incurred on a per customer basis.

Other jurisdictions

The NWC (2011a) observed that consumption-based tariffs based on marginal costs are now in place in most jurisdictions throughout Australia, and there are now few examples of property-based water charges.

ESCOSA (2013a) set average revenue caps rather than prices. However, ESCOSA noted that marginal costs should be used to set variable charges.

SEQ entities

The SEQ entities pricing principles support the concept of marginal cost (as providing a guide to volumetric pricing).

QCA analysis

Average cost pricing

Average cost pricing is simple and transparent. However, average cost pricing may result in less water being used than is optimal where decreasing costs are associated with increased supply, that is, where average cost is greater than marginal cost.

While this approach does not therefore meet the efficiency criterion (see below), the inefficiencies may not be significant where demand is inelastic, such as is usually the case for non-discretionary water demand.

Average cost pricing may be relevant where meters are not economic.

Marginal cost pricing

Marginal cost pricing ensures that a consumer only purchases services where the value to the consumer is greater than the marginal cost of production, while ensuring that producers receive a return equivalent to the cost of supplying the additional service.

If implemented in conjunction with a fixed charge in a two-part tariff to ensure revenue adequacy, it meets all the efficiency, cost recovery and equity objectives noted above. Marginal costs can be complex to estimate (see issues below), but charges once determined are relatively simple to understand.

Ramsey pricing

Ramsey pricing requires that:

(a) the ability to on-sell the resource be limited (so that buyers at lower prices cannot arbitrage by reselling to those with higher volumetric charges)

(b) it is not possible to pay less for a given quantity by buying it in smaller lots.

Difficulties can exist in accessing the necessary demand elasticity information for different customer groups and in accounting for variations over time.

Moreover, equity concerns can arise in charging a higher price to customers that are less able to access alternatives or negotiate lower prices. Berg (1999) also noted that Ramsey pricing could lead to some customers paying more than stand-alone costs, resulting in by-pass or disconnection where alternative options are available.

Ramsey pricing can be used in conjunction with marginal cost pricing and two-part tariffs, but because of the practical difficulties in its application, remains more theoretical than a workable option (Bonbright et al 1988). It requires information about the demand response of different customer groups which may not be readily available.

It is therefore not recommended.

The efficient pricing band

The efficient pricing band lies between incremental cost (the additional cost per unit for a specified volume of demand, usually equivalent to marginal cost) and stand-alone costs (total fixed and variable costs). The pricing band must be respected for individual customers or groups of customers who could for example combine to by-pass (the combinatorial test).

The efficient pricing band provides general guidance for setting charges so as to avoid cross-subsidies between different customer groups and between different services. For example, it can provide guidance for setting fixed charges in a two-part tariff to ensure that prices are efficient and do not result in monopoly pricing or by-pass.

However, the efficient pricing band generally results in too wide a range when seeking to establish prices per se.

Draft Recommendation

1.2 Entities initially establish that the pricing principles are being applied and subsequently advise of any departures, the reasons for the departure and provide relevant supporting analysis.

1.3 Pricing reflects marginal cost, together with a two part tariff where necessary to achieve revenue adequacy.

1.4 Prices be set between incremental (marginal) cost and stand-alone cost.

1.4.2 SRMC or LRMC

Usually two options are considered when applying marginal cost pricing:

(a) *short run marginal cost (SRMC)* - the additional cost associated with increasing production by one unit, in a period in which at least one factor of production is fixed. When there is spare capacity, SRMC typically comprises costs that change with demand such as electricity costs. When capacity is reached SRMC increases to reflect scarcity value. In instances where supply cannot expand to match demand, SRMC rises to the price necessary to curtail demand to match supply.

(b) *long-run marginal cost (LRMC)* - the additional cost of providing an extra unit of the service when no input costs are fixed. LRMC comprises marginal operating costs (typically equivalent to SRMC) and, if relevant, a marginal capacity cost (MCC). MCC may take the form of increased storage, pipeline or treatment plant capacity.

National commitments and positions

The NWI pricing principles (NWC 2010) state that:

> *Principle 3: Cost reflective tariffs - the water usage charge should have regard to the long run marginal cost of the supply of additional water.*

The PC (2011) however was critical of the NWI pricing principles support of a LRMC approach to setting volumetric prices without reference to scarcity charges. The PC noted that LRMC is a static concept and estimates change only slowly as new sources come within the planning horizon. In times of scarcity, the estimated LRMC may under-price water, and by taking a long-term approach it may over-price water when there is surplus capacity.

Other jurisdictions

ERA (WA) (2013), IPART (2013), ESC (2013a) OTTER (2012) support the use of two-part tariffs based on LRMC in their urban water pricing determinations.

ESC (2005) has previously required regional water supply distribution/retail entities to estimate LRMC. However, more recently, ESC (2013b) noted that estimating LRMC is difficult and did not require the water businesses to present estimates of LRMC.

In Tasmania, OTTER (2012) did not specifically adopt LRMC, but noted that the proposed variable charges applied by the 3 Tasmanian water businesses exceeded SRMC. OTTER considered it appropriate that prices be set above SRMC to moderate demand and to defer demand driven capital investment.

Ofwat (UK) (undated) concluded that volumetric tariffs that reflect LRMC are consistent with balancing supply and demand in the long term and with companies' duties to promote efficient use of resources.

QCA analysis

Pricing needs to take into account the period over which the relevant incentives are intended to apply. For the water sector, dominated by very large and lumpy assets with long lives and characterised by only small changes in technology, long term pricing signals have generally been considered appropriate to fully reflect the investment consequences of increased demand. London Economics (1997) noted that such pricing enables stable financing of long term investment.

While these are particular characteristics of bulk water assets they are also applicable to trunk distribution and reticulation systems.

Pricing for distribution and retail services has, therefore, generally been set with reference to LRMC.

In reflecting the LRMC, prices rise well in advance of infrastructure capacity constraints. Prices based on LRMC will most effectively provide early signals for impending infrastructure constraints.

A higher LRMC-based volumetric charge would be accompanied by lower fixed charges as total charges remain consistent with the revenue requirement. While there may be a welfare loss due to customers paying higher volumetric charges and responding with lower water use than if prices were set to SRMC, these losses are offset by savings from deferral of demand-driven augmentations.

The customer response to LRMC also provides information back to the service provider in regard to the willingness of customers to pay the additional cost of augmentation. If demand decreases as a result of LRMC pricing, the investment can be deferred or its scale changed.

A further advantage of LRMC compared to SRMC is that it reduces or eliminates the instability in SRMC pricing which is particularly evident when capacity constraints are encountered.

In mature businesses, with spare capacity and slow demand growth, no augmentations may be identified in the planning horizon, and LRMC will equal SRMC.

While accepting LRMC pricing, the QCA acknowledges that there may be a need for short term variations to LRMC prices when there are capacity constraints - that is where the SRMC (for a particular period) exceeds the LRMC (set for a longer period). In such circumstances, SRMC pricing would be appropriate. This is often referred to as scarcity pricing (see more comprehensive discussion further below).

Such variations require relatively sophisticated customer engagement and communication strategies to ensure that customers understand that such variations are unusual rather than the rule. The conditions for invoking such charges should be pre-defined, for example where capacity constraints arise from unexpected events that could not be foreseen and which impose additional unavoidable costs on the system.

Where the LRMC is below long run average cost a two part tariff will be needed to apply to ensure revenue adequacy.

In most circumstances, LRMC based volumetric tariffs satisfy:

(a) economic efficiency - the volumetric charge is reflective of the cost of long term supply including forecast augmentations

    (i) is forward-looking (by providing pricing signals in advance of augmentations) and relevant to the planning period

    (ii) promotes sustainable investment

(b) revenue adequacy – the fixed charge component of a two-part tariff in conjunction with long run marginal cost pricing ensures that the full revenue requirement is covered

(c) public interest considerations - while generally these should be addressed through separate policy arrangements, if necessary rebates and concessions can be provided through the fixed charge

(d) transparency, simplicity and cost effectiveness – although LRMC can be complex to estimate, two-part tariffs provide a clear signal to customers on the impacts of their water use decisions.

The QCA has previously applied LRMC pricing in its investigations. It adopted LRMC based pricing in its investigation of GAWB's pricing practices (QCA 2010). SunWater and Seqwater irrigation charges reflect SRMC as no capacity augmentation was proposed.

The QCA therefore continues to support a LRMC pricing two-part tariff framework, consistent with most other regulators and the NWI pricing principles.

In estimating LRMC for the SEQ entities it should also be noted that:

(a) some expenditure (such as expansions of the reticulation and drainage systems) may be partially or fully covered through developer charges. The extent of such funding should *not* be incorporated in LRMC

(b) bulk infrastructure charges (that is, those administered by Seqwater) are part of LRMC.

> **Draft Recommendation**
>
> **1.5 Prices reflect the LRMC of providing a particular service.**
>
> **1.6 Prices reflecting SRMC be considered when SRMC for a particular period significantly exceeds the LRMC (estimated for a longer period) for a particular service. This is sometimes referred to as scarcity charging.**

1.4.3 Estimating LRMC

Introduction

LRMC comprises SRMC plus Marginal Capacity Costs (MCC). Estimation of SRMC relies on available data on the variation in costs arising from an additional unit of demand – in the context of the SEQ entities this is likely to include electricity, water or sewerage/trade waste treatment and some labour and maintenance costs as well as bulk water costs.

The MCC component of LRMC can be difficult to estimate.

In general, there are three accepted alternative methods for estimating MCC.

The simple (or simplified) Turvey approach (Turvey 1976) estimates the difference between the present worth of the next planned capital investment for a given forecast increment in demand, and the present worth of delaying the capital investment for one year. The result is expressed as an annual unit value for one year (Turvey 1976). This approach as originally proposed by Turvey does not look beyond the next growth-driven investment.

A variation on Turvey's original approach (known as the perturbation approach) allows for multiple augmentations over a longer planning period. This method takes the difference in PV of capacity costs between a base case demand scenario and a revised demand scenario, and divides it by the PV of the demand difference. It requires the entity to derive two alternative demand scenarios - a base case demand scenario, and an alternative (higher) demand scenario which would require bringing forward capacity upgrades (Turvey 2000).

The Average Incremental Cost (AIC) method derives an average incremental cost over a designated planning horizon. It estimates MCC by taking the present value of a stream of capital costs needed to satisfy demand increments, divided by the present value of demand increments to express the result in present value terms on a unit basis. The AIC method can smooth out lumps in capital expenditures while reflecting the trend in future costs.

Regardless of which method is adopted, the estimation of LRMC is dependent on effective demand forecasts and projected costs and timing of future capital works.

Other jurisdictions

ERA (WA) (2013) approved the Water Corporation's approach for estimating LRMC using a Monte Carlo simulation model of demand profiles, rainfall scenarios and water supply options over a 100-year period to estimate a mean per kL cost of water in present value terms. The simulation model compared the present value for a base case long term demand scenario to that for a demand scenario that was 7% higher.

The present value of the difference in costs, divided by the present value of the difference in demand, provided an estimate of LRMC. The method is an example of application of the Turvey method over multiple growth augmentations over a longer planning horizon.

For the Hunter Water Corporation, IPART (2013) calculated the NPV of the capital and operational costs of the augmentation project over its life and divided by the NPV of benefits over the same period. This is effectively the AIC method.

The ESC (2005) has provided guidance to water businesses on the calculation of LRMC. Although indicating a preference for the perturbation approach over AIC, ESC essentially does not recommend a particular approach, leaving it to the water businesses to decide which approach to adopt.

The metropolitan Melbourne water businesses (of City West Water, South East Water, Yarra Valley Water and Melbourne Water) commissioned NERA Economic Consulting (2012) to develop a framework for estimating LRMC methodology applicable to the Victorian water industry. NERA recommended the application of either the perturbation or AIC approach subject to certain conditions. As an example, in those instances where service is characterised by a more periodic, smooth profile of forecast expenditure, the AIC approach is recommended.

In recent reviews, Ofwat has not indicated how LRMC is estimated. However, in the past, Ofwat (2001) identified both methods but did not indicate a preference. Water businesses were free to use either method, but tended towards the AIC approach.

QCA analysis

The QCA recognises that the simplified Turvey and perturbation methods are more conceptually sound as they estimate the cost of the marginal increment of demand. In contrast, the AIC method uses average capital costs to approximate the marginal costs associated with a change in demand.

In the 2002 investigation of GAWB, the QCA (2002) used the simplified Turvey method to estimate MCC on the basis that it more closely reflected incremental costs. However, in the 2005 GAWB review (QCA 2005), following concerns of GAWB that this Turvey method was too complex to apply and difficult for customers to understand, the QCA adopted the AIC approach on the basis of advice from Marsden Jacob Associates (MJA, 2004).

In the 2005 GAWB review, the QCA concluded that the methods that take account of all planned augmentations are acceptable - that is, LRMC could be based on either the Turvey perturbation method or the AIC method. However, the AIC method was the preferred method in practice on the grounds of ease of computation and greater transparency. It requires only the base case demand scenario. The AIC method was again used in the QCA's 2010 investigation of GAWB (QCA 2010).

The AIC method has advantages in that it:

(a) incorporates all augmentations over the planning period, not just the first augmentation, and will therefore produce more stable prices over the period

(b) it is more transparent and more readily explainable to stakeholders

(c) it is computationally straight-forward, despite a requirement for forward-looking capex and opex data.

However, the AIC method is in concept an average cost rather than a marginal cost.

The perturbation method has marginal cost characteristics as it bases the MCC estimate on the difference between capex for different demand scenarios. However, it requires these demand scenarios to be derived and it may be difficult to explain to stakeholders.

Other regulators tend not to make specific recommendations regarding the adoption of either the perturbation or the AIC approaches. Water service providers assess the merits of these approaches themselves, depending on their circumstances, including data availability.

The choice of method is therefore to the entities. The QCA will outline the basis of calculations using either method by 30 May 2014.

Draft Recommendation

1.7 LRMC be estimated on the basis of the perturbation or AIC method.

2 URBAN WATER

2.1 Introduction

Urban water services constitute water intended for use as drinking (potable) water supply.

In SEQ, the 5 entities provide drinking water to about 3 million people. Services are provided to residential (household) and non-residential (commercial and industrial) customers throughout the region.

Urban water charges in SEQ are generally set as a two-part tariff, and in some cases volumetric charges are set according to tiers (blocks) of consumption levels. Charges are typically different between the entities, and in some cases are further differentiated by council area. A variable bulk water charge, differentiated by area, also applies.

Bulk water charges are set by Government and administered by Seqwater. These pricing principles do not apply to bulk water charges but rather to the pricing practices of the five SEQ retail-distribution entities.

This chapter reviews the matters and methodologies relevant to applying the general pricing principles to the urban water sector.

2.2 Urban water demand forecasting

Estimates of demand are relevant for determining the prudent and efficient level of costs, including capital expenditure to be incorporated into LRMC.

The key determinants of demand for water include:

(a) population growth (increases in the number of residential and non-residential connections)

(b) the mix of connections (houses or apartments) and changes household allotment and garden size

(c) implementation of demand policies such as water restrictions, rebates, retrofit, and uptake of efficient water appliances

(d) changes in consumer behaviour over time - reflecting economic, political and income factors, marketing and media

(e) price elasticity- customer responses to prices and implications for discretionary and non-discretionary use

(f) seasonal and climatic factors

(g) the level of system leakage.

A particular issue relevant to SEQ (and many other Australian jurisdictions) is the level of demand rebound or 'bounce-back' in the aftermath of extended drought periods with the easing of supply restrictions.

Bounce-back may be constrained where customers make permanent adjustments to water installations or have adopted permanent behavioural changes that result in more efficient uses of water and permanent water savings. Such permanent change can imply lower demand elasticity with respect to price.

Demand is often forecast by reference to changes in key drivers such as population growth. Other techniques that can be used to forecast demand include (QCA 2012a):

(a) end-use modelling - generating forecasts of future demand based on individual end-uses of water

(b) econometric modelling - uses cross-sectional data, time series data or panel data. These approaches may complement other approaches

(c) simple extrapolations - uses the extrapolation of observable historical trends in per connection (or per person) use, based on assumptions regarding demand drivers.

Other jurisdictions

Many alternative approaches, including sophisticated modelling, are adopted across Australia. Most have been only recently applied and their accuracy has not yet been generally tested.

Most Victorian water retail entities adopt a simple extrapolation approach to demand forecasting. End use modelling is primarily undertaken by City West Water (2012), South East Water and Yarra Valley Water. The modelling of end use takes into account:

(a) input data for number of dwellings, appliance stock levels (disaggregation into laundry, toilet, shower, miscellaneous), technology (flow rates and duration) and frequency (number of uses)

(b) bounce back effect - with changes in water storages, City West assumed a 3% bounce back effect

(c) household and population growth - increase in connections consistent with long term forecasts in strategic plans

(d) climate change - consistent with the medium scenario

(e) price elasticity - different responses for the volumetric tiered tariffs levels - 0 for customers in the first (non-discretionary) tier, 0.1% for tier 2 and 0.14% for Tier 3.

For non-residential users, City West Water used historic water usage projected forwards with efficiency trends and applied to commercial growth.

In another Victorian example, Goulburn Valley Water (2012) used multi-variant regression models to forecast residential usage per customer. These use variables such as temperature, rainfall, usage restrictions and conservation initiatives which are the key drivers of discretionary (outdoor) use, considered the main demand modifier. Population growth forecasts were sourced from the Department of Planning and Community Development. For commercial users, the average demand was used as water demand is relatively static from year to year.

Sydney Water (IPART 2012b) used econometric models to forecast average daily residential water use, with key inputs being previous water use, price of water, presence of drought restrictions or Water Wise rules, participation in water efficiency programs and weather.

Hunter Water (IPART 2013) used the Integrated Supply-Demand Planning model (iSDP) an end use model developed by the Institute for Sustainable Futures. For each end use, specific information is required on the stock (number of households with each type of appliance), water intensity (use by appliances) and frequency of usage. Non-residential demand was predicted as a compilation of disaggregated sectors rather than end-use. It uses historical trends and specific information from water-intensive customers.

In WA, the Water Corporation (ERA 2013) forecasts demand by generating forecasts in growth in customer numbers and growth in per capita consumption, essentially an extrapolation approach. Customer numbers are forecast using population projections from the WA Planning Commission, structure plans and local government information. Per capita annual consumption was predicted to decline from 140kL in 2012-13 to 137kL in 2015-16, based on the Water Forever forecasts by Government.

SA Water (ESCOSA 2013a) used regression models to analyse customer numbers and water use per customer for residential and commercial customers. SA Water considered that residential demand per customer is driven by price, temperature and water restrictions. Economic activity was included as a driver for commercial water use.

SEQ entities

The general approach adopted by QUU and Unitywater is to forecast residential water volumes based on estimating connected population and multiplying this by an underlying forecast level of consumption on a per person basis (l/p/d).

Growth in connections was calculated by reference to the Office of Economic and Statistical Research (OESR) growth rates, reflecting expected population growth (recommended by QCA as the low growth series). Consumption per person was then derived by the QCA assuming a bounce-back from prior lower levels subject to an overall SEQ regional cap of 185l/p/d.

For Unitywater, the forecast 2015-16 residential averages were 172l/p/d for Moreton Bay and 227l/p/d for Sunshine Coast. For QUU, the average residential water usage for 2015-16 ranged from 160l/p/d (Lockyer) to 196l/p/d (Brisbane). QUU (2013a) forecast a growth of 5l/p/d between 2013-14 and 2014-15.

For the non-residential sector, QUU (2013a) and Unitywater (2013a) estimated consumption per connection, using billing system data. Previously, Unitywater (2012) used equivalent population (EP) projections linked to forecasts for the residential sector. QUU (2013a) noted non-residential demand growth is influenced by large customers - with demand growth varying from year to year.

For the long term forecasts (>5 years), used for capital planning purposes, QUU and Unitywater adopted an average daily demand of 230l/p/d. Unitywater (2013a) noted that the SEQ System Operating Plan (SOP) requires the entities to provide DEWS and Seqwater with 20-year demand forecasts, revised annually, and aligned with an approved Water Netserv Plan.

Gold Coast Water (2014) indicated it is working towards a more sophisticated approach to demand forecasting involving demand modelling.

Differences in approach can reflect the unique characteristics of each entity - including approaches to demand management, climate variations, age of infrastructure, customer profiles etc.

QCA analysis

Long term forecasts

The SEQ entities' long term forecasts are matched to an expectation that demand will revert to a forecast regional residential average of 230l/p/d (also 375l/p/d across all uses), considered sufficient to maintain outdoor amenity and lifestyle (QWC 2010). This allowance is 90l/p/d higher than the low point reached during the drought. The Strategy proposed a target average of 200l/p/d to defer augmentation by about 5 years.

On the basis that SEQ long term planning is based on the residential average of 230l/p/d, this is considered appropriate for long term capital planning for the entities. It is considered appropriate that long term forecasts used for capital planning purposes should be based on the SEQ Water Strategy forecasts.

Short-term forecasts

For the previous price monitoring reviews, the QCA broadly accepted the relatively simple demand forecasting methods adopted by QUU and Unitywater, but considered that more sophisticated methods should be developed taking account of demand elasticity once the bounce-back effect has occurred. Essentially, short-term forecasts involve forecasting two key parameters - growth in connections and changes in water use (l/p/d). The QCA set an interim forecast of 185l/p/d for the 2013-15 review.

WSAA (2003) notes that traditionally, demand forecasting was undertaken using historical trends or by using econometric regression techniques incorporating variables such as population, income, price of water and restrictions. These methods effectively incorporate the two key parameters in one model, for example, population growth and customer demand elasticity. WSAA indicated that methods using historical data, because of changes in consumer behaviour and technology, may lead to an over-estimate of demand.

Panel data techniques and end use modelling are techniques that move away from simple extrapolation techniques and focus on factors and technologies that affect water use, including emerging trends. Panel data can be used to assess more accurately such things as demand elasticity, responses to supply restrictions and other demand management programmes.

End use methods disaggregate demand into services or uses, e.g. indoor/outdoor, or further broken down into toilet, laundry, showers, garden watering. Demand for each end use is calculated based on ownership of appliances, usage patterns (frequency and duration) and technologies - that is, *Water Use = Stock x Usage x Technology*. The aggregation of end use demands gives total demand.

WSAA developed the Integrated Supply Demand Planning (iSDP) model based on this methodology. This model has been used by entities such as Hunter Water and City West Water in Victoria.

End use modelling is appropriate where water entities are implementing demand management options and want to assess their impact on water use per customer (l/p/d). The method can be complex and data-intensive depending on the level of disaggregation of end uses. In SEQ, end-use modelling may not sufficiently take account of behavioural change driving a bounce-back effect.

If it were to be considered, disaggregation by indoor and outdoor uses may be sufficient, to at least distinguish potential differences in responses in the non-discretionary and discretionary components of demand to price changes.

In general, the approach of estimating projected population growth and usage (l/p/d) remains reasonable in the circumstances. It remains the most cost effective approach given the risk of error of any of the methods where the bounce-back effect is continuing. Individual circumstances of each entity should also be considered, such as demand management strategies and the nature of the customer base.

Once the bounce-back effects are cleared, QCA recommends that a review of demand forecasting practices and alternative models should be undertaken, involving the entities, QCA and other relevant parties. Unitywater (2013a) suggested such a regional working group. This review could include considering options such as panel data to estimate demand responses, or specific end use forecasting at least based on indoor/outdoor uses. Such options should be considered in terms of cost effectiveness - the costs of implementing more sophisticated methods should be balanced against the expected improvement in accuracy.

Demand elasticity

Most empirical evidence indicates that demand for water is inelastic. Examples are cited by PC (2011), and include elasticities (as a percent reduction resulting from a 1% increase in price) ranging from -0.09 to -0.418 for Sydney, and -0.15 to -0.39 for the ACT. As noted above, City West Water (2012) proposed an elasticity of up to -0.14.

Grafton and Kompas (2007) used Sydney Water bulk supply data from 2001-2005 to estimate short-run demand elasticities of -0.35 (nominal) and -0.42 (real prices). A similar study by Grafton and Ward (2007) using Sydney data from 1994 to 2005 found a short-run elasticity of demand for real prices of -0.17.

Sydney Water (2011) used panel data analysis involving 95,000 individuals considering a 10% price increase. The study found an average elasticity of -0.06 for immediate responses and -0.11 for the long term. Owner occupied households were more elastic - -0.08 for immediate responses and -0.14 for the long term.

However, a study by Hoffmann et al (2006) noted a short-run elasticity for Brisbane of between -0.51 and -0.59, and a long-run elasticity of -1.17 to -1.44. This suggests that demand may be more elastic in the long run, and that there is some scope for prices to affect demand. However, since 1996, discretionary use has declined significantly and these elasticity estimates may no longer be relevant.

Worthington et al (2006) modelled residential demand in eleven Queensland councils from 1994 to 2006. In modelling response to changes in average prices, they found an elasticity estimate of -0.126, that is, a 10% increase in the price of water is associated with only a 1.26% reduction in the quantity demanded. Worthington et al considered that the low elasticity of demand could be due to non-price controls on discretionary consumption, limiting the scope for demand reductions.

A study using panel data from 1995 to 2005 for Perth (Xayavong et al 2008) found higher demand elasticities ranging from -0.7 to -0.94 for indoor use, and -1.3 to -1.45 for outdoor use.

The PC (2011) suggested that estimation of demand elasticities are problematic as it is difficult to separate out the effects of supply restrictions and other campaigns to reduce water use.

The PC (2011) noted that the elasticity of demand could be affected by:

(a) type of use – household demand for outdoor water use is more elastic than the indoor, less discretionary use

(b) time – demand is more elastic over the long run as customers can modify behaviour and install water-saving technologies. The greater the level of adoption of water efficiency technology the less elastic water demand will be as households have fewer options to respond (City West Water 2012)

(c) level of price – as prices rise, and water becomes an increasing household cost, price elasticity will be higher. Elasticity is likely to be non-linear

(d) clarity and transparency – the more understandable the prices and the consequences of behavioural change, the more elastic demand is likely to be

(e) billing – a shorter billing period will result in more responsive demand. Cole (2011) noted that demand elasticity would be affected by billing of landlords rather than tenants, and splitting of bills between multi-occupancy residences. City West Water (2012) noted that owner occupied houses have more elastic demand than tenanted ones.

Cole (2011) indicated that there is little consensus on the price elasticity of various types of water use - ultimately price elasticity is linked to customers' behavioural responses, socio-economic characteristics and weather.

In SEQ, demand response to price will be difficult to separate from any bounce-back effect. QUU (2013a) noted that demand for water is more affected by past government policies (changes arising from supply restrictions) than by price. This is despite significant annual increases in the bulk water charge.

In SEQ, the focus in demand forecasting over the short term is on the bounce-back effect - mainly as households increase outdoor usage (gardens, car-washing etc). As noted in the QCA's 2012-13 price monitoring review, once this effect is considered stabilised, the SEQ entities should consider investigations of demand forecasting taking account of price elasticity.

The empirical studies suggest that demand is relatively inelastic when there are no supply constraints and prices are stable. However, when prices increase to reflect capacity and long term supply constraints, demand is likely to be more elastic. This would support the adoption of LRMC as a basis for estimating the volumetric component with deviations in periods of unusual circumstances.

Concerns about the elasticity of demand are not an impediment to the success of using prices to achieve water security at least expected cost. Although an inelastic demand may result in a small change in demand for a given price change, and the magnitude of the change in demand might be uncertain, this does not make it inferior to other tools such as restrictions.

An inelastic demand indicates that consumers place a high value on additional water consumption. This suggests that the welfare of society would be larger if supply were augmented to satisfy demand, rather than restrict demand. Indeed, the more inelastic demand is, the greater the costs to the community of restricting demand and not allowing flexible prices to signal the need for investment in supply augmentation (chapter 7).

Demand forecasts should therefore take elasticity into account and the SEQ entities should consider whether the increasing bulk water price has had an effect on the long run demand elasticity.

The elasticity of demand is also a consideration in regard to applying SRMC-based scarcity charges as part of a demand management strategy during droughts. This is discussed below in Section 2.11.

Draft Recommendation

2.1 Long term forecasts used for capital planning be based on SEQ Water Strategy forecasts.

2.2 Short term demand forecasts be based on estimated water use per customer/connection and population forecasts (number of connections) and take account of any bounce-back effect as well as local circumstances.

2.3 Demand forecasting practices and alternative models (including demand elasticities) be reviewed by a working group including the entities, QCA and other relevant parties.

2.3 Urban water volumetric charges

Efficient pricing principles involve the application of LRMC based pricing in most circumstances, to meet the objectives of cost reflectivity, revenue adequacy, equity/fairness and simplicity and transparency.

Most jurisdictions make reference to LRMC to set volumetric charges in a two-part or multi-tiered tariff structure.

Issues that may arise in setting urban water volumetric charges are:

(a) tariff balance. Where the LRMC is low, the two-part tariff will be predominantly a fixed charge. While this shifts revenue risk to the customer, there may be concerns that customers have less control over their bills

(b) where the LRMC-based volumetric charge exceeds the revenue requirement. This could occur where the next augmentation involves an increasing marginal cost compared to average cost, for example, investment in desalination. In these circumstances, the application of LRMC pricing would result in a single volumetric charge and no fixed charge to comply with the revenue requirement

Tariff balance

Other jurisdictions

Despite general support for LRMC pricing, there are examples of adjustments to volumetric tariffs to alter a tariff balance.

In Victoria (ESC 2013a), the percentage of revenue from variable bulk water prices for Melbourne Water was set at 70 per cent to align it with water retailers' pricing approaches and send signals to customers about water conservation and the benefits of deferring additional infrastructure investments. Victorian Government policy requires water bills to have a minimum 60 per cent variable component.

IPART (2012a) in setting bulk charges for Sydney Catchment Authority (SCA) to Sydney Water for 2012-16, recommended a tariff structure with an 80:20 split between fixed and variable revenue, changed from the previous 40:60 split. The variable component reflects the short-run operating costs of pumping from Shoalhaven River, in effect, SRMC. The objective of the new structure was to minimise revenue risk to the SCA given its reliance on one customer.

The Queensland Government's (1997) guidelines for setting two-part tariffs concluded that economic efficiency is achieved where the volumetric charge equals LRMC of an additional unit of water. However, the Guidelines noted that the relative size of access and volumetric charges will influence demand response. Non-economic objectives such as the impact on gardens and streetscapes may be a factor, as well as environmental costs which may not be quantified. The Guidelines suggested that the variable component should normally account for 30-60% of revenue.

Ofwat (undated) considered that the link between LRMC and volumetric tariffs should not be seen as mechanistic. If LRMC is very low compared to average costs, there would need to be a very high standing charge to cover fixed costs. This would not give customers sufficient control over their water bills. Ofwat encourages minimising fixed charges.

In the QCA's review of irrigation water pricing in SEQ, the two-part tariff structure was heavily weighted to the fixed charge as the LRMC was low, effectively only SRMC (as no augmentation was being considered) or the variable operating costs, and the need to meet the lower bound revenue requirement was key. The tariff structure for bulk water supply was typically a 90:10 balance. The QCA did not vary the tariff structure from that attributable to observed marginal costs (noting also the broader implications of such a structure for water trading).

SEQ entities

QUU (2012) noted trade-offs between revenue adequacy and customer control - lower variable charges provide greater stability of revenue but limit customers' ability to reduce their costs (reduced ability of price to influence behaviour).

In 2013-14, the ratio of fixed to variable revenue for the 5 entities, including bulk water revenues are: QUU 52:48, Unitywater 66:34, GCCC 51:49, LCC 60:40, and RCC 61:39. The SEQ average is 56:44.

Stakeholder submissions

GCCC (2013) submitted that pricing principles should allow entities scope and the ability to design tariffs that suit local customer, industry and community needs, rather than a set of rigid rules to adhere to.

Unitywater (2013c) submitted that water and sewerage pricing should balance outcomes in terms of customers, risk and sustainability.

QCA analysis

The QCA does not support mandated minimum charges or tariff structure balances based on pre-determined targets beyond those implied by the LRMC.

Essentially LRMC pricing sends the appropriate signal for the efficient use of water and the remaining revenue, if required, is achieved by the fixed component.

Increasing the volumetric charge beyond its LRMC may result in demand responses that are inappropriate for the circumstances.

As noted above, there may be short term circumstances which require alternative approaches such as SRMC but the reasons and triggers need to be clear and the response appropriate to those circumstances. In such circumstances, variations should be supported through relevant customer engagement such as surveys and community reference groups.

However, entities should be able to demonstrate that departure from LRMC ensures broad consistency with the overall general pricing principles.

Draft Recommendation

2.4 The volumetric charge for urban water services should reflect LRMC.

Over-recovery of revenue

Over-recovery of revenues due to annual variations in demand is managed through the regulatory framework.

The issue of over-recovery due to SRMC or LRMC being higher than average costs at a point in time is likely to be rare, particularly for the SEQ entities. However, it could occur with increasing costs for future augmentations.

National commitments and positions

The NWI pricing principles (NWC 2010) state that:

> *Principle 6: Over recovery of revenue - where water usage charges lead to revenue recovery in excess of upper bound revenue requirements in respect of new investments, jurisdictions are to address the over recovery. In addressing the over recovery, revenues should be redistributed to customers as soon as practicable. This principle recognises that in some cases, long run marginal cost may exceed average cost.*

QCA analysis

Where prices are set at LRMC, exceed average costs and excess revenue is collected, additional funds could be hypothecated to future capital augmentation, rebated to customers immediately or returned in the future as a discount to the fixed charge. An ex post rebate is the preferred approach.

Such considerations are more appropriately decided in consultation with the local community.

Draft Recommendation

2.5 Where prices exceed average costs, short term over-recovery of revenues be addressed by ex-post rebates with adjustments made to the fixed charge.

2.4 Urban water fixed charges

Introduction

In applying LRMC pricing, a fixed charge in a two-part tariff will usually be required to ensure that sufficient revenue is generated. Issues in setting a fixed charge are:

(a) the revenue requirement of the fixed charge depends on the amount raised by the volumetric charge

(b) cost allocation between particular users or classes of users, for example residential, commercial and industrial to reflect a share of fixed costs.

Revenue requirement

Where LRMC is low, (where spare capacity exists for example), the volumetric charge will also be low and the tariff structure would be heavily weighted to the fixed charge.

Revenue risk increases where LRMC is high relative to total costs, that is, where the MCC component is high and LRMC departs from SRMC (variable costs). In this circumstance, customers may reduce demand more than expected and revenues may be impacted. This will depend on the demand elasticity.

National commitments and positions

The NWI pricing principles (NWC 2010) refer to the fixed charge as a service availability charge. Specifically:

> *Principle 4: Setting the service availability charge:*
>
> *the revenue recovered through the service availability charge should be calculated as the difference between the total revenue requirement as determined in accordance with full cost recovery principle and the revenue recovered through water usage charges and developer charges.*

QCA analysis

For the SEQ entities, the level of demand-driven augmentations is not likely to be substantial and therefore the MCC should not be a high proportion of the estimated LRMC. The fixed charge should therefore be established based on the level of maximum allowable revenue (MAR) not recovered through the volumetric charge.

However, given the Government's bulk water charge is a solely volumetric charge, and is set on an upward price path for the years ahead, the entities therefore bear some risk that there will be a demand response to these price rises.

In SEQ, the demand response to the increasing bulk water charge may be reflected in a slower bounce-back effect from prior low water use levels. This would be reflected in entities' demand forecasts.

Draft Recommendation

2.6 Fixed charges for urban water services recover the maximum allowable revenue (MAR) not covered by the volumetric charge.

Differentiated fixed charges

Water distribution assets that may give rise to common costs include distribution pipes that service more than one customer, communication systems, network meters at junctions between bulk transfer facilities and reticulation systems, fixed assets such as buildings and land that are not associated with any particular user (for example, head office buildings), and maintenance and overhead costs related to assets such as motor vehicles and construction equipment.

Others include administration and management expenses, data collection and publication, emergency services, maintenance services, billing systems, system leakages and network planning and development.

The allocation of these costs typically results in fixed charges being differentiated between residential and non-residential customers, and by commercial customer size, to reflect an appropriate share of fixed costs.

National commitments and positions

The NWI pricing principles (NWC 2010) state that:

> *Principle 4: Setting the service availability charge:*
>
> *the service availability charge could vary between customers or customer classes, depending on service demands and equity considerations. Unattributable joint costs should be allocated such*

that total charges to a customer must not exceed stand-alone cost or be less than avoidable cost where it is practicable to do so.

Other jurisdictions

In other State jurisdictions, residential fixed charges in major centres are mostly set on a per customer or connection basis (IPART 2013, ESC 2013a, ERA 2013, OTTER 2012). IPART (2013) noted that the fixed charge structure is simplest to understand and has the lowest administration cost.

Until 2008, Sydney Water's residential customers paid a fixed charge reflective of a standard 20mm connection and meter, even if they had larger meter sizes. However, IPART (2008) proposed that charges to residential users be on the basis of actual meter size (as for commercial users) to encourage residential users to switch to the more efficient small meter sizes (at shared cost with Sydney Water).

ESC (2013a) indicated that City West Water, South East Water and Yarra Valley Water proposed to move away from property title based fixed service charges to a charge per customer to achieve better cost reflectivity. Property based charges are not linked to meter size. Because some customers will receive a fixed charge for the first time, the change is to be transitioned over three years. Western Water has a higher fixed charge for 25mm residential connections.

Commercial and industrial fixed charges are set according to meter size in most jurisdictions (IPART 2013, ERA 2013, OTTER 2012). OTTER (2012) noted that for customers with connections larger than 20mm, higher charges reflect the extra volume of water the larger connection can draw from the network infrastructure.

In Victoria, three of the four metropolitan water authorities have a flat fixed charge (not set by meter size) for non-residential customers. It is noted these entities have volumetric charges based on discharge factors. Only Western Water has a fixed charge set by meter size. Most regional water authorities in Victoria set a fixed charge according to meter size.

SA Water applies a fixed charge to commercial customers (retail, wholesale) on either the same fixed charge as applied to residential users or a charge based on the capital value of the property, whichever is the greater. To other non-residential customers (industrial, rural, hospitals, hotels etc.), the fixed charge as applied to residential users applies.

SEQ entities

In SEQ, fixed charges are typically set for residential users as an equal charge per customer or connection charged quarterly. The only exception to this in SEQ is in Redland City Council where for multiple dwellings (such as units/flats), a charge per meter size applies.

Commercial customers typically have a fixed charge that is set according to connection or meter size. There is no bulk water fixed charge.

Charges that apply in SEQ are outlined in Table 3.

Table 3 Fixed Charges - 2013-14

Entity	*Council*	*Type*	*Charge ($/quarter)*	*Description of Charge*
QUU	Brisbane	Residential	43.41	Per property - single charge
		Non-Residential	43.98	Per property - single charge
	Ipswich	Residential	72.72	Per property - single charge
		Non-Residential	various	Charges depend on connection size, from 25mm @ $89.31 to 250mm @$9072.93
	Lockyer Valley	Residential	72.72	Full pressure - single charge
			53.88	Constant flow - single charge
		Non-Residential	various	Per tenement - full pressure, from 1st tenement @ $116.34 to > 7 tenements @ $58.20
				Per tenement - constant flow, from 1st tenement @ $85.47 to > 7 tenements @ $42.87
				Per tenement - full pressure, combined residence/business (one meter) @ $116.34
				Per tenement - full pressure (non-profit) @ $62.49
				Per tenement - constant flow (non-profit) @ $44.64
	Scenic Rim	Residential	various	Charges depend on connection size, from 20mm @ $72.72 to 200mm @$9117.63
		Non-Residential	various	Charges depend on connection size, from 20mm @ $92.37 to 200mm @$9236.16
	Somerset	Residential	72.72	Per connection - single charge
		Non-Residential	77.58	Per connection - single charge
Unitywater	Sunshine Coast	Residential	57.94	Per connection - single charge
		Non-Residential	various	Charges depend on connection size, from <25mm @ $59.75 to 200mm @$6002.25
	Moreton Bay	Residential	73.39	Per connection - single charge
		Non-Residential	various	Charges depend on connection size, from 20mm @ $89.00 to 300mm @$20,028.50
Gold Coast	-	Residential	51.43	Per connection - single charge

Entity	Council	Type	Charge ($/quarter)	Description of Charge
City Council[2]		Non-Residential	various	Charges depend on connection size and in some instances connection size plus an estimate of volume. Charges range from 20mm @ $91.62 to 300mm (and >45,315 kL consumption[3]) @ $20,613.00
Logan City Council	-	Residential	69.75	Per connection - single charge
		Non-Residential	69.75	Per connection - single charge
Redland City Council	-	Residential	64.39	For single dwellings, on a per meter/lot basis
			various	For multiple dwellings (such as flats and units), charges based on meter size, from 20mm @ $64.39 to 150mm @$3621.75
		Non-Residential	various	charges based on meter size, from 20mm @ $83.75 to 150mm @$4708.25

Source: QUU (2013b), Unitywater (2013b), Gold Coast City Council (2013), Logan City Council (2013) and Redland City Council (2013)

[2] Gold Coast City Council charges on a six monthly basis. Charges that appear in this table have been adjusted to establish a quarterly charge.
[3] Volume based on previous year's metered volume.

QCA analysis

In a report to the Government Prices Oversight Commission of Tasmania, London Economics (1995) established four general principles for allocating fixed costs that may assist water businesses in developing fixed charges:

(a) identical customers should bear the same costs

(b) customers should not be charged more than the service is worth to them, or else the market will be distorted by disconnections, that is, prices should be set to avoid by-pass

(c) charges must be based on an observable or measurable characteristic of the customer

(d) continuity of charging policy is important for public and political goodwill – any changes in charges to different customer groups can create customer discontent and may need to be transitioned.

In considering the appropriate fixed charge, and the allocation of costs, it is important to consider the incentives created. If priced too high, there may be inefficient bypass, or disconnection by consumers who would be prepared to pay at least the marginal costs of consumption, but not a 'full' contribution to fixed/common costs. For example, if the fixed costs were simply to be divided equally among consumers, then some of those potential purchasers may find by-pass options (subject to technical and institutional constraints).

As noted above, the efficient pricing band lies between incremental or avoidable costs (LRMC) and stand-alone costs or by-pass price. This pricing band applies to prices as a whole – irrespective of the approach taken to the setting of fixed charges.

The by-pass price for residential water users could potentially be the cost of purchasing and installing water storage tanks. For industrial users, by-pass may relate to the costs of re-using water on-site, stormwater retention or developing a dedicated desalination plant.

However, the issue for the entities is to determine the stand-alone or by-pass price for a customer or group of customers, and the propensity for actual by-pass to occur. Such information is typically not available. Options to manage the risk of by-pass could include:

(a) nodal pricing. For some groups of customers, location-based or nodal pricing can be more cost reflective and allow prices to be below stand-alone costs. Location-based pricing is discussed further below

(b) self-selecting tariff schedules. These allow customers to choose from more than one pricing scheme, to discourage disconnection. For example, an industrial customer with sporadic but potentially large water use profiles could choose a tariff structure with a high volumetric charge (potentially higher than LRMC) and a lower fixed charge. Self-selecting tariffs are considered below

(c) declining block tariffs (as applied by Hunter Water Corporation for very large customers). Although likely to not be cost reflective, DBTs may allow the marginal volumetric charge to fall below stand-alone costs if required.

There are a number of approaches that may be applied to allocate fixed costs across services or users and therefore for setting the fixed charge in a two-part tariff. These include:

(a) *equal charge per customer or connection* – this approach involves simply allocating the residual amount as an equal charge per customer, and is the widely adopted approach for residential services (which usually have a standard connection size)

(b) *land or property value* - under this approach, fixed charges are highest for those consumers with higher land values, reflecting the perceived capacity to pay of the consumer. However, the approach is not necessarily cost reflective as land value is not likely to be a strong indicator of the customer's share of the network fixed costs. In addition, it adds complexity, is less transparent and may be perceived as a tax. There has been a move away from coupling water charges to measures relating to land value

(c) *connection size* – connection or meter size is likely to be a proxy indicator for each user's proportion of consumption at the system's peak, and therefore reflective of the user's call on the network assets. However, where larger meter connections are required for purposes other than expected peak demand requirements (for example, for fire services purposes), meter size may be a poor proxy for the consumer's 'normal' call on the system. A competing argument in support of using meter sizes as the basis for fixed water charges is that, even if a consumer uses no water, the water business has an obligation to supply and the customer, therefore, should pay for the option of 'reserving' use of the network

(d) *contracted or allocation volume* – in some cases, such as for large industrial or commercial customers, fixed charges could be set on the basis of a contracted volume or entitlement. This may align with a pre-determined maximum daily demand volume. Similar to connection size, such volumes could be an appropriate indicator for the customer's share of the network fixed costs.

In Australian jurisdictions, the most common approach is to set charges according to meter or connection size, with residential customers usually having the same connection size.

In general, fixed charges set by customer grouping or meter size (as a proxy for peak period demand), are likely to remain appropriate for SEQ retail services. Against the pricing objectives:

(a) efficiency - provided fixed charges recognise the efficient pricing band, charges by customer or by meter size are efficient

(b) revenue adequacy - the approach is designed to ensure cost recovery

(c) equity and public interest - the recommended approach is equitable in providing the same charge for all customers, having regard to draw on the infrastructure. Care needs to be exercised where there are large meter sizes for non-use reasons (e.g. fire-fighting). Separate charges may be required for such services

(d) simplicity and transparency - the recommended approach is relatively simple, and is already widely in place.

Relevant cost allocation issues are addressed in Chapter 7.

Draft Recommendation

2.7 Charges not encourage customers to bypass or disconnect from the network.

2.5 Inclining and declining block tariffs

Introduction

Some utilities use more complex multi-part or tiered volumetric tariff structures in place of a single volumetric charge. Inclining block tariffs (IBTs) are common in urban residential charges, including in SEQ.

The declining block tariff (DBT) is less common, but is in use in irrigation, for example in SunWater's Mareeba Dimbulah Water Supply Scheme. Large user tariffs are a form of DBT and are in use in the Hunter Water Corporation and by water utilities in the UK.

Most urban water suppliers distinguish between residential and non-residential or commercial water users in determining tariff structures, to reflect the different cost drivers.

Key issues

These tariff variations are usually developed to meet certain policy objectives.

However, they may not be consistent with efficiency objectives and may lead to other unexpected equity or affordability concerns. Their greater complexity can mean that revenue to the service provider is more difficult to forecast, while customers may find them less transparent and difficult to understand.

At the practical level, the implementation of IBTs requires analysis of how the tiers (blocks) are set and the charge levels for each block.

National commitments and positions

The NWI (NWC 2010) pricing principles allow Governments to decide on more than one tier for the water usage charge for policy reasons, such as for sending a strong conservation signal or for equity objectives.

The PC (2011) recommended that retail prices could be made more efficient by moving away from mandatory inclining block tariffs. The PC noted that if one tier reflects the marginal cost, then water consumed in the other tiers will be at a price higher or lower than marginal cost. The PC recommended a flat volumetric tariff in a two-part tariff.

Other jurisdictions

Residential IBTs

In other jurisdictions, IBTs are applied in residential charges. Examples are:

(a) WA – ERA noted that LRMC is higher than in the past due to the rising costs of desalination, resulting in higher usage charges. The Water Corporation, servicing Perth, has a three-block IBT, with the first tier usage charge reflecting a lower bound estimate of LRMC, the second tier reflecting the expected LRMC, and the third tier reflecting the upper estimate of LRMC. Aqwest and Busselton Water each have a six-block IBT, while country centres have four-block tariffs

(b) ACT - in the 2008 ICRC decision, ACTEW moved from a three-block IBT to a two-block charge. The block is set as equivalent to 200kL per year

(c) SA – ESCOSA (2013a) set an average revenue cap of $4.10/kL for 2013-14. Within this framework, SA Water set a three-block IBT for bulk water, which applies across the entire State of SA for residential users. A single volumetric charge equivalent to the residential middle block charges, applies to commercial users

(d) Victoria – ESC (2013a) supported the metropolitan retail business' proposals to retain a three-block IBT but considered that a simple two-part tariff with a single variable charge may be a more efficient approach. ESC noted that while the businesses cited customer surveys in support of IBTs, submissions from consumer advocacy groups noted that they do not perform well on social equity, sustainability and efficiency grounds.

There has been a general trend away from IBTs, either reducing the number of blocks or removing them altogether. In 2005 ERA recommended that the Water Corporation transition from a five-block IBT to the three-block charge (ERA 2005).

Sydney Water also previously had a two-block IBT and from 2009-10 has a two-part tariff (IPART 2008). IPART noted that the IBT was intended to provide strong conservation incentives to customers during drought, but with the construction of the Sydney Desalination Plant and rainfall events, scarcity concerns were eased. IPART's estimate of LRMC for the two-part tariff was higher than the Tier 2 charge under the IBT.

The ACT has moved from a three-block IBT to a two-block variable tariff.

In metropolitan Victoria, South East Water indicated a long-term aim to have a single variable potable water charge (ESC 2013a). In the regions, ESC (2013b) has approved moves by Central Highlands Water from a three-block IBT to a two-block tariff, and moves by both Coliban Water and Westernport Water to remove a three-block IBT in favour of a single variable charge. Westernport Water (2011) noted that the IBT had not influenced water conservation but had penalised large families and those who suffer a leak or burst.

In Queensland regions, Fitzroy River Water has a three-block IBT for residential users, with the highest block charge set to 'discourage excess usage'. Toowoomba Regional Council has a two-block IBT.

Non-residential IBTs

In general, IBTs are not used in non-residential charges. QUU is an exception. Central Highlands Water in Victoria also applies an IBT to commercial customers. The Water Corporation of WA previously applied a three-block IBT to commercial customers but has now moved to a conventional two-part tariff.

Declining block tariffs

Declining Block Tariffs are not widely adopted but may take the form of large customer discounts.

For Hunter Water, IPART (2013) accepted a proposal to apply a discounted charge to large customers over 50,000kL per year. This discount varied according to location, up to 25% in some locations. IPART noted that if the discount was not applied, large customers may by-pass the system and use alternative sources such as artesian bores. Given a capacity constraint is some 20 years away, IPART accepted the discount. The large customer discount is in effect a two-block DBT, applied only to a small number of large commercial customers.

In the UK, large user tariffs are applied by water companies for users taking more than a threshold volume for example, 50ML per year (Ofwat 2012). These reflect lower costs due to a single off-take point being used for a large volume and not all of the delivery system being used. Intermediate tariffs for users taking at least 10ML can also be applied. Anglian Water has declining block charges for businesses taking over 25ML per year and 10-25ML per year.

SunWater has a DBT for one irrigation tariff group in the Mareeba Dimbulah distribution system. The declining blocks apply to both the fixed (set by each irrigator's allocation) and volumetric charges.

SEQ entities

For Brisbane, QUU has a three-block IBT for both residential and non-residential customers for 2013-14, with different block thresholds and charges for residential and non-residential. In Ipswich, QUU applies a three-block IBT for residential customers and a two-block IBT for non-residential customers. For Lockyer Valley a two-block IBT applies with different block thresholds and charges for residential compared to non-residential customers.

QUU (2012) noted that continuation of IBTs is influenced by trade-offs between the pricing principles of simplicity of design, cost reflective pricing and sustainability.

Unitywater (2013b) has a two-block IBT for residential customers of Moreton Bay and Sunshine Coast regions for 2013-14. A three-tier IBT previously applied in 2012-13 in the Moreton Bay region. Redland City Council has a three-block IBT for residential to apply in 2013-14.

Table 4 and Table 5 (below) refer.

The Gold Coast and Logan City Councils do not use IBTs.

Table 4 Inclining Block Tariffs (2013-14) - QUU

	Residential Brisbane	*Non-Residential Brisbane*	*Residential Ipswich*	*Non-Residential Ipswich*	*Residential Lockyer Valley*	*Non-Residential Lockyer Valley*
Bulk Water $/kL	2.30	2.30	2.23	2.23	2.49	2.49
1st Block	≤ 63 kL/quarter - $0.69 per kL	≤ 49 kL/quarter - $0.83 per kL	≤ 79 kL/quarter - $0.84 per kL	≤ 80 kL/quarter - $0.85 per kL	≤ 75 kL/quarter - $0.23 per kL	≤ 75 kL/quarter - $0.46 per kL
2nd Block	> 64 kL/quarter but ≤ 76 kL/quarter - $0.736 per kL	> 50 kL/quarter but ≤ 74 kL/quarter - $0.95 per kL	> 80 kL/quarter but ≤ 118 kL/quarter - $1.34 per kL	> 80 kL/quarter - $1.72 per kL	> 75 kL/quarter - $1.12 per kL	> 75 kL/quarter - $0.91 per kL
3rd Block	> 76 kL/quarter - $1.31 per kL	> 74 kL/quarter - $1.39 per kL	> 118 kL/quarter - $1.70 per kL	-	-	-

Source: QUU (2013b)

Table 5 Inclining Block Tariffs (2013-14) - Unitywater and Redland City Council

	Unitywater - Residential Sunshine Coast	*Unitywater - Residential Moreton Bay*	*Redland Residential*
Bulk Water $/kL	1.85	2.43	1.71
1st Block	≤ 75 kL/quarter - $0.64 per kL	≤ 75 kL/quarter - $0.64 per kL	≤ 36.5 kL/quarter - $0.83 per kL
2nd Block	> 75 kL/quarter - $1.28 per kL	> 75 kL/quarter - $1.28 per kL	> 36.5 kL/quarter but ≤ 73 kL/quarter - $1.34 per kL
3rd Block	-	-	> 73 kL/quarter - $1.85 per kL

Source: Unitywater (2013b) and Redland City Council (2013)

QCA analysis

Inclining block tariffs

IBTs are typically justified for perceived equity reasons. The belief is that larger users should pay proportionately more, and that a non-discretionary or minimum amount of water should be affordable to protect basic human needs. They may also be justified in terms of water conservation benefits - a higher block tariff may be used for discretionary water use above a pre-defined level of non-discretionary use.

However, the equity argument is not supported in the case of large households. In addition, the distorted variable charges where the top tier is linked to LRMC (and the lower tiers therefore less than LRMC) may result in fixed charges that are higher than otherwise for everyone, potentially affecting low-income and small users. Hence IBTs can lead to unintended equity consequences.

Water conservation objectives are best met by using a LRMC based pricing signal to all customers, not just those using more water.

IBTs are also used where LRMC is not easily estimated and derived as a range. An upper estimate of LRMC may be allocated to high water users and the low estimate to low water users. ERA has used this approach. ICRC (2007) noted that while IBTs are inefficient, they may be appropriate where there is a lack of precise information about forecast demand and cost conditions.

ACIL Tasman (2007) in a paper for the NWC considered that if IBTs were applied, they should be restricted to residential use, adjusted for family size, and involve as few tiers as possible.

ACIL Tasman considered that providing charges set under an IBT were within a range of LRMC estimates, the impact on efficiency may not be substantial, as water demand is typically inelastic.

Where demand is inelastic this would negate the basis for applying an IBT with a higher charge for large users. If demand response was invariant, there is little point in applying an IBT. Adjustments for family size would also be difficult in practice.

In terms of the pricing objectives:

(a) economic efficiency - IBTs are generally inconsistent with allocative efficiency, as only one of the volumetric charges can align with incremental costs

(b) revenue adequacy - the complexity of an IBT can increase the revenue risk for service providers and make demand forecasting problematic

(c) equity and public interest - IBTs can result in lower water charges for low water users and small households. However, there can be unintended equity implications for larger families which may contradict the proportionality principle. Also, fixed charges may be higher than if a single volumetric charge applied

(d) simplicity and transparency - IBTs are also more costly to administer, and may be more difficult for customers to understand. If they are used to discourage discretionary demand, customers may find it difficult to monitor and modify their consumption due to quarterly billing (Frontier Economics 2008).

One problem with IBTs is that once in place they can be difficult to remove and would need to be phased out over time to manage the impact on users. This depends on the number of blocks and the price differential between the blocks.

For example, reducing the number of blocks will usually result in higher overall increases for bills for low use customers compared to high use customers. Moving from three blocks to a single usage tariff structure will have a greater impact than moving to a two-block structure (at the same time having the greater potential for efficiency gains). The social impacts of these 'price shocks', particularly for low water users, will be compounded when overall price levels are also rising significantly. While there may be benefits in the longer term from moving to a single-tier structure, in the shorter term the social impacts of doing so appear to be a constraint.

It is noted that in many jurisdictions, IBTs are being gradually phased out, with reductions in the number of blocks and narrowing of the charge differentials.

Declining block tariffs

DBTs, with lower volumetric charges for larger users, are also generally inconsistent with efficient LRMC pricing principles, particularly in the case of residential users. The Hunter Water Corporation example is in response to concerns that some larger customers could by-pass the system unless a discount is applied. This is consistent with efficient pricing principles which define that prices (overall including fixed charges) should fall within an efficient pricing band, between incremental cost and by-pass cost.

A more efficient strategy in these circumstances would be to adjust the fixed charge in a two-part tariff and retain the volumetric tariff linked to LRMC.

Summary

In general, a two-part tariff with the usage charge set at LRMC is considered to be superior to an inclining or declining block tariff on efficiency and equity objectives. Single volumetric charges provide clearer, more transparent marginal use signals to customers, and are less costly to administer.

This is also generally the view of the NWI pricing principles, although the principles leave open the option of IBTs for policy reasons. However, the PC (2011) disagrees with the NWI pricing principles and considers that the consumption-based charge should be a single charge on efficiency grounds.

IBTs are in place in some SEQ entities and it may be difficult to remove IBTs without impacts on some customer groups, at a time when bulk water charges are increasing annually under the Government's price path. However:

(a) Unitywater (2013b) has reduced the number of tiers in its IBT for Moreton Bay from three to two

(b) QUU's first and second residential and non-residential blocks for Brisbane are not substantially different both in volume or price, and it should be relatively straightforward to reduce the tiers from three to two.

To transition away from an IBT, it is recommended that entities consider gradually reducing the charge differentials between tiers, or move the tiers closer together, over time until one or more blocks is removed.

> ### Draft Recommendation
> **2.8 Inclining and declining block tariffs not be introduced, and where they are already in place be phased out over time to a single volumetric charge.**

2.6 Location-based or nodal pricing

Introduction

The cost of providing water services will typically vary over geographic areas. In bulk systems that are unconnected, the marginal cost can vary according to water sources. Distribution costs can vary according to whether water is gravity-fed or pumped. Additional infrastructure and, therefore, pumping costs are required to service customers that are distant from treatment plants.

Postage stamp tariffs with prices that vary from location-based marginal costs could lead to efficiency losses. Such losses are greater where postage stamp charges apply over large geographic areas and many zones.

The alternative to postage stamp tariffs is location-based or nodal pricing, involving either or both the fixed or volumetric components of a two part tariff varying between areas, depending on the particular cost characteristics of the network.

As noted above, location-based charges may be required to ensure prices for particular customer groups fall within the efficient pricing band, to prevent by-pass, or where low-cost users are subsidising high-cost users and alternative supply/distribution options are available. Developer charges may provide a basis for differentiating fixed infrastructure charges in distribution systems, enabling equalised fixed charges for all customers across a network.

There are administrative costs in terms of structuring and implementing a charging regime which recognises such cost variations. Complex pricing structures also may be less readily understood by consumers, resulting in community opposition to pricing reforms.

National commitments and positions

The NWI (NWC 2010) stated:

> *Principle 7: Differential water charges -*
>
> *Water charges should be differentiated by the cost of servicing different customers (for example, on the basis of location and service standards) where there are benefits in doing so and where it can be shown that these benefits outweigh the costs of identifying differences and the equity advantages of alternatives.*

The PC (2011) concluded that charging a uniform price over a large geographic region irrespective of the variation in costs of servicing individual locations within the region, leads to inefficiencies and inequities. There is scope for efficiency gains in moving to location-specific pricing, particularly where cost differences within the 'postage stamp' region are large and easy to quantify. The PC supported moving to location-specific pricing, if justified by cost-benefit analysis.

However, the PC (2011) also noted that there are perceived equity concerns with location-based charges which impose different charges to different customers for an 'identical product'.

Other jurisdictions

There are few examples of nodal pricing among distribution/retail businesses - in most cases, any price differentials reflect legacy structures aligned with Council boundaries.

For example, among Victoria's regional water service providers, Coliban Water has two pricing zones but proposes to combine them over a seven-year period commencing in 2013-14 (ESC 2013b). North East Water has location-based sewerage fixed charges for regional towns and proposes three zones of water charges from 2013-14. Wannon Water has 5 water charge zones.

In Tasmania OTTER (2012) requires that pricing zones must be clearly identified and justified on the basis of the cost differential involved. In transitioning from differentiated council charges to regional authorities, two entities (Ben Lomond Water and Southern Water) proposed a postage stamp tariff, while Cradle Mountain Water proposed a transition from council area based charges to a postage stamp tariff. Cradle Mountain Water has nine tariff groups. OTTER (2012) noted that location based pricing signals will not have a significant impact and that developer charges will provide location signals for new developments.

Hunter Water's large user tariff (declining block tariff) is also set on a location basis (IPART 2013). The large user discount ranges between 1% and 25% depending on location.

SA Water applied a postage stamp bulk water tariff across the entire State on the basis this spreads the cost of providing and maintaining basic water facilities across the community. Increases due to the costs of desalination are spread across the entire State.

At the bulk level, Melbourne Water's variable and fixed bulk transfer charges are different for City West Water, South East Water, Yarra Valley Water, Western Water and Barwon Water (ESC 2013a). This approach reflects the differing costs of transfer to the water businesses, and thus was considered an appropriate price signal to Melbourne Water's customers.

The SCA (IPART 2012a) also has differentiated bulk charges – the volumetric tariffs to Sydney Water are differentiated from those charged to the smaller councils, and the fixed charges also vary between the councils.

In Queensland, where councils have been amalgamated, there remain some location-based charging structures. For example, Toowoomba Regional Council has two different charging arrangements - for Toowoomba and non-Toowoomba, which applies different fixed and volumetric water charges and IBTs for residential users.

The QCA (2010) recommended nodal (or zonal) bulk charges to GAWB's customers, reflecting their location on the distribution system, which is of a linear structure as against a network. Nodal prices also apply in some of SunWater's irrigation channel systems, such as the Burdekin Haughton Water Supply Scheme and the Mareeba Dimbulah Water Supply Scheme. SunWater's subsidiary Burnett Water, has nodal prices for water sales from Paradise Dam in the Bundaberg distribution system.

SEQ entities

At the distribution/retail level, there are no location-based differentials applied, other than legacy arrangements reflecting differentiated charges based on previous Council boundaries. QUU has eight such charging arrangements and Unitywater has two.

QCA analysis

Postage stamp charges are the predominant charging arrangement at the residential level throughout Australian jurisdictions. In some jurisdictions, such as Tasmania, differentiated charges are being unwound to form uniform charges, while in SA, a uniform bulk charging structure applies State-wide.

Against the QCA's pricing objectives:

(a) efficiency - where costs of supply differ between consumers (whether by geographic area, consumer class etc), efficiency is enhanced where prices reflect these cost differentials. Location-based pricing signals could provide guidance to new customers, as well as to new entrants for water supply and delivery services. Where the need for system augmentation is linked to new locations, the service provider may consider the merits of location-based charges as an alternative to developer charges (Frontier Economics 2008)

(b) revenue adequacy - entities' ability to ensure revenue adequacy should not be affected by using location-based charges, although revenue forecasting may be more difficult

(c) equity and public interest - location-based charges may be seen as fairer by eliminating cross-subsidies. However, postage stamp tariffs are usually justified on the basis that shared network costs benefit all users, all receive the same service (proportionality principle), and there are equity concerns regarding locationally differentiated charges, such as -

    (i) price differences apply to similar customers around the zonal boundaries that could appear inequitable and politically unpalatable

    (ii) there are potential disadvantages to low-income users in more distant locations that have higher service costs

(d) simplicity and transparency - location-based charges could be more transparent, but rely on the clarity of cost differential information. Practical issues that arise in setting location-based nodal or zonal prices include the administrative cost of establishing and monitoring cost differentials, and determining geographic or zonal boundaries.

While location-based charges should be considered where possible, the QCA will also consider the specific circumstances in any particular case, including any differences in service quality, differences in provisions for externalities or environmental costs, the costs of obtaining information, the complexity of the tariff structure and the efficiency gains from more cost-reflective pricing.

On efficiency grounds, the QCA supports tariff structures that reflect identifiable and substantial differences in costs of supply. These costs may vary by consumer, consumer class, or geographic area. The main application for location-based charges is where there are well-defined zones or supply segments that have markedly higher (or lower) costs that can be easily identified, such as for GAWB. Another example is where water is pumped to higher elevations, such as in irrigation channel re-lift areas. In areas where there are low cost alternatives, differentiated charges may be appropriate to avoid by-pass.

Postage stamp tariffs will remain appropriate in most distribution/retail circumstances – they avoid the above identified equity and administrative practical problems that could arise with nodal or zonal prices. Locality-based infrastructure costs may already be reflected to some extent in cost reflective developer/infrastructure charges, although such charges are one-off charges for new developments and do not allow for cost differences in the existing customer base[4].

Draft Recommendation

2.9 Location-based charges for urban water services be applied where the location cost differences are material and where it is practical and cost effective.

2.7 Peak period and seasonal pricing

Introduction

Urban water charges are typically unchanged regardless of the time or season at which water is supplied, and meters tend to be read and customers billed quarterly.

Water supply and delivery costs (either or both fixed and marginal costs) could vary according to:

(a) within-day variations - peak demand has a diurnal profile with well-defined morning and evening peaks. Demand patterns for weekdays would also vary from weekends (Cole 2011). System capacity will need to cater for maximum flow rates

(b) seasonal variations - usage is likely to peak in the summer months due to higher outdoor use. Within-day variations may also change between seasons.

Within-day and seasonal peak demands drive system capacity requirements, and therefore impact on the magnitude of both fixed and variable costs[5].

Cole (2011) refers to time of use tariffs (TOUT) based on peak hourly demand.

National commitments and positions

The NWI does not specifically address peak period or seasonal charging options.

Other jurisdictions

Examples of peak period and seasonal pricing are rare in water utilities. Peak pricing is common in other utility and service industries, including telecommunications, electricity (for hot water services), air travel and accommodation bookings. In these industries, consumers understand that peak users are responsible for a higher proportion of business costs (or that price premia are needed to manage peak demand) and prices reflect this.

Westernport Water (2011) in Victoria previously applied a two part tariff in which the volumetric element was increased in summer as a means of promoting water conservation during peak summer periods. However, Westernport Water later moved to a three-block IBT in 2008 and has since changed to a conventional two-part tariff with no seasonal differentials. Westernport Water noted that seasonal charges (and IBTs) adversely affected large families.

With funding from the Australian Government Water Fund, Wide Bay Water trialled a system that allows water meters on residential properties across the Hervey Bay supply network to be

[4] It is noted that developer/infrastructure charges are not necessarily cost reflective and that the methodology for their calculation (at time of writing) is being considered for review.

[5] Network capacity also may be related to fire suppression requirements. Residential sub-divisions, for instance, are generally supplied through 150mm pipes to ensure sufficient supply and pressure for fire fighting purposes, with resulting capacity substantially in excess of any 'normal' peak demands.

read remotely (Cole 2011). Cole also undertook research on the costs and demand responses of a time of use billing system which will encourage customers to use water in off-peak times. However, Wide Bay Water continues to bill on a four-monthly basis.

Cole (2011) found that only a small number of residential users accounted for high peak hour demand (7% of residences accounted for 56% of peak hour demand) and there was a correlation between high consumption and block size. This could be because of outdoor use at peak periods. Cole suggested an hourly IBT to target this consumption. However, Wide Bay Water has not progressed with time-of-use pricing.

Ofwat (2012) considered it is good practice for UK water companies to apply different summer and winter volumetric rates to reflect differences in LRMC.

SEQ entities

Time-of-day or seasonal charging arrangements are not in place in SEQ.

QCA analysis

Allowing for prices to vary for daily or seasonal cost differentials can provide benefits in terms of smoothing peak demands, with consequent reductions in system capacity requirements. Such pricing mechanisms can provide signals about the long-term costs of water supply and distribution by better reflecting marginal costs of services at different times of the day and across the seasons.

Where peak demand drives the need for increased capacity, peak prices should reflect LRMC including the opportunity cost of congestion, with off-peak prices based on SRMC (Campbell 1999). Such an approach should produce efficiency benefits depending upon the circumstances of the supply system.

The use of such pricing arrangements is broadly similar in concept to scarcity charging or flexible pricing arrangements (discussed below).

Properly implemented peak period or seasonal charges would also provide more information to customers on the costs of supply. For example, the use of smart meters to monitor water use provides immediate information to customers and can help detect leaks. Seasonal pricing may also be suited to rural residential areas where outdoor water use may be greater.

In practice, there are few examples of water tariffs that incorporate time-of-day or time-of-week consumption elements. Westernport Water has moved away from seasonal pricing citing equity issues. Some of the constraints on implementation are:

(a) insufficient information - for example on the marginal costs at different times and seasons

(b) technical constraints - the inability to simultaneously read all meters at the beginning and end of designated periods. The cost of more sophisticated multi-rate tariff meters and automated smart meter reading technologies may not be justified

(c) the likely response of customers. Peak shifting can occur where peak demand responds to higher charges by falling to a level below that in the off-peak period. The extent to which peak shifting takes place obviously would depend on the price elasticity of the relevant consumers, and the magnitude of the peak price premia. Peak shifting would make revenue forecasting difficult for the water entity.

A key issue in implementing seasonal tariffs is whether the benefits in water conservation and deferral of augmentations offset the additional costs in billing and monitoring. The ERA (2005), for example, noted that seasonal pricing may not be a cost-effective tool for managing demand because demand elasticity is typically low and any impact is lessened because of water restrictions.

In terms of the QCA's pricing objectives, peak period and seasonal pricing practices provide efficient market signals where they are based on LRMC, and are practical and cost effective. Efficiency gains can occur from peak shifting to manage delivery capacity constraints. Equity concerns should be limited provided the same approach applies to all customers. However, the approach can present challenges in terms of managing revenue adequacy, as the response of customers may be difficult to predict. While there are intuitive benefits, there are technical and cost constraints for entities in applying such tariffs at this stage.

Draft Recommendation

2.10 Time of day or seasonal charges be considered for urban water services where there are identified economic efficiency benefits and where practical and cost effective.

2.8 Self selecting tariffs

Introduction

Self-selecting tariffs (or tariff menus) allow customers to choose from more than one pricing scheme in line with their circumstances.

In their simplest form, consumers may choose between a low fixed charge/high volumetric charge (exceeding LRMC), or a standard (higher) fixed charge and lower usage charge. Alternative charges may be based on variations from a baseline tariff structure.

The purpose of such schedules is typically to discourage disconnection. Consumers with low demands than otherwise may have been discouraged from connecting because of the fixed charge could then elect to pay a lower fixed fee, but face a higher usage charge.

National commitments and positions

The NWC has not considered the option of self-selecting tariffs. The PC (2011) has considered flexible tariffs, one variation of which involves a range of tariff options being put to customers.

Other jurisdictions

Townsville City Council (2013) offers residential customers a choice of two tariff options:

(a) a Standard Plan with a fixed charge of $714 per year for an allocated 772kL of water use. Excess water use charges are $2.74/kL (2013-14)

(b) a Water Watchers Plan, using a two-part tariff with a fixed charge of $325 per year plus a usage charge of $1.30/kL (2013-14).

The Standard Plan is the default, and customers can change between plans once a year. Non-residential customers pay a conventional two-part tariff.

In Victoria, Yarra Valley Water (2012) is undertaking a trial of 1000 eligible customers in 2013-14 to assess an 'opt-in' 100% variable charge rather than the fixed charge plus a three-block IBT. For business customers, to address uncertainty, Yarra Valley Water is exploring an optional tariff that ties a customer's price to the base price path for a three-year period, providing their demand does not increase by more than 5%.

The ESC (2013a) noted that implementing customer choice options may increase costs for a small water business, and these costs may outweigh any potential benefits. However ESC encouraged City West Water and South East Water to pursue targeted research and consult with customers about tariff choice, and undertake similar customer trials as proposed by Yarra Valley Water.

In the UK, customers have the choice of opting for a meter and a two-part tariff, or retaining a tariff comprising a fixed charge plus a variable charge per £ of rateable value. Ofwat (2012) proposed that prices should be differentiated between metered and unmetered customers to reflect cost differences. Metered customers incurred additional costs in meter reading and billing, but charges will better reflect usage.

Some UK companies have optional low user tariffs with no fixed charge and a higher than normal volumetric charge. Anglian Water offers two hardship tariffs - with higher than standard fixed charges and either a lower or no volumetric charge. Ofwat (2012) does not favour such options as they may not be consistent with cost recovery, but noted that these can be difficult to remove due to the impacts on users.

QCA analysis

In general, self-selecting tariffs may not be consistent with economic efficiency as not all the tariff structure options will reflect a LRMC pricing approach. For example, the Yarra Valley Water option of a 100% variable tariff departs from the LRMC estimate used for the IBT. However, Yarra Valley Water's trial appears to be driven by the need to allow customers the option of more control over their bills at a time when supply costs are increasing due to desalination.

In Townsville's case, provided they are well-informed, high water users will opt for the fixed charge option, and small users will tend to select the two-part tariff. Townsville has previously maintained a 'green city' policy as a basis for not introducing a universal two-part tariff.

Efficiency may not be greatly curtailed if all the volumetric charge options on offer are greater than LRMC and demand elasticity is low. Berg (1999) concluded that where customer demand information is lacking, self-selecting tariffs can reveal willingness to pay benefiting both the consumer and the provider.

Allocative efficiency may be enhanced if customer prices reflect the respective values they place on water supply. Efficiency gains may in fact accrue if customers are better able to 'choose the signal' that best suits their circumstances, that is, the approach applies efficient price discrimination through customer selection of tariff options.

Self-selecting tariffs may imply an efficient level of cross-subsidy between customer groups. Tariff options should also always lie within the efficient pricing band, that is, greater than incremental cost, and less than stand-alone cost or by-pass price.

Self-selecting tariffs generally involve greater revenue risk to the service provider. Revenues will be more difficult to forecast, although this would improve with better information over time. Also customers could be required to lock in their choice of tariff option for a period providing certainty on revenue projections.

Self-selecting tariffs may be seen as more equitable - by allowing customers a choice to suit their circumstances. Options that involve simple fixed or variable charges are also more transparent and simple for customers to understand. However, customers may not always be able to understand the implications of the choices on offer and the service provider will need strong customer engagement practices. The PC (2011) suggested that a default charge of a fixed and variable two-part tariff should apply for those customers who choose not to exercise their choice.

Frontier Economics (2013) concluded that tariff choice has the potential to improve the value proposition to customers by better reflecting their preferences and attitudes to risk. However, Frontier suggested caveats that customers should have sufficient information to make their choices, and that the tariff options are broadly cost reflective.

Overall, self-selecting tariffs can be consistent with economic efficiency by allowing greater customer choice reflecting risk preferences, provided they do not result in cross-subsidies, but could increase revenue risk to the service provider. However, they may be used to address specific equity concerns or policy objectives of the service provider.

Draft Recommendation

2.11 Self-selecting tariff options be considered where there is sufficient information for customers to make choices, provided they do not result in cross-subsidies or introduce unmanageable revenue risks for the entity.

2.9 Service quality differentials and interruptible tariffs

Introduction

A variation on self-selecting tariffs is pricing differentiated according to service quality standards.

Water users pay a uniform price for a uniform service, and there is no opportunity to choose a more reliable or high quality service at a higher price, and vice versa. Frontier Economics (2008) noted an example where customers could be charged a lower price for accepting supply restrictions during droughts while others would pay a higher price for desalination supply.

Flexible tariffs as suggested by PC (2011) could offer options to customers to accept differentiated volumetric charges to reflect changes in the marginal cost of water over time - for example, due to drought. A partially fixed option could allow a guaranteed supply level to meet basic needs with adjustable tariffs for usage over these levels (PC 2011).

Interruptible tariffs involve non-residential users taking a risk of occasional supply interruptions (full or partial) in exchange for lower tariffs (Ofwat 2012). Short-term interruptions can help with water delivery capacity constraints, while long-term interruptions may reflect water storage constraints.

National commitments and positions

The NWI (NWC 2010) stated:

> *Principle 7: Differential water charges - Water charges should be differentiated by the cost of servicing different customers (for example, on the basis of location and service standards) where there are benefits in doing so and where it can be shown that these benefits outweigh the costs of identifying differences and the equity advantages of alternatives.*

The PC (2011) noted that interruptible tariffs may be suitable for industrial customers that do not require guaranteed supply and can tolerate restrictions during times of scarcity. Trigger conditions would need to be agreed to by customers.

Other jurisdictions

The QCA is unaware of any examples of price/service quality tariff options being offered to water users in Australia.

However, in partnership with Gold Coast City Council, Griffith University's Smart Water Research Centre is undertaking the Riverstone Crossing Water Conservation Research Project. This project aims to achieve greater water conservation through introducing demand-based tariff structures to establish consumers' willingness to pay to avoid restrictions brought about by drought.

Ofwat (2012) supported UK companies' use of interruptible tariffs, but noted that there has been limited customer interest. Ofwat recommended such options be available upon request. Anglian Water offers interruptible tariffs to businesses that use more than 25ML per year and have the capacity to store at least 6 hours of water consumption, with a guarantee that interruptions will last no longer than 4 hours. Interruptible tariffs have a higher fixed charge, a much lower variable charge, and a higher charge for maximum daily demand (the latter is fixed by agreement for a year).

The QCA (2005) considered price differentials for service quality in its investigation of GAWB. Some customers suggested a price differential on the basis of supply source, with customers prepared to pay for a 'premium' service that provides a back-up source of supply. It was also observed that drought supply restrictions were more severe for Council customers than for the major industrials and this was not reflected in cost allocation. The QCA supported price differentials, but concluded it was unable to incorporate these differentials in price until customers and GAWB reach agreement on service standards and reliability.

QCA analysis

Tariff options that are varied to take account of the different marginal cost (and total capacity cost) incurred in providing different service quality products are consistent with economic efficiency. Frontier Economics (2008) noted that tailored price/service offerings have the potential to enhance efficiencies by providing a means for users to signal their willingness to pay for different levels of reliability. The PC (2011) noted that such approaches give water utilities flexibility to manage risks around demand and supply variability over time to achieve overall water security at least cost.

The main issue for the service provider is the availability of cost information enabling differentiated charges to be determined. They will also potentially increase revenue risk to the service provider, although if the service-based charges are correctly linked to cost differentials, the cost recovery risk should be minimised.

Equity issues may arise in that the high reliability options may not be affordable to low income users. Conversely, the option of lower prices for adopting some of the service quality risk may be perceived by some users as equitable as it may better reflect their willingness to pay profile.

Flexible and interruptible tariffs can be complex and costly to administer. However, these concerns can be addressed where flexible and interruptible tariffs are applied only to large non-residential customers. Frontier (2013) noted the considerable scope for greater negotiation with larger customers regarding price/service offerings.

Draft Recommendation

2.12 Price/service quality tariff options be adopted, where material cost differentials are associated with different levels of service.

2.10 Metering and billing arrangements

Introduction

Billing arrangements can have implications for the effectiveness of pricing signals and therefore the application of the pricing principles.

Flats and units (shared meter)

National commitments and positions

The PC (2011) recommended that all new single and multi-unit dwellings should have separate water meters, and retro-fitting of dwellings should be assessed by utilities.

Other jurisdictions

The ICRC (2004) uses a deeming approach whereby unit owners are deemed to use 175kL per year and are charged accordingly.

Hunter Water previously applied a lower service charge to flats and units but has now equalised the service charge across all residential user types (IPART 2013). For 2013/14, the charge is increased for flats and units and decreased for houses.

Sydney Water (2013) has a lower fixed service charge for flats and units that have shared water meters, as compared to houses. Usage charges are shared between the owners.

Yarra Valley Water levies a single fixed (service fee) which is equivalent to the single residential fixed charge. The volumetric (usage) charge is divided by the number of dwellings.

City West Water (2013) levies a single fixed (service fee) which is equivalent to the single residential fixed charge but lower that the non-residential fixed charge. The volumetric (usage) charge is divided by the number of dwellings.

SEQ entities

In accordance with the introduction of the Queensland Plumbing and Wastewater Code (established to fulfil the requirements of the *Plumbing and Drainage Act 2002)*, as of 1 January 2008 all new unit/apartment complexes in Queensland are required to be fitted with individual meters per dwelling.

However, in instances of shared meters, QUU's and Unitywater's billing approaches reflect an apportionment based on the original plans submitted for approval by the builder. Therefore, those flats and units with more bedrooms/bathrooms are allocated a greater proportion of water and wastewater charges.

In instances of shared meters, Logan City, Redland City and Gold Coast City Councils take instructions from the owner of the complex or body corporate as to the method of billing (either individual invoices or a single invoice to the owner or body corporate). If individual invoices are chosen, the owner or body corporate also advises of an appropriate apportionment.

QCA analysis

Metering and billing arrangements should support the application of cost reflective prices.

The absence of individual metering in flats and units limits pricing options. As outlined above, customers in flats and units usually have a shared meter and bills are divided evenly between owners. While there are cost savings to the service provider in terms of metering and meter reading, individual unit owners do not have an effective pricing signal.

The plumbing configurations of many apartments cannot support individual metering. Retro-fitting of such meters (where possible from an engineering perspective) may not be economic. Even if individually metered, there may be access issues in reading meters.

Fixed charges are usually set equivalent to that faced by a standard household (that is, based on a 20mm meter connection). In some jurisdictions a lower fixed charge applies to flats and units than for houses.

In regard to the objectives:

(a) efficiency - individual metering should be more efficient, providing it is cost effective

(b) revenue adequacy - the implications for revenue adequacy should be minimal

(c) equity - individual metering is more equitable as users pay for the water they use

(d) simplicity and transparency - there should be no implications as the same charges apply to other users.

In general, to maximise the pricing signal and economic efficiency, flats and units should be individually metered where economic to do so, and where practical in terms of meter-reading. Fixed charges should be the same as for a standard dwelling (such as a house), as there is no basis to differentiate a share of fixed and infrastructure costs between the different users.

Draft Recommendation

2.13 Individual metering of flats and units be adopted where economic and practical.

Tenant billing

Where bills are sent to landlords rather than to tenants, the pricing signal is effectively misdirected.

National commitments and positions

The PC (2011) recommended that utilities should charge tenants directly for the fixed and volumetric charges.

Other jurisdictions

In NSW, landlords are entitled to pass the volumetric proportion of a bill to a tenant provided the premises are individually metered and meet water efficiency standards (NSW Fair Trading).

In Victoria, unlike owner-occupiers, generally tenants are billed for the variable water and sewerage charges only (ESC 2013a). Fixed charges are paid by landlords. For example:

(a) Yarra Valley Water (2012) bills the property owner the fixed (service) charge and the volumetric usage charge. The property owner then has the option of requiring the tenants to pay the dwelling specific usage charge

(b) City West Water (2013) bills the property owner a single fixed (service charge) equivalent to a single residential fixed charge. The volumetric usage charge is divided equally (and invoiced) on a per dwelling basis.

In SA and Tasmania, a landlord may, by agreement, pass part or all of the water charge to a tenant. In the ACT, the volumetric charge is paid by the tenant but the fixed charge is met by the landlord unless there is an agreement to pass the charge on. In WA, the water consumption charge is billed to the owner, who may pass the bill to the tenant by prior agreement.

SEQ entities

Like NSW, landlords are entitled to pass the volumetric proportion of a water bill to a tenant provided the premises are individually metered, water efficiency standards are met (such as the premises has a dual flush toilet) and the tenancy agreement specifies that the tenant is to pay for water consumption.

In SEQ, tenants are not billed the fixed water and sewerage charges. There is no head of power to charge tenants for sewerage costs under the *Residential Tenancies and Rooming Act* 2008.

QCA analysis

In most States, there are arrangements for the volumetric pricing signal (but not fixed charges) to be passed through to tenants. This could be more transparent if the tenant is directly billed for the full cost (including sewerage costs), as occurs with electricity.

However, this would involve additional administration costs, potentially involving disconnection and reconnection, and meter-reading when tenancies change, which may not be cost effective.

The benefit to the tenant is that they could receive the benefit of any reductions in water use they are able to achieve.

Such changes may be accompanied by a rental reduction as effectively fixed charges are passed through to tenants in the rental charge. QCOSS (2012) expressed concern that tenant water billing is unmonitored and unregulated, and rental reductions to offset water bills are not being passed through to tenants.

QCOSS indicated that tenant billing could lead to increases in financial hardship. There is also an issue where a tenant would otherwise be eligible for concessions and rebates, and such concessions are not reflected in the bill to the landlord. However, eligible tenants are in effect not benefitting from such concessions if the water bill is already reflected in rent.

In regard to the pricing objectives:

(a) efficiency - tenant billing should be more efficient, providing it is cost effective

(b) revenue adequacy - the implications for revenue adequacy should be minimal

(c) equity - tenant billing is more equitable as users pay for the water they use

(d) simplicity and transparency - there should be no implications as the same charges apply to other users.

The QCA recommends that where water is separately metered, efficiency is maximised where the landlord passes the fixed and variable charges for water and sewerage through to tenants. Water entities should provide advice to landlords that the pass-through of water charges to tenants should be accompanied by rental reductions. In a competitive rental market, the pass-through of charges should be reflected in rental rates.

Where pass-through of charges is undertaken, entities should ensure that tenants are included in customer consultation processes.

> ## Draft Recommendation
>
> **2.14 Where water is separately metered, and where practical, tenants be billed the fixed and variable charges for water and sewerage.**

Unmetered connections

In some cases, where meter installation is not universal, charging for unmetered connections may be an issue. Volumetric charging cannot be applied, and charges may need to reflect a deemed amount of use to achieve an appropriate level of cost recovery.

Other jurisdictions

IPART determined that for Sydney Water, unmetered connections for residential and non-residential properties have the same fixed charge plus a charge for a deemed amount of 180kL. Customers may have a meter installed, with the meter supplied by Sydney Water and installation costs met by the customer. Hunter Water has introduced a deemed usage amount of 180kL per year for unmetered users (IPART 2013).

ACTEW Water in the ACT (2013) has a specific fixed charge for unmetered connections which is higher than the metered fixed charge.

In the UK, customers of some utilities have the option of installing meters and facing a two-part tariff or continuing to pay a flat access charge.

SEQ entities

Of the five entities, only QUU has a specific fixed access charge for unmetered connections and this only applies to Ipswich. This charge is 3.6 times higher (in 2011-12) than the residential water access charge.

QCA analysis

Unmetered connections typically are charged using an implied or deemed average consumption level. This may lead to concerns where actual usage is below or above average. This typically occurs in less urbanised areas, as evidenced by the entities (generally) not having a policy that applies.

The QCA considers that charges for unmetered connections should be based on a deemed volume, which may be established in line with average use volumes for like property types.

Customers with unmetered connections should be given the option of paying for the installation of a meter. This allows them to benefit from reduced charges through the introduction of metered volumetric charges and a comparatively modest fixed charge. This would be consistent with the treatment of new properties which are generally required to meet the costs of meter installation at the time of construction or through developer charges.

> ## Draft Recommendation
>
> **2.15 Customers with unmetered connections be charged a deemed amount for usage, reflecting average use for similar property types.**
>
> **2.16 Customers with unmetered connections be given the option of paying for meter installation.**

Vacant land and non-connected properties

This issue refers to appropriate charging in instances where:

(a) there is vacant land and a connection is available on request, but the connection is not being used

(b) there is land that is not vacant and a connection is available on request, but the connection is not being used.

Land owners in these circumstances enjoy the improved land value implied by the potential for connection. While there can be no application of a volumetric charge, the attribution of a fixed charge to reflect a share of infrastructure and operating costs not already recouped through developer charges is an issue.

Other jurisdictions

As part of the inquiry into SA Water's water and sewerage prices, ESCOSA (2013c) consider that where vacant land exists that is not connected to water and wastewater infrastructure (but where water and wastewater infrastructure exists), the water service provider incurs ongoing costs. SA Water levy a fixed charge on non-connected properties as these services are available to customers should they, or future owners, choose to connect. The availability of these services contributes to the value of vacant land.

ERA (2013) in Western Australia recently endorsed Water Corporation's approach that vacant land with potential connection to water and wastewater infrastructure is to pay a fixed annual charge spread over the billing cycle. Although the Water Corporation historically has this fixed charge based on the estimated Gross Rental Value of the relevant property, ERA recommend that this charge be based on the average annual cost of service as this approach is more cost-reflective and relatively simple to implement and administer.

Western Water (2013) noted it applies charges to vacant land to cover the costs of maintaining the pipes, valves and pumping systems to ensure services are available when a customer wishes to connect.

Taswater (2013) in Tasmania and ACTEW Water (2013) in the ACT levy service charges for vacant land where water and wastewater infrastructure exists as this infrastructure will provide services to the land at some time in the future.

SEQ entities

In accordance with section 164 of the *Water Supply (Safety and Reliability) Act 2008,* service providers are required to ensure all premises in a service area are able to be connected to a water and sewerage network. Section 165 allows the service provider to recover the reasonable costs associated with complying with section 164.

The access charges applied by the five entities to vacant land reflect the status of that land - that is, depending on the residential/commercial status of the land, the appropriate access charge applies.

QCA analysis

The five entities' objective is to ensure all premises in a service area are able to be connected to a water and sewerage network. The *Water Supply (Safety and Reliability) Act 2008* requires service providers to ensure all premises are able to be connected. This places an obligation on an entity to provide the service. If vacant land owners are not charged, the share of costs would need to be met by connected land owners.

It is noted that charges for vacant developed land are in place in many jurisdictions. This is usually justified on the basis that the value of the available services becomes capitalised in the value of the land, and owners could achieve a windfall gain on the sale of such land unless they have been charged a share of the operating costs of providing the (unused) service.

It is noted that charges for providing other local government services (for example roads maintenance, parks, stormwater drainage) which contribute to the improved value of the vacant land are also charged through council rates to owners.

The QCA accepts that vacant land owners should, in principle, meet a share of the service costs for water and sewerage where it is available for connection, given that these services are required to be provided. In regard to how charges are applied:

(a) as no variable costs associated with vacant land are incurred by the entities, no variable charges should be levied (this is consistent with the practice of the five entities)

(b) it is reasonable to conclude that the water access charge that applies to developed properties is appropriate in estimating the costs to be recovered from vacant land. This charge reflects that the benefit to vacant land owners of the available water connection is the same as that applying to water users.

Therefore, the water fixed charge (and sewerage fixed charge if applicable) that applies to developed properties (both domestic and commercial/industrial) should also apply to vacant land.

In regard to the objectives, this approach satisfies the principles of efficiency (cost recovery), equity and revenue adequacy. The minor additional administration costs for billing are likely to be justified.

Draft Recommendation

2.17 For vacant land where water services are available for connection, the water access charge that applies to connected properties (the relevant domestic or commercial charge) be applied.

Concessions and rebates

Concessions and rebates on charges may be applied for various reasons. Typically they involve concessionary rates for certain water customers, such as pensioners and the financially disadvantaged, or those with medical needs. In these instances, the foregone revenue is typically recouped through charges to the general customer base, or potentially through a CSO provided by Government.

National commitments and positions

The PC (2011) noted that concessions and rebates on water and sewerage services are administered and mostly funded by State and local governments. Such concessions, rather than price adjustments, can be more efficient as they can be targeted to particular groups in need and are less distorting on pricing signals.

However, PC noted that concessions and rebates can be confusing to customers, and can result in higher administration costs. If applied to the volumetric component, customers may be prevented from facing an efficient pricing signal. Equity issues arise where tenants are effectively charged through their rent and concessions may not take account of the size of the household.

The PC concluded that efficiency gains can be made by amending water and sewerage concessions with direct payments to targeted households, or rebates on the fixed component of charges.

Other jurisdictions

In Victoria, the State Government (through the Department of Human Services) provides a 50% discount to apply to water and sewerage charges (up to an annual maximum of $283.90 in 2013-14) for eligible customers (such as pensioners and veterans). This concession is indexed each year.

In Victoria, the State Government also requires water service providers to provide a rebate equal to the cost of 168 kilolitres per year for customers undergoing haemodialysis at home. The costs associated with this rebate are met by the State Government.

In NSW, Sydney Water and Hunter Water Corporations both grant concessions/rebates to eligible pensioners on behalf of the State Government.

For Sydney Water these concessions/rebates comprise:

(a) water service - 100% of quarterly service charge to maximum $31.34 (2012-13)

(b) wastewater service - 83% of quarterly service charge

(c) stormwater (if applicable) - 50% of quarterly service charge.

For Hunter Water the concession/rebate applied to eligible customers for the 2013-14 financial year is a total $87.70.

Sydney Water also has a rebate (that is, free of charge) of up to 400 kilolitres per annum for customers who require kidney dialysis (or other type of similar medical treatment). Similar arrangements exist for Hunter Water with 250 kilolitres per annum free of charge being provided. Costs associated with these rebates are fully funded by the NSW Government.

Both Sydney Water and Hunter Water have rebates that apply to *exempt properties* - that is, historically non-profit organisations (such as charities) with the rebate applying to the usage allowance or to reduce fixed charges. Costs associated with these rebates are fully funded by the NSW Government.

SEQ entities

In Queensland, water and waste water invoices issued by the entities reflect the application of the State Government Pensioner Water Subsidy which represents a concession to eligible customers of up to $120 (maximum for 2013-14) or $30 each quarter. This concession is applied to the bulk water (variable) usage charge and is a flat amount rather than proportionate to the bill.

Rebates also include:

(a) QUU applying the Brisbane City Council pension remission which is applicable to eligible pensioners of QUU who reside in Brisbane City Council. This concession is applied to the net invoice amount

(b) a haemodialysis rebate which provides customers using haemodialysis machines at home with an allowance (at no charge) of -

  (i) 200 kilolitres per annum - QUU and Unitywater

  (ii) 150 to 400 kilolitres per annum (depending on extent of dialysis) - Gold Coast City Council

(iii) 80 kilolitres per annum (although a case can be made for the provision of an additional volume) - Logan City Council

(iv) an annual allowance based on 25% of the average kilolitres used per annum in the dialysis treatment as advised by the treating hospital - Redland City Council.

Costs associated with administering the haemodialysis rebate are not offset by State Government funding. These costs are typically allocated by the entity to other customers.

All entities maintain a water leakage relief program whereby the entity considers off-setting water use costs in instances where a leak (primarily concealed) has caused excess consumption and the customer could not reasonably know of the leak's existence. The relief (that is, the amount the entity is willing to offset water use costs) is at the entities' discretion and reflects certain conditions (such as the leak being repaired within a certain period of time by a licensed plumber).

QCA analysis

In SEQ, the provision of concessions and rebates to specific classes of water and/or wastewater customers is at the discretion of the entity, with, where relevant, support from the State Government (as provider of the concession/rebate for specific customer categories).

Similarly, other rebates (such as Brisbane City Council's specific pensioner remissions) are at the discretion of the entity concerned.

The QCA supports the application of the concession/rebate to either the fixed charge or to the net invoice amount as this approach ensures the correct price signal is maintained - that is, the price signal associated with use achieved through the (variable) usage charge is maintained.

Concessions should be generally limited to ensure that discretionary use is not subsidised. This could mean applying a flat concession amount (as in SEQ) or a proportion of the bill up to a capped amount (as in Victoria).

For certain customer groups, such as those using haemodialysis machines at home, public interest and equity issues may precede economic efficiency objectives. The provision of such concessions is best supported by the State or local government as social policy decisions and judgements reside best in government. This allows the service provider to focus upon the delivery of commercial services.

Another option is to limit the discounted charge to a volume of water considered to meet basic needs. This is often the basis for implementing IBTs - but such approaches are not limited to disadvantaged groups. The QCA does not support using IBTs as a substitute for targeted concessionary charges.

Accordingly, concessions and rebates:

(a) require a consistent approach between the entities is desirable and best achieved through State or local government support

(b) should preferably apply to either the fixed charge or to the net invoice amount, to maintain the volumetric pricing signal

(c) should be capped at amounts that subsidise non-discretionary use levels only

(d) should be transparent - that is, the entity should acknowledge (including in any published document) the source of, and purpose for, the concession/rebate.

The exception to these principles is QCA's support of the entities maintaining water leakage relief programs, where the conditions should be determined in consultation with customers (therefore, a consistent approach between the entities may not be maintained).

Draft Recommendation

2.18 Concessions and rebates:

(a) reflect a generally consistent approach between the entities

(b) be set to apply to either the fixed charge or as a total direct adjustment to the gross invoice amount

(c) be capped so as not to subsidise discretionary use

(d) be transparent with acknowledgement of the source of, and purpose for, particular concessions/rebates.

2.19 Concessions associated with excess water use caused by leaks, be determined by the entities in consultation with customers.

Financial hardship arrangements

Pricing arrangements may be put in place for specific hardship issues. These are different arrangements to those eligible for concessions and rebates noted in the preceding section.

Other jurisdictions

All water businesses in Victoria have a financial hardship policy in place whereby those eligible customers experiencing financial difficulty (either short-term or long-term) can enter into agreement with the water business to manage any outstanding debt in a mutually beneficial manner. Having these programs in place is a condition of the water service providers' operating licence (ESC 2013a, 2013b).

In NSW (IPART 2012b, 2013) both Sydney Water and Hunter Water Corporations have payment assistance programs in place that ensure customers experiencing financial difficulty have access to essential water services while simultaneously assisting them manage their payments over time. Having these programs in place is a condition of their operating licence.

SEQ entities

Section 99AD of the *South-East Queensland Water (Distribution and Retail Restructuring) Act 2009* requires the entities to establish a Customer Service Charter which allows eligible customers who are experiencing financial hardship, to meet their obligations by making payments by instalments.

In summary, hardship arrangements that are presently in place include:

(a) a definition of what constitutes a hardship event

(b) a description of a typical instalment plan

(c) a description of the application of interest to outstanding balances in certain circumstances.

Section 93 of this legislation allows the Minister for Energy and Water Supply to make a Customer Water and Wastewater Code (Code) to provide for rights and obligations of SEQ water providers and their customers. The Code makes mention of complaints to be referred to the Energy and Water Ombudsman Queensland.

QCA analysis

The entities have a legislative obligation to have in place financial hardship arrangements, but the legislation provides no specific details on how to structure these arrangements. This has resulted in entities having a degree of flexibility in how hardship arrangements are managed[6].

Hardship arrangements should be consistent with formal requirements - such as those outlined in legislation or as a condition of an operating licence. Under the Water and Sewerage Services Code, hardship policies must include flexible payment plans, information about concessions options and details of when hardship policy would cease to apply to a small customer. Instalment payment plans must take account of customers' ability to pay and be negotiable.

The Department of Energy and Water Supply (DEWS) is undertaking a review of the Water and Sewerage Services Code for Small Customers in South East Queensland and will consider the water businesses' policies (including hardship) in relation to supporting customers.

The entities incur costs in administering financial hardship arrangements that are not necessarily recovered from the customer(s) experiencing financial hardship. In these instances, these costs are typically incorporated into general administration costs and allocated across the entities' customer base. Under the Code, entities cannot charge interest on hardship instalment plans, unless customers fail to meet the terms of the plan. As a general pricing principle, hardship arrangements should be set so as to avoid cross-subsidies, that is, prices to the hardship group should at least cover incremental costs.

Draft Recommendation

2.20 Hardship arrangements be consistent with legislative and operating requirements and avoid cross-subsidies where practical.

Billing frequency

The pricing signal can be influenced by the frequency of billing (and associated meter reading). While more frequent billing can provide more timely pricing signals, there are higher costs involved.

Other jurisdictions

Quarterly meter-reading and billing is the standard approach throughout Australia. Exceptions include:

(a) Toowoomba and Townsville Regional Councils which have six-monthly billing cycles

(b) Cairns Regional Council which reads meters and issues invoices on a 4-monthly basis

(c) Water Corporation (2013a) in WA which introduced 2-monthly billing from 1 July 2013 to make billing more manageable for customers, consistent with the billing policy of other utilities.

Mackay Regional Council (2012) has an alternate six monthly meter-reading and billing cycle - that is, meters are read, and consumption based charges levied, in November and May each year with fixed charges levied in February and August.

[6] An example of this flexibility includes the discretion entities have in the timing of interest to be applied to outstanding balances. Although the entities have the ability to charge interest, to-date the entities have chosen not to charge interest on outstanding balances.

In addition, since 2012 Mackay Regional Council has been progressively installing automatic meter reading (AMR) devices to most properties. AMR devices allow water meters to be read remotely in real time. Although the initial intention of the AMR device was to identify leaks, data will eventually be used for billing purposes, including allowing more frequent billing.

SEQ entities

Section 99AG of the *South-East Queensland Water (Distribution and Retail Restructuring) Act 2009* requires entities to take reasonable steps to ensure meters are read at least annually. The Customer Water and Wastewater Code require the entities bill customers at least quarterly.

Accordingly, the SEQ entities typically apply quarterly billing. The exception is Gold Coast Water which has a 6-monthly billing cycle, but will from 1 July 2014 adopt quarterly billing.

QCA analysis

The pricing signal is most effective where meter-reading and billing is more frequent. However, the administration and operating costs of more frequent billing typically means that quarterly billing is most practical.

Technological advances in smart meters (such as the introduction by Mackay Regional Council of AMR devices) enable more frequent billing that maximises the pricing signal. Smart meters can involve significant up-front costs but should present savings in meter-reading costs, early leakage detection and opportunities for more sophisticated pricing.

Meter-reading and billing should be at least quarterly. However, where economic, and subject to technology advances over time, meter-reading and billing should be undertaken on a basis more frequently than quarterly.

To the extent practical, billing should allow for alignment of bills with the financial years (or other such periods) for which charges are determined.

Draft Recommendation

2.21 Meter-reading and billing be undertaken at least quarterly.

2.11 Scarcity charges

Introduction

Scarcity charges mimic market behaviour by increasing prices when water is scarce and reducing prices when water is plentiful (NWC 2011b).

ACIL Tasman (2007) suggested that scarcity is not included in LRMC based pricing, as augmentation or demand management options are triggered in time to avoid scarcity. Scarcity relates to hydrological volatility and the associated uncertainty, while LRMC pricing is based on the underlying cost of infrastructure and its operation.

Frontier Economics (2008, 2011a) noted that scarcity charges are akin to SRMC charging, with prices increasing as demand exceeds supply and new, more expensive sources are required. Scarcity charging effectively places a value on the water itself, reflecting the changes in its value in line with natural rainfall variability.

Scarcity charging is relevant to the bulk water supply side of the water business, but would be applied as a cost pass-through at the retail level.

National commitments and positions

The NWC has considered scarcity charging in a report by Frontier Economics. However, at this stage, the NWC has not issued any formal principles in regard to scarcity charging.

The PC (2011) favours flexible retail pricing, one version of which involves a straight pass-through of the marginal cost of water to consumers. The PC suggests this approach manages demand better, compared to a LRMC approach. While LRMC sets a smoothed price over a regulatory period, flexible pricing allows prices to move up and down in line with the prevailing demand/supply balance.

Other jurisdictions

IPART (2008) considered the option of scarcity charges for Sydney Water. IPART concluded against scarcity charges on the basis that:

(a) sufficient water supplies were available in the medium term

(b) doubts existed about protection of vulnerable customers from very large price increases.

IPART (2008) noted that water restrictions appear to have broad community acceptance and may be more effective at managing short term supply/demand imbalances.

IPART (2012a) made the same conclusion in respect of Sydney Catchment Authority for bulk prices. In this case, IPART noted that the requirements of the Government's 2010 Metropolitan Water Plan effectively mean that the costs of alternative supply and demand options are already built into the retail price. That is, the cost of desalinated water is included when the plant is in operation. IPART noted that these are actual costs for sales, not a scarcity rent.

The ERA (2009) considered the option of SRMC based prices to deal with short-term shortages rather than supply restrictions for the Water Corporations' bulk supply activities. However, the ERA considered it would be inappropriate to replace restrictions with higher prices prior to the commissioning of the second desalination plant, given the uncertain demand response to higher prices. ERA applied an IBT as an alternative.

The QCA (2010) considered scarcity charging for GAWB and concluded that because of the inelastic demand of the major industrial customers, it would need to be complemented by supply restrictions. The QCA recommended GAWB evaluate the potential for scarcity pricing in the future.

QCA analysis

A key characteristic of scarcity based charging is that prices may fluctuate widely, depending on available water supplies. Prices may be very high during droughts to encourage conservation. The corollary is that prices may be very low when there is abundant supply. Hence, scarcity based charging reflects a SRMC based approach, as noted by PC (2011), rather than LRMC pricing. Implementing scarcity-based charging therefore marks a short-term departure from LRMC pricing.

Frontier Economics (2008) indicated that rationing available supply through a pricing mechanism is likely to result in more efficient allocation of resources compared to the regulated imposition of supply restrictions.

While there are efficiency grounds for adopting scarcity based charges, there are some problems:

(a) Frontier Economics (2008) noted that setting a scarcity charge in advance that exactly clears the market would be virtually impossible. Practical options could include: benchmarking against prices paid by others in the industry or in other areas; estimating a relevant demand function; using financial information to impute a value; or estimating the cost of the least expensive substitute for use in the production process

(b) SRMC based prices could be volatile, resulting in confusion and uncertainty for customers. Users are accustomed to stable prices reflecting long-term costs

(c) IPART (2008) also noted Sydney Water's concern that as the demand for water is relatively inelastic prices would need to rise significantly to achieve balance. Supply restrictions may in fact be required to complement scarcity charges

(d) high short-term prices may induce customers to invest in long-life on-site infrastructure and appliances which may not be justified when water supplies recover (Watkinson, 2006)

(e) the timing of meter reading and billing means that the pricing signal is deferred. Some users such as tenants do not directly receive the pricing signal. However, a change in scarcity value may occur only gradually over successive billing periods (Frontier Economics 2008).

Frontier Economics (2008) noted that highly variable SRMC based prices give confusing and inappropriate signals to consumers in terms of longer-term water consumption. LRMC pricing gives an ongoing signal to users to manage the timing of capacity investments. This long-term signal is lost with SRMC based pricing.

An alternative suggested by Frontier Economics is to price at LRMC when water is not scarce, and to use SRMC based pricing when demand exceeds supply - that is, price at the higher of LRMC and SRMC. This approach maintains the long-term LRMC pricing signal, thereby better promoting dynamic efficiency. Short-term over-recovery of revenues, if it occurs, can be addressed through appropriate measures (see above). This approach would seem to be a more economically efficient variation on scarcity based charging.

In terms of revenue risk, scarcity-based charging in its pure form could increase revenue uncertainty. The entity would need to match increased revenues to likely increased costs. However, as volumetric tariffs are increased to reflect scarcity, the fixed charges could be decreased.

Equity issues may arise in terms of the impact of higher temporary use charges on low income and vulnerable customers. This was a concern raised by IPART and a key reason for not adopting scarcity based charges. Such concerns may be managed through direct assistance measures or concessions. It is noted also that in many jurisdictions, equity issues of a similar nature exist already with IBTs that can impose higher charges on large families.

The additional costs of administration are also likely to be a factor against scarcity-based charging. Ideally, meter-reading and billing should be more frequent. There will also need to be additional customer engagement to provide clarity and transparency if volumetric prices are to vary each quarter. These costs could be significant enough to make scarcity charging unviable.

Overall, scarcity based charging is consistent with efficiency objectives, but there are practical implementation problems. Frontier Economics (2008) does not consider these insurmountable. However, while scarcity-based charging is widely acknowledged, it has not yet been implemented by any water entity. The key reasons include concerns about the impact of higher and more volatile charges, and the lack of information about demand responsiveness. There is also more general acceptance of direct measures such as supply restrictions.

In Section 2.2 it was noted that demand is typically inelastic in the short term. However, the PC (2008) considered that concerns about the elasticity of demand are not an impediment to using prices to achieve water security at least expected cost. Although an inelastic demand will result in a small change in quantity demanded for a given price change, and the magnitude of the change in quantity demanded might be uncertain, this does not make it inferior to other tools such as restrictions. The PC noted that restrictions can be unfair as they affect households in different ways.

An inelastic demand indicates that consumers place a high value on water consumption. This suggests that the welfare of society would be larger if supply were augmented to satisfy demand, rather than restrict demand. Indeed, the more inelastic demand is, the greater the costs to the community of restricting demand and not allowing flexible prices to signal the need for investment in supply augmentation. Hence, demand inelasticity is not a reason to eschew a necessary pricing signal to customers.

The concept of scarcity charging is supported. This implies that when scarcity emerges, prices should be adjusted to reflect the higher SRMC of supplies. For the SEQ entities, this may reflect the costs of any emergency actions taken to address scarcity - for example, increased water treatment costs or pumping or delivery costs from new sources.

Defined trigger events should be established to indicate the circumstances where SRMC based charges would replace the LRMC based charges. As noted previously, such a circumstance arises whenever SRMC significantly exceeds the LRMC for a particular service.

2.12 Tradeable urban water entitlements

Introduction

An alternative to scarcity charging is to define and provide tradeable water entitlements to urban water customers. This approach would allow a market mechanism to determine the scarcity value of water, and customers would have the option to trade surplus water requirements.

Such trading schemes may operate within, or across, participant groups - for example, residential customers, large urban users (industrial) or between developers.

National commitments and positions

The NWI (NWC 2004) required the States to facilitate water trading between, and within, urban and rural sectors.

The NWI Pricing Principles (NWC 2010) noted that for a range of reasons, the operation of water trading in the urban context is limited and is likely to remain so due to physical limitations.

Other jurisdictions

Trading of water entitlements is commonplace in the rural but not the urban sector. Much of this trading occurs on a temporary (within a water-year) basis.

QCA analysis

A key barrier to establishing an urban water trading market is the need to establish an initial allocation of entitlements (Frontier Economics 2008). For residential customers, allocations could be uniform, or take account of property size, type or number of residents. For large users, entitlements could be based on average recent water use levels, or contracted volumes if relevant, but should not penalise previous conservation efforts to reduce water use.

Frontier noted that a tradeable market should satisfy allocative economic efficiency objectives as it would enable the price of water to reflect its opportunity cost - those users with higher valuations can purchase from willing sellers. The result should be better than an administered scarcity pricing scheme and would encourage water-saving technologies.

Tradeable water entitlements should have little effect on revenue adequacy to the service provider - the costs of service delivery will remain reflected in prices paid for supply. Equity/fairness and public interest issues may arise in regard to initial allocations, which may disadvantage large families. New entrants may be required to purchase allocations, eg through developer charges.

As Frontier (2008) notes, the administration and transactions costs for such a scheme may be considerable. Transactions costs may be a barrier to trading of a large number of relatively small volumes of water. The maintenance of a large water register could be costly, but could be largely automated. One option is to limit the trading market to large users.

The QCA recognises the efficiency benefits that could be achieved through tradeable water entitlements in the urban sector. Such gains are more likely to offset the additional administration and transactions costs if applied to large industrial water users. The logistical constraints are likely to limit scope for trading urban water entitlements for the foreseeable future.

Draft Recommendation

2.22 Tradeable urban water entitlements be considered only where the efficiency gains are sufficient to justify the administration and transactions costs.

3 SEWERAGE

3.1 Background

The Ministerial Direction requires the QCA to set out pricing principles to apply to sewerage services.

Sewerage services include the collection, conveyance and treatment of wastewater and the disposal of the end products of the process. Domestic sewage discharged by both residential and non-residential users includes greywater (domestic wastewater from showers, laundries and kitchens), and blackwater (sewage undergoing a process of treatment).

The costs to provide sewerage services arise from the collection, transport, treatment and safe disposal of sewage. The volume and quality of sewage produced directly impacts on the network and the cost of providing these services. By managing the external impacts of sewage, charges for sewerage services are effectively a form of externality price (on impactors).

This chapter reviews the matters and methodologies relevant to applying the general pricing principles to sewerage services.

3.2 Issues in pricing sewerage services

Sewerage systems are infrastructure intensive with large investments in trunk transportation networks, pumping stations and sewerage treatment plants. Sewerage system costs are predominantly fixed, while volume and load-driven variable costs include pumping costs and treatment chemicals, and disposal costs.

Key issues related to pricing for the provision of sewerage services are:

(a) forecasting demand for sewerage services to input to determining price

(b) efficient pricing and tariff structures - the structure of charges (that is, the appropriate mix of fixed and variable charges, and the basis for applying these charges).

Trade waste (or trade effluent) discharged from manufacturing and commercial processes is considered separately.

3.3 Sewerage service demand forecasting

Estimates of demand are relevant for determining the prudent and efficient level of costs, including capital expenditure to be incorporated into LRMC for sewerage charges.

The demand for sewerage services is mainly driven by population growth (increases in the number of residential and non-residential connections). The mix of connections (houses and apartments) and allotment size may also be relevant to the scale of sewerage infrastructure required.

The extent of external infiltration to the system also influences infrastructure size and flow-related operating costs. Sewerage systems must be built to manage peak infiltration during wet weather and storm events.

National commitments and positions

The PC (2011) acknowledges that demand for wastewater services is linked to the volume of water consumed (indoor water usage in bathrooms, laundries and kitchens).

However, PC (2011) also considered it unlikely that demand for domestic sewerage services can be influenced by price to the same degree as demand for water overall, given that households have less scope to adjust their use of services.

Other jurisdictions

IPART (2013) noted that most sewerage systems are sized at around 6 times the size necessary to cope with sewerage discharges from customers, to cope with wet weather inundation of the sewerage system.

ESCOSA (2013a) noted that over the past few years prior to 2012, the number of SA Water's sewerage customers has grown at a higher rate than population growth due to drivers such as falling household sizes. However, ESCOSA considered that over the longer-term, sewerage customers should be determined using ABS population projections for South Australia. Accordingly, the rate of population increase from 2013 to 2022 yielded an average annual growth of 0.9% under the medium growth scenario.

City West Water (2012) noted that given sewage volume is a function of water use, sewage forecasts need to accommodate water conservation initiatives. Over the 2013 to 2023 regulatory period, City West Water considered that sewage volume will increase by an average of 1.5% annually.

Outlined in TasWater's Corporate Plan (2012) (as bulk, distribution and retail water and wastewater service provider throughout Tasmania) is a commitment to considerable investment to be undertaken to achieve compliance with contemporary standards associated with sewerage infrastructure. Stormwater ingress and older systems and pump stations result in a high number of wet and dry weather overflows to the environment. Investment is to take place over the three year period 2013 to 2015.

SEQ entities

QUU (2013a) based its sewerage demand forecasts on growth in connections within the sewerage catchments, and weather patterns.

QUU (2012) indicated that sewerage systems need to be designed not only to carry sewage and wastewater discharge, but also surface water run-off and groundwater that enters the system via illegal connections, low-lying disconnector traps and defects in the system. It is not possible to eliminate this infiltration and remedial action is subject to benefits outweighing the costs. Sewers must be designed to accept sudden and larger inflows.

QUU's design parameters allow for:

(a) a sewage load of 150l/p/d

(b) continuous groundwater infiltration of 25-30% of dry weather flow in the network, equivalent to 60l/p/d

(c) stormwater inflows generating peak flows many times the average dry weather flows. The system is designed to carry 5 times the average dry weather flow.

Unitywater (2013a) used the number of sewerage connections escalated by the OESR medium dwelling growth series to estimate short-term growth in connections. Long term sewerage load forecasts are determined in a similar manner to water, reflecting long term projections set out in an approved Water Netserv Plan.

QCA analysis

The demand for sewerage services requires an analysis of the key demand drivers. The number of connections is typically linked to population growth. An approach based on forecasting population trends is consistent with water demand forecasting and is the approach adopted by the entities.

Where entities adopted a two-part tariff with a volumetric charge linked to volume of water, forecasting demand is more complex - the forecast sewerage volume is directly linked to water volume. In effect, the entity needs to forecast the return factor or discharge factor that should apply, and this may vary by property type and seasonal conditions.

The entities may need to vary the discharge factor in line with changes in seasonal conditions, for example, when supply restrictions are in force.

Where the volumetric charge for sewerage is directly linked to the water volumetric charge, the potential demand response is magnified - that is, a customer who reduces water usage saves on both the water and sewerage bills. Demand elasticity may therefore be higher. Over time, the discharge factor may need to be adjusted iteratively to ensure cost recovery.

Draft Recommendation

3.1 Demand for sewerage services be based on forecast growth in connections, linked to population growth

3.4 Efficient pricing of sewerage services

The cost structure of sewerage services is based around the key activities along the chain - collection and reticulation, transmission, treatment and disposal, and retail services. Often the infrastructure costs associated with collection and reticulation are in part recouped through developer charges.

Key cost drivers, for residential and non-residential users, are the number of connections, peak wet weather flow (affecting transmission and treatment costs), discharge volumes (driving the costs of all stages), chemical and biological load (affecting treatment and disposal), development density and distances/topography, which affect transmission costs.

Efficient prices based on LRMC, therefore, may in theory be estimated taking into account marginal operating costs such as pumping and treatment and capacity costs such as demand-driven augmentations.

However, the application of LRMC based pricing principles to sewerage services is difficult due to the technical constraints of volume and load measurement.

In addition, where there is no capacity cost, LRMC is likely to be relatively low, limited to some pumping and treatment costs. Hence, any prices based on LRMC are likely to be predominantly fixed charges, since customers have limited scope to reduce their costs by reducing sewage.

The pricing of sewerage services is usually differentiated between residential and non-residential customers.

National commitments and positions

The PC (2011) observed that network costs are driven by the number of customers more so than the volume of wastewater travelling through the pipes and volumetric charges are not appropriate.

The National Competition Council (NCC, 2003) has previously noted:

> *Charging on a consumption basis for sewerage services provided to households and small commercial customers is generally not efficient (NCC 2003, p.14).*

Other jurisdictions

Residential charges

Most water businesses use a single flat fixed fee for residential sewerage services (NWC 2010, ICRC 2013, IPART 2012b, ESC 2013a).

In some jurisdictions, the fixed charge is varied in order to reflect perceived cost differentials. For example, Hunter Water (IPART 2013) sets a lower flat charge for flats and units compared to houses.

South Australia and Western Australia use property values to set fixed service charges to residential customers (ERA 2013, ESCOSA 2013a). In SA, the view is that property based charges better reflect capacity to pay. The difference between the metropolitan and country sewerage price increases recognises that property values in the country are on average lower than those in the metropolitan area. This results in country customers, on average, having lower sewerage charges than metropolitan customers.

In SA, sewerage charges are also applied to unconnected properties where the sewerage network runs past their properties (rating on abuttal). The fixed charges are applied on the basis that the service contributes to the value of both developed and vacant properties.

ERA (2013) noted that residential wastewater tariffs in Perth are set as a fixed charge based on the estimated Gross Rental Value (GRV) of the property. This was considered an inefficient method as:

(a) there is little relationship between the price and the cost of the service

(b) the use of GRV pricing is not an effective form of charging on the basis of capacity to pay

(c) the administrative costs of maintaining the database are significant - $3 to $4 million per year for the Water Corporation.

ERA recommended a move away from GRV charging for 2013-14, to a flat charge per customer. This would result in an increase in the charge for some customers and a decrease for others. However, the WA Government elected to continue with property based charging.

In Tasmania, TasWater's sewerage charges are set as a fixed charge per equivalent tenement (ET). A single residential property is rated one ET, while a hotel may be rated as 50 (OTTER, 2012). The water entities are to establish ETs for customer types prior to implementing charges. OTTER (2012) considers that basing fixed sewerage target tariffs on ETs is appropriate as it reflects potential demand upon each regulated entity’s sewerage infrastructure, which is consistent with the requirements of statutory pricing principles.

Some urban areas have adopted two-part tariffs for their residential sewerage customers, including a proxy volumetric charge, typically based on a discharge assumption linked to water volumes, and a fixed charge.

For example, in Melbourne, (ESC 2013a) metropolitan retailers set residential sewerage charges based on a fixed service charge and volumetric disposal charge (based on metered water use multiplied by an estimated discharge factor). Discharge factors vary between entities:

(a) City West Water - determines volume of sewage as the *volume of water x a seasonal factor x a discharge factor* -

(i) the seasonal factor varies from 1.45 in the summer months to 1.00 in winter

(ii) the discharge factor varies from 0.9 for usage below 125 kL, on a sliding scale to 0.45 for usage above 250kL

(b) Customers may elect to have a customised discharge factor based on the consumption history of the property (City West Water 2013).

(c) South East Water and Yarra Valley Water - a return rate or discharge factor of 75% for houses and 85% for apartments.

However, in some jurisdictions, this approach was considered but not implemented. For example:

(a) IPART (2013) noted that most of the sewerage system costs are fixed - once the infrastructure costs are in place, the variable costs of extraction, treatment and pumping are small, for example 10% in the case of Hunter Water. IPART also noted that the driver of costs is not volume, but load, and it is not economically feasible to install meters. Further, a standard discharge factor may overstate costs for owners with pools and large gardens.

(b) the ICRC (2013) considered that in the absence of an actual measure of residential volumetric discharge, any potential economic efficiency benefits are likely to be outweighed by the complexity of the charges. Further lower volumes do not necessarily translate into lower costs for ACTEW.

(c) in South Australia, SA Water does not apply consumption based pricing to residential sewerage. ESCOSA has acknowledged that this recognises the impracticality of metering direct usage for small customers and the minor benefit that price signals of this type would generate (ESCOSA, 2006).

In the UK, sewerage charges vary according to whether water supplies are metered or unmetered. Where water supplies are unmetered, sewerage charges comprise a fixed charge per property plus a zonal charge based on rateable value. For metered customers, sewerage charges are based on volumes recorded on the water meter, with adjustments for non-return to sewer (Ofwat, 2009).

Table 6 summarises fixed and variable charges in Australian jurisdictions. Victoria is the only State outside Queensland where volumetric charges for residential sewerage are applied.

Table 6 Residential sewerage charges

State	*Entity*	*Fixed*	*Variable*
NSW	Sydney Water, Hunter Water	Flat charge	No
ACT	ACTEW	Flat charge	No
Victoria	City West Water	Flat charge	Discharge factor, seasonal adjustment
	South East Water	Flat charge	Discharge factor
	Yarra Valley Water	Flat charge	Discharge factor
	Western Water	Flat charge	No
	Goulburn Valley Water	Flat charge	Discharge factor
WA	Water Corporation	Gross Rental Value	No
SA	SA Water	Property Value	No
Tasmania	TasWater	Flat charge (ET)	No

Non-residential charges

In non-residential sewerage services, the fixed charge is typically linked to the number of fixtures or water meter size. These factors are considered indicative of sewage volumes.

In addition, the adoption of two-part tariffs with some form of volume related charge is more widespread as compared to the residential sector.

In Sydney, the non-residential fixed charge for sewerage services is set on the basis of the size of the water meter connection (IPART 2012b). IPART also applied a usage charge, of $1.49/kL of water used above 500kL in 2013-14, to be reduced to $1.10/kL for volumes above 300kL by 2015-16. IPART preferred SRMC to LRMC as the disaggregated nature of sewage catchments makes it difficult to estimate a single LRMC. IPART estimated the SRMC of collecting, transporting, treating and disposing of sewage is less than $0.30/kL.

For Hunter Water (IPART 2013), the fixed non-residential sewerage charge is also set according to water meter size. The volumetric charge of $0.67/kL is applied using discharge factors that vary according to customer type, for example 10% for nurseries up to 85% for restaurants and hotels.

In metropolitan WA, the fixed component is based on the number of sewerage fixtures (Water Corporation 2013a). For example, a fixed charge of $772.10 applies to the first fixture, $330.51 to the second, $441.38 to the third and $479.97 to the fourth and any subsequent fixture. A usage charge of $2.8376/kL also applies if the business discharges more than 200kL annually.

A discharge factor is applied to determine the percentage of total water used that is discharged to the sewer. The discharge factor will either be the default of 95% or, alternatively, be subject to negotiation.

In the ACT, non-residential customers are charged based on the number of flushing fixtures. In addition to the fixed supply charge of $456, non-residential customers pay $446 for each fixture greater than two (2013-14) (ICRC 2013). There is no volume charge.

In selected Victorian entities:

(a) City West Water (2013) applies a fixed charge plus a variable charge based on a discharge factor of 0.9 to the volume of water (less volume of trade waste). A lesser discharge factor can be calculated upon request

(b) South East Water (2013) applies a fixed charge plus a variable charge based on a discharge factor that varies by customer type, from 0% (farms, vacant land) to 90% (laundries, restaurants, etc). This approach is also adopted by Goulburn Valley Water (2013), although the discharge factors vary

(c) Coliban Water (2013) applies a volumetric charge based on industry-specific discharge factors, for water volumes in excess of 230kL per year

(d) Westernport Water has a flat charge plus an additional charge for each commercial cistern in excess of two

(e) Western Water applies a flat charge per property, with no usage charges.

SEQ entities

Residential and non-residential customers in the SEQ usually pay a fixed charge per property.

Unitywater introduced a two-tier sewerage usage charge in 2013-14, based on a discharge factor of 0.9, with the second tier being zero for residential users. Unitywater based its discharge factor on an end-use study which showed that 89% of water measured through the water meter was returned to the sewerage network. The charge structure will be phased in for non-residential users.

Non-residential customers of GCCC also pay a usage charge based on their water consumption adjusted according to a set of assumptions made about the proportion of water use that is discharged to the sewer system.

The 2013-14 charges for the SEQ entities are detailed in Table 7.

Table 7 SEQ Sewerage Quarterly Charges 2013-14

Entity	***Fixed***	***Other***
QUU[7] - Brisbane	$118.98 - residential	No other charges apply
	$120.54 - business	Pedestal charges
QUU - Ipswich	$142.86 - residential	No other charges apply
	$149.46 - business	Pedestal charges
Unitywater - Moreton Bay	$173.81 - stand alone residential	Volumetric charge of $0.64/kL, based on a discharge factor of 0.9, capped at 740l/day (270kl per year)
	$191.75 - other residential	No other charges apply
	Various fixed charges apply to non-residential customers	No other charges apply
Unitywater - Sunshine Coast	$127.46 - stand alone residential	Volumetric charge of $0.64/kL based on a discharge factor of 0.9, capped at 740 l/day (270kL per year)

[7] QUU levy a series of charges for the other regions of Lockyer Valley, Scenic Rim and Somerset.

Entity	Fixed	Other
	$147.00 - other residential properties	No other charges apply
	Non-residential - southern - fixed charge for first pedestal $156.25	Pedestal charges
	Non-residential - central - fixed charge by water meter size	Discharge factor by customer type
	Non-residential - northern - fixed charge for first pedestal - $166.25	Pedestal charges
Gold Coast City Council[8]	$175.84 - residential	No other charges apply
	$175.84 - non-residential	Volumetric charge of $4.32/kL applies based on property discharge factor and discharge allowance
Logan City Council	$165.40 - residential	No other charges apply
	$165.40 - non-residential (incl hostels, guesthouses)	Second and subsequent pedestals/urinals - fixed charge of $124.05 per unit
Redland City Council	$158.44 - residential	No other charges apply
	$158.44 - commercial and industrial	Second and subsequent pedestals/urinals - fixed charge of $126.75 per unit

Source: QUU (2013b), Unitywater (2013b), Gold Coast City Council, Logan and Redland City Council (2013)

QCA analysis

Residential volumetric tariffs

While metering of sewage discharge is not practical for technical and cost reasons (except, potentially, in greenfield developments), an option to apply efficient marginal cost pricing practices is to price sewage according to the relationship between water supplied and sewage discharged (PC 2011). In this way, a two-part tariff can be established for residential sewerage services. Volume based charges are often used to allay equity issues arising from the more common approach of applying a single fixed sewerage charge regardless of household size.

In the absence of meters, options for volumetric charging are to:

(a) apply a discharge factor to water volumes supplied - adopted by Hunter Water and many Victorian water retailers, and Unitywater

(b) apply a charge linked to water volumes above or below a threshold.

Proxy usage charges, in effect, magnify the water usage pricing signal, as the only way for customers to reduce their sewerage usage bill is to reduce water usage.

The PC (2011) noted some drawbacks with this approach, including:

(a) the relationship between discharge and water use needs to hold tightly. However, depending on the level of outdoor use, the ratio of water supplied to water returned to

[8] Gold Coast City Council has a 6-monthly billing cycle - however, as of 1 July 2014, quarterly billing will apply.

the sewerage system will vary across consumers. Customers who use water for purposes that do not generate sewage (for example, for gardening, irrigation or other [typically] discretionary purposes) will face a higher volumetric charge. Options to address this include:

(i) separately metering outdoor and indoor use (however, this is usually impractical and expensive)

(ii) setting the discharge factor on a sliding scale to reduce as water supplied increases (City West Water 2013). However, this adds complexity

(iii) setting a cap on the amount of water volume that is prescribed as entering the sewerage system. This approach, adopted by Unitywater, should minimise the risk that outdoor use volumes attract a sewerage charge

(iv) adjusting the discharge factor for seasonal differences (for example, setting charges based on seasonal indices of water use). However, in SEQ outdoor water use is likely less seasonal than in southern Australia due to wet summers and dry winters. This approach also adds complexity

(v) combining volumetric sewerage charge revenue with the volumetric water charge. This creates a direct link to volume of water supplied but is less transparent

(vi) providing individual customers an opportunity to negotiate a different discharge factor. This requires strong customer engagement and awareness practices and adds to administration costs.

(b) it is unlikely that demand for domestic sewage services can be influenced by price to the same degree as demand for water overall.

Approaches to address perceived equity issues (for example, small households) of the conventional flat fixed charge approach may simply result in a different set of equity issues (for example, high volume outdoor users). The PC (2011) is of the view that volume-based charging is likely to be of most benefit where disposal costs are high or there are significant differences in the levels of demand for sewerage services by different users.

The PC concluded that it is most efficient to price household sewage as a fixed charge, as occurs in most jurisdictions, and to not apply a proxy volume based charge.

However, the PC noted that there could be a case for volumetric charging of sewage if metering technology advances to reduce the cost of installing sewage meters, or if installation costs are significantly less expensive in greenfield developments.

In regard to the broad pricing principles, proxy sewerage usage measures such as discharge factors applied to water volumes:

(a) potentially can provide efficient pricing signals, although only by using complex sliding scale discharge factors to achieve a close link to sewage outflows or caps to limit the impact on high outdoor water users. A carefully structured sewerage usage charge could be more cost reflective than a flat fixed charge

(b) are able to be structured to ensure revenue adequacy, albeit at some revenue risk to the service provider compared to flat fixed charges

(c) may not be equitable or fair, where residential customers have high levels of outdoor water use. This issue can only be overcome using complex remedial tariff structures or expensive separate metering

(d) are complex and more costly to administer. The variable component of the sewage service tariff is not easily understood by customers as there is no direct metering (PC 2011). Administration costs may be incurred in addressing individual claims for variations.

If SEQ entities opt to apply a volume based sewerage charge for residential use, then:

(a) usage based charges should reflect as close as possible the LRMC of providing sewerage services, with a fixed charge to recover any revenue shortfall. LRMC may be significant where demand growth requires substantial sewerage system capacity upgrades

(b) customers' circumstances should be taken into account in usage charges by applying different discharge or return factors for different customers, and/or by similar adjustment to the fixed charge. One option is to use a sliding scale of discharge factors in line with water usage volumes or apply a cap

(c) seasonal variations in the proportion of sewerage outflows to water inflows should be taken into account in setting discharge factors. In SEQ, with higher summer rainfall seasonality of discharge factors is likely to be less an issue

(d) where cost reflective charges are implemented in place of flat charges or property based charges, a period of transition should be provided to minimise impacts on customers.

Where discharge factors are limited by use of caps (for example, Unitywater) or sliding scale factors, the variation in bills between different residential customers is constrained. This is likely to mean that the sewerage bill for typical customers may only be a small amount higher or lower than if the same fixed charge was applied to all customers.

Overall, the QCA agrees with the PC that sewerage two-part tariffs are in most cases not practical for the residential sector. Specifically:

(a) variable costs are not likely to be large enough to justify complex cost reflective volumetric charging structures unless there are significant forecast demand-driven augmentations in the planning horizon

(b) revenue risk is potentially introduced compared to other approaches

(c) it may not be equitable where residential customers have high levels of outdoor water use, implying that such customers will be paying more for sewerage services than like customers, contravening the proportionality principle

(d) it is complex, more costly to administer and not easily understood by customers as there is no direct metering.

In contrast, an average cost based pricing approach, using a single flat charge for all customers is easily understood by customers [that is, transparent], is administratively simple and can be easily set to achieve cost recovery.

Residential fixed charges

While residential charges based on a single fixed charge are practical for sewerage services, such charges may not meet equity/fairness principles as all users would pay the same regardless of household size. This equity issue is the reason many entities have adopted volumetric charges based on discharge factors. Alternatives for setting the fixed charge may be used to address cost reflectivity and equity concerns. These include setting charges by:

(a) property value. Charges based on property value assume that households in higher value areas tend to use more water and require more wastewater services than households in lower value suburbs. However, the ERA (2005) notes that there is no evidence that households in higher value areas produce higher sewage discharges than other areas, because not all water consumed is returned to the sewer system. Charges based on property values are primarily reflective of capacity to pay rather than costs

(b) type of property. Charges differentiated between detached houses and flats/units may be used to take account of the likely different sewerage system use to reflect household size

(c) equivalent tenement (ET) or floor area. This approach is usually used to distinguish between residential and non-residential and is essentially a property based charge

(d) number of fittings. Charges may apply per pedestal (or fixture) or for the number of pedestals above a specified limit. Although this approach is common for non-residential fixed charging, it may be impractical and/or costly to establish and monitor the number of pedestals.

Charges based on these variables represent attempts to link prices to the cost of services for certain customer types. However, fixed charges that vary according to pedestals or property size/value are not likely to be appropriate for the residential sector, as they may not be reflective of the costs attributable to particular residential customers.

The QCA considers that a single residential fixed charge avoids potential distortions, is simpler to understand and is transparent.

Non-residential volumetric tariffs

Many jurisdictions apply a form of two-part tariff with volumetric charging to non-residential users, by either applying a discharge factor to water volumes supplied, or by setting a charge triggered when water volumes are above a specified threshold.

Unlike the residential sector, the economic efficiency gains from applying such approaches to the non-residential sector are likely to be greater, given that commercial customers may substantially vary in their impact on the sewerage system (PC 2011). Provided that there is a significant commercial customer base with a variety of industry types, more complex charges are likely to be justified, as a second best option to direct metering.

In these circumstances, a volumetric charge based on discharge factors is expected to be economically efficient and more equitable, justifying the additional cost and complexity, although the greater complexity may mean greater revenue risk for the service provider.

In applying such charges in the non-residential sector:

(a) usage based charges should reflect the LRMC of providing sewerage services, with a fixed charge to recover any revenue shortfall

(b) customers' circumstances should be taken into account in usage charges by applying different discharge or return factors for different customers, and/or by similar adjustment to the fixed charge. One option is to use a sliding scale of discharge factors in line with water usage volumes9

9 In some individual cases, such as where rainwater tanks are in use, the discharge factor could exceed 1.0.

(c) charges should reflect the costs attributable to general sewerage services. Trade waste revenues may need to be netted out for individual large customers to avoid double counting and for ensuring correct pricing signals.

As is characteristic of other jurisdictions, individual large customers may seek to negotiate a variation - for example, where wastewater is supplied directly to a recycling facility and not returned to the sewerage system.

Non-residential fixed charges

Unlike the residential sector, the costs of sewerage services can vary substantially across the non-residential customer base, depending on the type of non-residential business.

In many jurisdictions, fixed charges are often linked to an indicator of usage of the sewerage infrastructure. This may be achieved by:

(a) charges based on property size. As a proxy for volume of sewerage outflows this may not be a reliable indicator.

(b) charges based on the water supply connection size. Larger water inflows may be correlated with larger sewage or wastewater outflows.

(c) charges by pedestal/cistern/fixtures. Such charges remain in many jurisdictions. However, these charges may unfairly increase charges for tourism related customers or other commercial customers. ICRC (2007) considered that the number of fixtures is a poor indicator of the impact placed by a customer on the sewerage system.

None of these measures is a direct link to sewage volumes. Charges based on water meter connection size are considered to provide the closest, least distortionary link between costs and prices. Businesses with the same connection size as residential (usually 20mm) should pay the same charge as residential users.

Until effective metering becomes a realistic option, the QCA considers that proxy indicators should be used for fixed charges for non-residential users, with water meter size the preferred indicator.

Nodal pricing of sewerage services

IPART (2013) noted that in the case of Hunter Water, sewerage service costs vary more by location than by customer type. However, developer charges typically recover the cost of new connections to the network. Nodal pricing of sewerage services has not been applied in practice.

Young (2000) proposes setting sewerage charges in proportion to the loads at each node in the sewerage system. A group of customers subject to the levy would have a financial incentive to collectively search for ways to reduce treatment costs and the loads of pollutants returned to the environment. However, such an approach could disadvantage individual customers that do not contribute to sewerage loads.

While nodal pricing may improve overall efficiency, and be more equitable, the cost and complexity are likely to preclude it in all but a few isolated cases where customers have significant sewage or wastewater outflows.

Unconnected properties

Consistent with the recommended approach for water supply services, customers that are not connected, but are able to connect, should be charged the fixed charge for similar properties on the grounds that the benefit will be reflected in their land value.

Draft Recommendation

3.2 For residential customers:

(a) sewerage charges be based on a single part tariff with a fixed charge per customer or connection

(b) volumetric charges (based on discharge factors) be applied where the LRMC is significant and should be based on discharge or return factors linked to the LRMC of providing the water volumes.

3.3 For non-residential customers:

(a) fixed sewerage charges be based on the impact of the customer on the system. In the absence of direct metering, water connection size is considered a reasonable proxy

(b) if appropriate, volumetric charges be applied based on relevant discharge factors established by customer type. Customers should be able to negotiate a variation in the discharge factor.

3.4 Nodal pricing for sewerage services be applied where cost effective.

4 TRADE WASTE

4.1 Introduction

The Ministerial Direction requires the QCA to develop pricing principles that apply to trade waste.

Trade waste is water-borne waste from business, trade or manufacturing premises, other than waste that is a prohibited substance, human waste or stormwater (*Water Supply (Safety and Reliability) Act 2008*). Trade waste contains concentrations of pollutants that exceed a domestic equivalent (IPART 2012b).

Substances that are prohibited from being discharged (and, therefore, not considered trade waste) include flammable, explosive and toxic substances.

More significant trade waste generators include motor vehicle industries and chemical, textile and other forms of manufacturing industries. In contrast, more modest trade waste generators include restaurants, hairdressers and university and other educational facilities.

Key Issues for pricing trade waste services

Pricing of trade waste services is typically on an 'impactor-pays' basis with costs relating to managing pollutant load and discharge into streams and rivers to avoid or minimise environmental and public health impacts (Frontier Economics 2011b).

Direct costs include transport, treatment and disposal of trade waste as well as corrosion costs of high strength wastes (IPART 2012b). Additional costs are incurred in monitoring, sampling and analysis of loads. Trade waste charges typically take account of biochemical oxygen demand (BOD) and suspended solids (SS), total kjeldahl nitrogen (TKN), total phosphorus (TP), total dissolved solids (TDS) and inorganic total dissolved solids (ITDS).

The entities have different limits for the same contaminant parameter based on:

(a) whether the receiving wastewater treatment plant (WWTP) discharges into fresh or salt water environments (different standards apply)

(b) the size/scale of a particular WWTP (smaller facilities tend to have been established to accommodate modest loads of predominantly domestic wastewater)

(c) the technology associated with a particular WWTP (some older facilities have been designed to treat predominantly domestic wastewater with upgrading required to treat significant quantities of trade waste)

(d) the capacity and age of infrastructure (such as a sewer line) which could be compromised due to the volume/quality of certain trade waste.

Since continuous sampling and chemical analysis for small to medium customers would incur unreasonable costs, charges are typically based on assumed contaminant load given a particular category, such as industry type.

The key issues for pricing trade waste services are:

(a) forecasting demand for services

(b) efficient pricing

(i) identifying the costs and drivers - for contaminant transport, treatment and disposal and principles for allocating costs to relevant parties

(ii) setting tariffs and consumption-based charges, including scope for location-based pricing

(c) charges or penalties for non-compliance.

4.2 Forecasting demand for trade waste services

Estimates of demand are relevant for determining the prudent and efficient level of costs, including capital expenditure to be incorporated into LRMC for trade waste services.

Trade waste demand is generally a function of the mix of commercial and industrial activities accessing the services. Usually, trade waste represents a small incremental change to sewerage systems' volume requirements, which are typically designed for large wet weather flows. Trade waste demand mainly concerns contaminant loads (mass and type), and these may relate to specific industry requirements, which may be defined only through negotiation and consultation.

Other jurisdictions

ESC (2012) suggested as a general principle that trade waste prices should reflect reasonable assumptions regarding the customer's demand for services – including the mass and strength of trade waste anticipated to be produced. ESC approved the growth in trade waste connections consistent with overall customer growth.

As part of their Water Plan, Goulbourn Valley Water (2012) provides a trade waste forecast on the basis of mass and contaminant load over a 12 year period from 2006-07 to 2017-18. In undertaking these forecasts consideration was given to:

(a) discussions held with major customers regarding projected trade waste discharge

(b) historic growth trends including trends in the characteristics of trade waste

(c) the outlook for industrial development

(d) the nature and potential of waste minimisation initiatives.

The Water Plan of City West Water (2012) forecasts trade waste contaminant parameters (BOD, SS, TDS, ITDS, Total Nitrogen and TKN) over a 10 year period. In undertaking these forecasts consideration was given to:

(a) historic trade waste data

(b) trends in, and proposed location of, industrial activity

(c) the adoption of onsite trade waste treatment processes in promoting cleaner production.

Prior to TasWater being established on 1 July 2013, each of the regionally based service providers (Southern Water, Ben Lomond Water and Cradle Mountain Water) established Price and Service Plans that reflected demand for trade waste services based on:

(a) projected changes in industrial activity (such as analysing Australian Business Registry data to establish the extent of potential trade waste customers)

(b) a commitment to decreasing trade water discharge over time through a number of initiatives such as requiring greater on-site pre-treatment (Ben Lomond Water 2012, Cradle Mountain Water 2012 and Southern Water 2012).

SEQ entities

The regulated entities forecast demand based on growth in trade waste connections as a proxy for growth in mass of trade waste discharge. The entities do not forecast changes in contaminant load or consider initiatives aimed at decreasing trade waste discharge over time.

Also, as identified by SKM (2013) the entities base growth projections for trade waste in proportion to the residential growth. Specifically:

> *SKM has accepted the trade waste connection projections proposed by QUU on the basis that the rates proposed are consistent with the growth rates seen in the other connection categories.*

For the period from 2012 to 2015, QUU's (SKM 2013) demand was based on the number of trade waste connections (as at 2010-11) indexed at OESR's dwelling projections, adjusted by the low population growth series. QUU then applies 95% of all growth in dwellings to its "connected" dwellings, the assumption that most new dwellings will be developed in areas that are connected to QUU's network. This growth rate is applied to both residential and non-residential connections.

QCA analysis

Projections in trade waste discharge are not necessarily in proportion to residential growth. As an example, a particular local government authority may experience an increase in residential, as opposed to industrial, activity over time. In addition, although experiencing an increase in industrial activity, the entity may introduce more stringent requirements associated with the on-site treatment of trade waste, leading to constant (or decreased) trade waste discharge over time.

Accordingly, consistent with the approaches in other jurisdictions, the entities in forecasting demand for trade waste services should:

(a) consider historic trends in the mass of trade waste being discharged and associated contaminant loads, having regard to the overall mix of residential and industrial customers

(b) the manner in which initiatives (such as moves towards full-cost recovery) reduce trade waste discharge over time

(c) trends in, and proposed location of, industrial activities.

Forecasts for trade waste mass and loads may require specific consultation with new large customers (and on an ongoing basis with large emitters) to identify any step-changes in demand for services.

Where the customer balance (residential to commercial) is relatively stable, or is strongly correlated with population growth, trend data should be sufficient to provide reasonable forecast estimates.

Draft Recommendation

4.1 Where the customer base changes in line with growth, trend information be used to provide reasonable forecasts of demand for trade waste services.

4.2 Entities consult with large customers to monitor any step changes in demand for trade waste services.

4.3 Efficient pricing of trade waste services

Under the preferred efficient LRMC pricing framework, the steps in the process of determining efficient trade waste prices are to:

(a) establish the costs attributable to the parties impacting the sewerage system associated with trade waste activities compared to those costs associated with non-trade waste activities. This entails identifying the incremental costs of trade waste, as distinct from 'normal' sewerage

(b) establish the bases for efficient two-part or multi-part tariffs to recover the share of total costs attributable to trade waste activities. This includes identifying cost drivers for variable charges typically including contaminant load and mass

(c) if relevant, charges are differentiated to reflect cost variations - for example for customer type, location or risk. Risk-based assessments may be used to derive charges for certain customer groups.

Who pays

Costs incurred by the trade waste service provider are typically direct (or pollutant) costs, ancillary costs (such as processing an application to discharge trade waste and conducting site specific audits/inspections) and indirect costs (such as non-site specific testing).

Cost drivers include the mass and contaminant load of trade waste generated, above that of the domestic sewerage system and the type and degree of treatment required.

A key issue is who should meet the costs of managing trade waste. As noted above in Chapter 1, the allocation of costs to relevant parties may be on the basis of either:

(a) the impactor (or polluter or user) pays principle. Here, costs can be attributed to a specific group in the community (for example, the entity's trade waste customers)

(b) the beneficiary pays principle. Here, beneficiaries may also be identifiable as a specific group.

Other jurisdictions

Other jurisdictions have adopted a user pays or 'impactor-pays' approach to trade waste cost allocation, meeting general objectives of cost reflectivity and marginal pricing signals (IPART 2012b, 2013, ESC 2013a, OTTER 2012).

SEQ entities

In Queensland, charges for trade waste are typically based on the pricing principles of ‘user pays’ with the aim of full-cost recovery.

Trade waste revenues for the SEQ entities comprise a relatively small proportion of total revenues. For example, QUU's trade waste revenue requirement is around $20 million but is only about 2% of the total MAR.

QCA analysis

In seeking to provide the most appropriate incentive to minimise costs for the community, charges applied to the party generating the trade waste (the impactor) are most appropriate and relevant.

The appeal of the impactor pays approach is that:

(a) it is fair to charge the costs resulting from pollution to those who cause and benefit from causing the pollution (equity considerations)

(b) this approach requires impactors to internalise costs that would otherwise be incurred by society that result from their environment damaging activities. The impactor pays approach also results in greater long-run economic efficiency compared to the situation where polluters are not subject to full-cost recovery (economic efficiency considerations)(Tilton 1995).

The impactor pays approach is consistent with the goals of economic efficiency and the revenue adequacy of the regulated entities. This approach is also consistent with equity/fairness (as those contributing more to trade waste discharge are exposed to associated charges) and simplicity/transparency (as this approach is more easily understood by stakeholders). The QCA recommends the impactor pays approach be applied.

The beneficiary pays approach provides less incentive for the trade waste emitters to reduce trade waste costs and to review the least cost option to manage trade waste - avoidance, abatement or treatment. Customers with low-cost opportunities to treat waste on-site have less incentive to do so (Frontier Economics 2011b).

Draft Recommendation

4.3 Trade waste prices be based on the impactor pays principle.

Trade waste tariff structures

National commitments and positions

The Council of Australian Governments' (COAG) *Intergovernmental Agreement on a National Water Initiative* (NWI) (NWC 2004) required that States and Territories (for metropolitan settings) review and develop pricing policies for trade wastes that encourage the most cost effective methods of treating industrial wastes, whether at the source or at downstream plants.

The Water Services Association of Australia's (WSAA 2012) Australian Sewage Quality Management Guidelines, proposed the following pricing principles:

(a) charges should be consumption-based, incorporating pay for use and fee for service

(b) charges should be full cost recovery and incorporate a real rate of return on assets with services provided at less than full cost incorporating a transparent CSO

(c) the tariff approach should -

  (i) be easily understood and linked to costs

  (ii) be equitable across all customer classes with any cross-subsidy removed or (should they continue) made transparent

  (iii) induce customer behaviour that aligns to operating strategies such as waste minimisation and the appropriate use of pre-treatment technologies.

WSAA also advise that to encourage compliance, waste minimisation and the introduction of cleaner technology, utilities should use incentive charges, such as:

(a) tiered charges for specific contaminants

(b) premium charges where required pre-treatment is not installed

(c) non-compliance charges in response to breaches of conditions/agreements

(d) asset protection charges where maintenance is provided.

The PC (2011) proposed that there are efficiency gains associated with load based pricing (that is, where charges reflect the cost drivers of transport, treatment and disposal). Where the costs of measuring contaminant loads do not outweigh the benefits, load based pricing signals to customers the costs of discharging to the sewerage system compared with waste minimisation and on-site treatment (PC 2011).

The PC indicated that load based pricing is likely to be most relevant for large users because the benefits are likely to be the greatest, and the costs of implementation are likely to be low as metering is likely already in place for compliance reasons.

Other jurisdictions

The ESC (2012) established that variable trade waste prices should reflect the LRMC of providing services, including trade waste transfer, treatment and disposal (also ESCOSA 2013a). Ofwat (2012) stated that the marginal costs of treating pollutant loads is to be estimated and the setting of the variable (treatment) charge to be above these marginal costs.

In practice, trade waste charges in various jurisdictions have been established taking account of volumetric charges for treatment and transport costs (mass and contaminant load), with fixed charges to provide sufficient revenues. Fixed charges also cover agreement costs and monitoring costs.

Specifically:

(a) in New South Wales –

 (i) Hunter Water Corporation charges comprise fixed (based on processing trade waste agreements and conducting inspections) and variable (based on transport and treatment) costs. Hunter Water Corporation also accepts and treats trade waste transported to its sites by tanker, with both fixed and variable charges applying.

 (ii) Sydney Water charges three types of trade waste charges, pollutant charges (transport, treatment and disposal, and corrosion costs of high strength wastes), ancillary and quarterly agreement charges (application fees and administration) and Wastesafe charges - covering the cost of electronic monitoring, including a fixed charge per waste trap plus charges for inspections.

(b) in Victoria:

 (i) Melbourne Water charges the three retail water businesses (City West Water, South East Water and Yarra Valley Water) to transport, treat and dispose of trade waste collected. Three charges apply, namely: a fixed annual charge; a variable price relating to mass; and a variable price relating to load.

 (ii) South East Water (2013) charges an application fee, a fixed agreement charge and mass/load charges above specified thresholds - mass over 1000kL per year, BOD>600mg/L and SS>600mg/L.

(iii) City West Water also charges application and agreement fees, and variable charges for mass and load.

(c) In South Australia, SA Water levy both fixed charges (to process applications and conduct regular audits) and variable charges (to transport and treat trade waste)

(d) in Tasmania, TasWater (as bulk, distribution and retail water and wastewater service provider throughout the State) levy -

(i) fixed charges - to process applications, annual management fees and annual fixed usage charges

(ii) variable charges - based on mass (either assumed or metered) and contaminant load of trade waste (either determined by TasWater or assumed based on industry class).

SEQ entities

Planning

The DR Act requires the entities to establish a Water Netserv Plan for management of trade waste entering the sewerage system. This includes requirements for waste prevention, treatment and recycling prior to trade waste being discharged.

All of the regulated entities have in place a Trade Waste Environmental Management Plan (TWEMP) or equivalent (such as a Trade Waste Management Plan) under the *Environmental Protection Policy (Water) 1997.* The Plan sets out objectives, procedures associated with applying to discharge trade waste and fees and charges based on a range of criteria (including the mass and contaminant load of trade waste).

Trade waste tariffs

Charges fall into three broad categories – namely:

(a) charges to recover costs associated with trade waste transport, treatment and disposal

(b) charges to recover costs associated with processing an application to discharge trade waste (including assessment to determine the risk posed to the sewerage system from the proposed discharge)

(c) charges to recover monitoring and measurement activities (such as regular auditing to ensure compliance with permitted trade waste mass and contaminant loads).

An overview of SEQ trade waste charges (and associated tariff structure) is outlined below in Table 8. This table also shows how charges are differentiated by customer type and risk factors.

Should agreement be struck between the entity and the trade waste customer that does not include reference to the charges schedule, then this is a contractual matter between the entity and its customer.

Table 8: Entities' Customer Categories Based on Risk Assessment and Tariff Structure (2013-14)

Entity	*Application Fee*	*Category Based on Risk*	*Mass*		*Contaminant Load*		*Tariff*	
			Metered	*Assumed*	*Measured*	*Assumed*	*Fixed*	*Variable*
QUU	$160.40 one-off fee	Category A - minor trader (<275 kilolitres per annum) with assumed domestic strength.		Yes		Yes	$92.25 per quarter	No variable charges apply
	$160.40 one-off fee	Category B - medium to large trader (>275 kilolitres per annum) with assumed domestic strength. Variable charges based on assumed mass of discharge		Yes		Yes	-	$1.41 per kilolitre (minimum charge of $92.25 per quarter)
	$160.40 one-off fee	Category C - medium to large trader (>275 kilolitres per annum) with assumed half domestic strength. Variable charges based on assumed volume of discharge		Yes		Yes	-	$1.07 per kilolitre (minimum charge of $92.25 per quarter)
	$160.40 one-off fee	Category D - large trader with high volume and/or high strength trade waste with quality routinely sampled (such as a brewery, abattoir or chemical manufacturing facility). Charges apply for routine sampling and analysis. Variable charges based on metered volume and contaminant load of discharge	Yes		Yes		-	$0.91 per kilolitre plus additional variable charges depending on composition of contaminant(s) (minimum charge of $92.25 per quarter)
	$160.40 one-off fee	Category E - medium to large trader (>275 kilolitres per annum) with assumed greater than double domestic strength (such as a restaurant or pub/tavern). Variable charges based on assumed volume of discharge		Yes		Yes	-	$1.41 per kilolitre (minimum charge of $92.25 per quarter)
Unitywater	No application fee applies	Deemed Customer - low risk status where no pre-treatment is required (such as a hairdresser or florist)	-	-	-	-	No additional charges apply	No additional charges apply
	$355.00 one-off fee	Category 1 - medium risk status where some pre-treatment may be required (such as a small manufacturing plant or motor vehicle workshop)	Yes (in some instances)	Yes (in the most instances)		Yes	$103.00 per annum	$2.00 per kilolitre plus $100 per annum if < 50 kilolitres or $300 per annum if > 50 kilolitres

Entity	***Application***	***Category Based on Risk***	***Mass***		***Contaminant Load***		***Tariff***	
	$355.00 one-off fee	Category 2 - high risk status where pre-treatment is required (such as a large volumes and/or where target sewer admission limits are exceeded)	Yes		Yes		$103.00 per annum	$2.00 per kilolitre plus additional charges depending on composition of contaminant(s)
Gold Coast City Council	No application fee applies	Category 1 - low risk, random monitoring of discharge (typically smaller businesses such as a restaurant or laundry)		Yes		Yes	-	$4.33 per kilolitre plus additional charges depending on composition of contaminant(s)
	No application fee applies	Category 2 - moderate risk, random monitoring of discharge (typically larger businesses such as metal finishers or printing facilities)		Yes		Yes	-	$4.33 per kilolitre plus additional charges depending on composition of contaminant(s)
	No application fee applies	Category 3 - place a significant load on wastewater reticulation and treatment systems and, if necessary, are monitored (that is, tested) quarterly (typically commercial laundries, car washes or food processing facilities)		Yes		Yes (but Council could require contaminant load to be measured)	-	$4.33 per kilolitre plus additional charges depending on composition of contaminant(s)
	No application fee applies	Category 4 - significant load on wastewater reticulation and treatment systems and are monitored regularly for the purpose of compliance and billing. These businesses (typically breweries and industrial manufacturing facilities) usually have extensive pre-treatment systems in place	Yes		Yes		-	$4.33 per kilolitre plus additional charges depending on composition of contaminant(s)
Logan City Council	Not applicable – annual base charge levied instead	Category 1 - low strength/low volume trade waste customers		yes		yes	Base charge of $97.85 plus fixed treatment charge of $286.43	
	Not applicable – annual base	Category 2 - medium strength trade waste customers, typically businesses such as small		yes		yes	Base charge of $656.27 per	$1.56 per kilolitre of discharge (contaminant

Entity	***Application***	***Category Based on Risk***	***Mass***		***Contaminant Load***		***Tariff***	
	charge levied instead	restaurants and motor vehicle workshops					year	load assumed)
	Not applicable – annual base charge levied instead	Category 3 - high strength/high strength trade waste customers, typically businesses such as industrial (milk processing and paper processing) facilities	yes		yes		Base charge of $982.61 per year	Variable charges (on a per kL or kg basis) apply depending on volume composition of contaminants
Redland City Council	No application fee applies	Category 1 - low strength/modest volume trade waste discharge (similar to domestic sewage), typically hairdressers, educational facilities and automotive workshops		yes		yes	$384.65 annual fee	$2.13 per kilolitre
	No application fee applies	Category 2(a) - higher strength and volume compared to domestic sewage where there are requirements for sampling and analysis (usually quarterly). Typically restaurants.		yes		yes	$384.65 annual fee	$2.13 per kilolitre plus additional charges depending on composition of contaminant(s)
	No application fee applies	Category 2(b) - higher strength and volume compared to domestic sewage where there are requirements for sampling and analysis (usually quarterly). Typically food processing facilities.	yes		yes		$384.65 annual fee	$2.13 per kilolitre plus additional charges depending on composition of contaminant(s)

Trade waste charges typically take account of treatment associated with biochemical (or chemical) oxygen demand (BOD or COD) and suspended solids (SS), total kjeldahl nitrogen (TKN), total phosphorus (TP), total dissolved solids (TDS) and inorganic total dissolved solids (ITDS).

The SEQ entities publish schedules of general acceptance (or admission) limits regarding a range of contaminant parameters. For the purpose of a comparing the different approaches of the entities, extracts from these schedules are included below in Table 9.

Table 9: Typical Acceptance/Admission Limits

Contaminant Parameter	***Entity***	***Maximum Limit***
BOD_5 or COD	QUU	BOD_5 2000 mg/l for Brisbane (300 mg/l for Ipswich)
	Unitywater	BOD_5 300 mg/l
	Gold Coast City Council	COD 1000 mg/l
	Logan City Council	BOD_5 600 mg/l
	Redland City Council	BOD_5 600 mg/l (COD 1500 mg/l)
TDS	QUU	10,000 mg/l for Brisbane (4000 mg/l for Ipswich)
	Unitywater, GCCC	na
	LCC, RCC	10,000 mg/l
Grease and Oil	QUU, GCCC, LCC, RCC	200 mg/l
	Unitywater	100 mg/l
Lead	QUU, Unitywater, LCC, RCC	10 mg/l
	Gold Coast City Council	1 mg/l
Mercury	QUU, Unitywater, RCC	0.05 mg/l
	Gold Coast City Council	0.01 mg/l
	Logan City Council	0.005 mg/l
Temperature	QUU, Unitywater, GCCC, RCC	38^{o} Celsius
	Logan City Council	40^{o} Celsius

QCA analysis

For trade waste, the volumetric charge should reflect at least those costs which vary with usage (variable costs), encouraging trade waste customers to seek least cost solutions whether at the source (through investing in pre-treatment technologies) or at downstream WWTPs.

The volumetric charges may be defined as:

(a) volume and load-based - based on the direct measurement of the volume of discharge and an assessment of contaminant load. Given the sewerage service provider incurs costs associated with treating volume and contaminant load, charges levied directly recover these costs. Load-based pricing typically applies to higher risk customers and requires trade waste discharge to be metered and contaminant load determined and routinely sampled and analysed to ensure consistency with agreed levels. In SEQ, load-based pricing is typical of arrangements between the regulated entities and larger trade waste customers.

(b) assumed or indirect measures - in contrast to load-based pricing for higher-risk trade waste customers, lower risk customers' contaminant loads and volumes tend to be assumed (or indirectly measured). In these instances, contaminant load is assigned (based on a category such as industry type) while volume is indirectly measured through applying a *trade waste fraction* to the volume of potable water consumed, measured typically at the primary water meter. *Trade waste fractions* are based on industry type and historic water consumption and trade waste flow.

The majority of trade waste customers discharge modest amounts of pre-treated trade waste with low contaminant loads. As a result, it is impractical to subject these customers to load-based pricing as the costs would outweigh the benefits.

Fixed charges are required to ensure sufficient revenue to cover fixed costs, as well as specific one-off costs such as application costs. Most entities (with the exception of GCCC) apply a quarterly fixed charge resulting in a two-part tariff.

Discretion is exercised by the entities associated with ancillary trade waste charges. As an example, as outlined in Table 8 and Table 9:

(a) QUU and Unitywater levy one-off application fees

(b) Gold Coast City Council is the only entity not to levy an annual fixed charge and application fee

(c) the entities tend to have different limits for the same contaminant parameter.

The differences in charges reflect the different cost drivers that apply to the regulated entities. Each entity has knowledge as to the capacity of its WWTPs and to the level of maintenance required due to the types of trade waste that are typically discharged.

Tariff structures adopted by the regulated entities are consistent with the principles of LRMC pricing. This approach:

(a) ensures economic efficiency objectives are met through marginal cost pricing based on the LRMC of service provision

(b) achieves revenue adequacy for the regulated entity as charges are directly cost-related. Where assumed volumes are used, the entity is reliant on the integrity of the *trade waste fraction* to estimate the amount of trade waste discharged into the sewerage system and therefore faces greater risks

(c) is equitable in that the impactors pay for their share of costs

(d) although necessarily complex to administer and apply, trade waste charges are transparent (that is, the methodology is easily understood).

The QCA recommends that the regulated entities have the discretion, within the general principle of LRMC pricing, to apply additional inspection and monitoring charges on a cost-reflective basis.

Draft Recommendation

4.4 Charges be based on the LRMC of transport, treatment and disposal of trade waste, with variable charges based on volume and contaminant load.

4.5 Specific charges for the management of trade waste services (inspection and monitoring) be applied on a cost reflective basis.

Price differentiation

Trade waste charges may be further differentiated on the basis of cost differentials according to customer types, related to size or risk. Customers are typically categorised according to volume/impact and/or risk.

Other jurisdictions

IPART's (2013) principles for trade waste charges are that they should vary to reflect differences in the cost of treating waste to the required standard at particular locations. Sydney Water has charges differentiated by 11 customer types (e.g. automotive, laundry, equipment hire, shopping centres, etc). Sydney Water has ceased price differentiation by level of treatment plant (primary, secondary, tertiary).

In Tasmania, trade waste customers are categorised as low volume/low impact customers under a standard contract and high volume/high impact customers on a negotiated contract (OTTER 2013).

Yarra Valley Water (YVW) has 3 customer categories - large customers discharge exceeding 1000kL per year such as industrial factories and large shopping centres; medium customers less than 1000kL per year such as restaurants and car washes, and minor customers such as small shops.

For large customers, YVW has moved from volume based trade waste fees to risk-ranked fees to cover operational costs in regulation, maintenance and consultation - under this structure, higher-risk customers are monitored more often and this cost is passed on to the customers. YVW has 5 risk-rank categories for the fixed annual charge as well as the one-off application charge. City West Water and South East Water have also adopted this approach. Sydney Water has 7 risk index levels.

Trade waste charges for large dischargers also typically include a variable quality based discharge fee in addition to a volume charge, for example for chemical content (of BOD, SS, TKN, ITDS, grease, phosphorus).

Western Water has three categories - Category A customers who pay a minimum management charge and no volume charge, category B customers discharging between 1000 to 10,000 litres per day with less than 400mg of organic content who pay a management charge and volumetric charge, and Category C customers who pay a management charge, volumetric charge and a quality charge. Volumetric charges for Category B and C are based on a 0.6 discharge factor for potable water.

South East Water has 5 categories, based on trade waste volume and quality, history and proximity to a sewage treatment plant. These are reflected in the fixed agreement charges. City West Water (2013) uses a complex points system to determine risk rank, with parameters including location, average daily volume, compliance history, activities, substances, and class of manufacturing. The risk rank determines inspection and sampling frequency, agreement terms and conditions.

Hunter Water has 4 risk-assessed categories, referred to as (in decreasing order), major, moderate, minor and deemed agreement, with no fixed charges applying to the latter.

Hunter Water applies location-based (by catchment) charges for BOD/NFR. It also has differentiated charges for heavy metal loads.

SEQ entities

All five of the entities apply risk assessments in identifying the level of risk posed by the trade waste customer to the service providers' sewage system.

As an example, QUU (2011) administers a risk classification system that considers the following elements of a customer's trade waste discharge:

(a) discharge volume

(b) capacity of the receiving water reclamation plant

(c) industry type

(d) record of compliance with acceptance standards.

Applying a risk based approach, the structure of trade waste charges tend to vary according to customer type. QUU has 5 categories, GCCC has 4, and the remaining entities have 3 categories (Table 8).

Given the uneconomic costs associated with metering all trade waste discharge and undertaking regular analysis to confirm contaminant load is consistent with agreed levels, alternative arrangements for certain trade waste customers are in place.

Specifically, for smaller trade waste customers, quantities are typically indirectly estimated (or assumed) through a two-stage process comprising:

(a) estimating the volume of sewage discharged (achieved through applying a discharge factor to, or subtracting a pedestal allowance from, metered potable water consumption)

(b) applying a *trade waste fraction* to the estimated sewerage discharged. The *trade waste fraction* is a number between 0.01 and 1.00 where 1.00 indicates that all water used at a premises (minus water assumed to be discharged as sewage) is discharged as trade waste. *Trade waste fractions* are typically based on industry type and historic water consumption and trade waste flow.

For smaller trade waste customers, contaminant load is also assumed based on industry type. Pre-treatment devices (such as a grease or oil/silt interceptor trap) are typically required to be installed.

QCA analysis

It is in most cases uneconomic to meter trade waste discharge, and/or to regularly sample discharge to ensure compliance within appropriate limits.

Customers may be differentiated on the basis of the level of impact, and associated risks. As noted above, low impact customers may be charged on the basis of assigned volumes/loads rather than directly measured ones. Customers and groups of customers may be assessed according to the risks they impose on the system - and these may vary according to volume/size, distance or location, customer type.

The QCA recommends, therefore, that:

(a) the entities have the discretion to levy fixed and variable charges subject to the nature of costs the individual entity incurs and the risks imposed by different customers

(b) the costs incurred reflected those costs determined to be prudent and efficient as part of the regulatory price monitoring process.

While location based pricing can provide greater cost reflectivity, the entities have adopted postage stamp pricing of trade waste. It is noted that in many jurisdictions, (for example, Victorian entities) the proximity of the customer to the sewerage treatment plant is taken into account in the risk assessment. While not a specific location-based charge, this approach recognises that location/distance are relevant for risk-related costs.

Such an approach may also be relevant for SEQ entities, subject to the additional complexity and administration and information costs being justified. Postage stamp pricing is consistent with equity objectives and reduces revenue risk to the entity.

Draft Recommendation

4.6 Charges be differentiated according to customer type and risk factors, and by location (as part of risk assessments) if considered cost effective.

4.4 Compliance

Penalty arrangements may be required to provide incentives for customers to manage their contaminant loads so as not to breach agreed limits. Charges may apply for corrective action by the entity to address, inspect and monitor breaches.

Other jurisdictions

Other jurisdictions have arrangements in place where additional charges are levied in instances where customers do not comply with agreed trade waste contaminant loads and/or volumes. Specifically:

(a) in New South Wales –

(i) Hunter Water Corporation has an incentive charge which is set at three times the base charge and only applies to the proportion of the load that exceeds the agreed limit. In this instance, the additional charges largely reflect the extra costs incurred by Hunter Water Corporation (IPART 2013)

(ii) where an industrial customer exceeds the predetermined contaminant load prescribed by Sydney Water Corporation, charges specific to the treatment of that contaminant are to double and be applied to the entire mass of the pollutant that is discharged in excess of the domestic equivalent for that pollutant (rather than only to the amount in excess of the acceptance standard)

(b) in Victoria, the *Water Act 1989* prescribes penalties that apply to those who discharge anything into the sewerage system other than sewerage or trade waste discharged in accordance with a trade waste agreement (Victorian Government 1989)

(c) in South Australia, SA Water may require customers who are in breach of a trade waste agreement to perform remedial actions within prescribed timeframes (SA Water 2013). Provisions of the Water Industry Act 2012 provide SA Water the ability to levy penalties on those who discharge into sewerage infrastructure without proper authority (SA Government 2012).

(d) in Tasmania, the state based water and sewerage service provider, TasWater, levies charges on customers who are in breach of their trade waste agreement in accordance with the provisions of the contract they have with TasWater (OTTER 2012).

SEQ entities

All SEQ entities have a process for managing breaches of approvals to discharge trade waste (or trade waste agreements).

The entities levy additional charges in the event a customer does not comply with their trade waste agreement. A customer may be in breach where the customer exceeds agreed limits regarding volume of trade waste discharge and/or contaminant load.

As an example:

(a) QUU relies on a combination of penalty units outlined in the *Water Supply (Safety and Reliability) Act 2008* and (if necessary) the courts to recover reasonable costs associated with damage to infrastructure caused by breaches of trade waste agreements

(b) Unitywater relies exclusively on applying the penalty units outlined in the *Water Supply (Safety and Reliability) Act 2008.*

Relying on the courts to pursue any party for compensation associated with damage to sewerage infrastructure through unlawful discharge (including from those not in a trade waste agreement with the entity), is available to all entities.

Additional charges that are applied by the entities reflect the penalty units as outlined in the provisions of the *Water Supply (Safety and Reliability) Act 2008.*

QCA analysis

The QCA considers that the arrangements (that is, the provisions of the *Water Supply (Safety and Reliability) Act 2008* and the courts) provide adequate mechanisms for the entities to recover costs associated with breaches of trade waste agreements and/or the unlawful discharge of trade waste.

SEQ entities should be able to pass through remedial costs, inspection and monitoring costs related to breaches.

Draft Recommendation

4.7 Consistent with regulations, entities apply penalty charges for non-compliance and recover the efficient costs associated with breaches.

5 RECYCLED WATER

5.1 Introduction

Under the Ministerial Direction, the QCA is to set out pricing principles to apply to the water industry including recycled water services.

Background

Recycling of water refers to the multiple use of water from wastewater or a stormwater system that has been treated to an appropriate quality standard for a further intended beneficial use (NWC, 2007).

Recycled water may be treated to different levels depending on end use. The typical recycled water classes involve (CIE 2007, 2010):

(a) primary treatment with neutralisation, filtration and sedimentation of wastewater

(b) secondary treatment which removes specific contaminants by separation into sludge or by degradation through biological activity

(c) tertiary treatment involving coagulation, flocculation, clarification, sand filtration and disinfection to remove more nutrient dissolved solids, heavy metals and pathogens. This water can be used for irrigation of human food crops

(d) advanced treatment using granular carbon absorption, ozonation and hydrogen peroxide filtration to remove organics, salts, micro-organisms and viruses. This water is to drinking water (that is, potable) standard.

Depending on the level of treatment, recycled water can be used for:

(a) agricultural and landscape irrigation, ranging from commercial crop irrigation to municipal purposes such as golf courses and green belts

(b) industrial (cooling, processing and heavy construction)

(c) environmental uses, such as streamflow augmentation, wetlands, groundwater replenishment or saltwater intrusion control and recreational water ponding

(d) non-potable urban or recreational uses, such as toilet flushing, fire fighting and other municipal applications

(e) in some circumstances it is also used for human consumption.

The reuse of wastewater for purposes such as landscape and food crop irrigation, groundwater recharge, and recreational impoundment often requires tertiary treatment.

Although quality requirements for industrial-process water are less than for potable water, but may need secondary treatment, disinfection and some quality upgrading.

Water recycling schemes can vary in scale and form, including:

(a) individual systems for households or apartment complexes which treat and reuse wastewater on-site. Such schemes include greywater reuse practices

(b) small-area systems which source wastewater from several buildings and which is then reused in that area

(c) large-area systems, typically from centralised treatment plants for residential or agricultural use

(d) industrial systems, which may reuse industrial effluent internally, or use treated wastewater from a centralised treatment plant

(e) large indirect potable schemes which process wastewater to potable standard and then introduce this directly or indirectly to the water supply system.

In some cases, urban recycling involves separate reticulated pipe infrastructure providing treated water for certain home uses such as toilet flushing or garden use. These 'third-pipe' schemes, such as the Pimpama Coomera Waterfutures scheme in Queensland, the Rouse Hill scheme in NSW, the town-wide water recycling system in the Shire of Augusta-Margaret River in WA and the Aurora residential project in Victoria, tend to be costly and have risks in ensuring that potable and non-potable supplies are kept separate.

Recycling schemes may be further differentiated as those that are mandated by government and those that are voluntary. IPART (2006) cites the Rouse Hill scheme as a mandatory project where the provider may be able to exercise market power in regard to price. In contrast, in voluntary schemes where the customer is not bound to take recycled water (primarily those associated with industrial and agricultural purposes), the provider's ability to exercise market power is comparatively less.

Sewer mining is a process of extracting sewage from sewerage systems, typically before delivery to a wastewater treatment plant. The Sydney Olympic Park recycling scheme is a sewer mining project processing sewage for irrigation and residential non-potable use.

5.2 Key issues for pricing recycled water

Benefits of recycling

The benefits of recycled schemes may be specific and relevant to pricing, including:

(a) substituting for potable water use to defer the need for surface water or groundwater resource development and augmentation

(b) increasing long term supplies of drinking water to meet population growth in urban and regional centres, and industrial and agricultural needs

(c) decreasing risk impact of reduced water yields from water catchments due to climate change and prolonged drought

(d) improving environmental outcomes, including less diversion of water from sensitive ecosystems, lower wastewater discharges and associated pollution, and reduced impacts of effluent discharged to the ocean

(e) in those instances of lower levels of treatment (such as Class 3 treated sewage), capital costs associated with maintaining a sewerage treatment plant to a higher standard could be reduced.

Although recycled water may not be economic in financial terms, it may provide public benefits in improved environmental outcomes. In such cases, the government may mandate that the scheme proceed and costs be met as part of an integrated supply system.

Cost drivers

Direct costs will vary by project, but are likely to include project planning and regulatory approvals, marketing, community consultation and information campaigns, capital, operating and maintenance costs.

Key cost drivers include:

(a) location of users, affecting the capital and operating costs of piping and pumping

(b) timing of users needs, storage capacity may be needed to match seasonal variations in demand, for example, for irrigation

(c) users' service quality requirements including supply reliability and water pressure

(d) input quality. The quantity, availability and quality of wastewater input, particularly its salinity, may be a key cost influence

(e) nature and scale of the scheme. Large scale recycling projects can achieve lower unit costs. However, scale can be scheme-specific.

(f) operating costs. These could include any costs for acquiring wastewater input

(g) extent of any on-site costs incurred by users to make use of recycled water, such as plumbing, storage or additional treatment

(h) risk management. These include the costs of managing actual and perceived human and environmental health risks, including the costs of managing by-product of recycling and any additional treatment of water discharged, marketing, public education and consultation campaigns. The risk of contaminating a broader water supply may also be relevant.

Pricing recycled water relative to potable water

Where recycled water is treated to potable standard, the efficient costs of recycled water can be simply incorporated within the costs of the overall water system. All water users pay for the efficient overall costs of water provision (which include water recycling) in their water charges.

More complex pricing issues may arise where recycled water is sold as a separate product, where:

(a) recycled water is a different quality to potable water. Although a different quality, it can substitute for certain uses of drinking water. The price of recycled water must, therefore, take into account the price of substitutes. Substitutability will depend on switching costs, relative quality, value, pricing and risks

(b) if only some users are supplied with recycled water, separate infrastructure that is dedicated to specific water users is required

(c) recycled water relies on the water and wastewater system for input and may share common infrastructure with drinking water and wastewater systems. Technically, it is a joint product with common costs. Allocating these common costs and identifying and avoiding cross-subsidies can raise challenges

(d) the production and use of recycled water may have significant external effects on parties other than service providers and users. Recycled water may benefit users of drinking water if costly augmentation of the drinking water system is deferred. The production and use of recycled water may benefit the wider community by reducing environmentally damaging wastewater runoff.

Pricing should ensure returns are comparable with competitive benchmarks while retaining the incentive to invest, and ensuring efficient pricing. As noted above in the QCA's general pricing principles, efficient (subsidy-free) prices fall in a band between incremental or avoidable cost and stand-alone cost, or by-pass price.

For recycled water, where supply costs are typically higher than for normal reticulated supply, the price that customers are willing to pay would normally be below stand-alone price.

5.3 National commitments and positions

The NWI (NWC 2004) requires States to develop pricing policies for recycled water and stormwater that are congruent with pricing policies for potable water, and stimulate efficient water use no matter what the source.

The NWI (NWC 2010) developed principles that are intended to assist States and Territories in meeting their commitments to the above. It is not expected that these principles should be applied to prices retrospectively. It is also not expected that these principles should take precedent over any principles jurisdictions may have developed for recycled water and stormwater reuse.

Principle 1: Flexible regulation

Light handed and flexible regulation (including use of pricing principles) is preferable, as it is generally more cost-efficient than formal regulation. However, formal regulation (for example, establishing maximum prices and revenue caps to address problems arising from market power) should be employed where it will improve economic efficiency.

Principle 2: Cost allocation

When allocating costs, a beneficiary pays approach — typically including direct user pay contributions — should be the starting point, with specific cost share across beneficiaries based on the scheme's drivers (and other characteristics of the recycled water/stormwater reuse scheme).

Principle 3: Water usage charge

Prices are to contain a water usage (that is, volumetric) charge.

Principle 4: Substitutes

Regard to the price of substitutes (potable water and raw water) may be necessary when setting the upper bound of a price band.

Principle 5: Differential pricing

Pricing structures should be able to reflect differentiation in the quality or reliability of water supply.

Principle 6: Integrated water resource planning

Where appropriate, pricing should reflect the role of recycled water as part of an integrated water resource planning (IWRP) system.

Principle 7: Cost recovery

Prices should recover efficient, full direct costs — with system-wide incremental costs (adjusted for avoided costs and externalities) as the lower limit, and the lesser of standalone costs and willingness to pay (WTP) as the upper limit. Any full cost recovery gap should be recovered with reference to all beneficiaries of the avoided costs and externalities. Subsidies and Community

Service Obligation (CSO) payments should be reviewed periodically and, where appropriate, reduced over time.

Direct costs include any joint/common costs that a scheme imposes, as well as separable capital, operating and administrative costs. This definition of direct costs does not include externalities and avoided costs.

Principle 8: Transparency

Prices should be transparent, understandable to users and published to assist efficient choices.

Principle 9: Gradual approach

Prices should be appropriate for adopting a strategy of 'gradualism' to allow consumer education and time for the community to adapt.

Water Services Association of Australia

The Water Services Association of Australia (WSAA) (2005) released pricing principles (compiled by consultants ACIL Tasman) as follows:

(a) prices for recycled water should be set within a price band, with the (whole of system) incremental cost as the floor, and willingness to pay (as defined by the lesser of stand-alone cost or by-pass price of the alternative) as the ceiling

(b) commercial judgments should determine whether prices are set at the lower end of the efficient price band (that is, just covering system incremental costs) or towards the higher end (where recycled water users make an increasing contribution to joint/common costs)

(c) prices for recycled water should be set in a way that broadly tracks the prices of substitutes, but does not lock-in artificially low prices for an unnecessarily long time

(d) prices for recycled water should be set as part of a longer term pricing reform strategy that encompasses the suite of products provided by the water industry (rather than a short-term position based on charges for potable water and other services)

(e) where there are mandated targets for recycled water usage, any subsidies provided to recycled water projects at the expense of the broader (water) customer base should be fully and transparently costed. Preferably, these subsidies should be paid for from general revenue since they constitute a community service obligation (CSO)

(f) if uneconomic recycled water projects are implemented to meet mandated targets (without CSO funding), it would be appropriate for regulators to accept the costs of mandatory schemes (provided the projects undertaken are the most efficient way of meeting the targets) as a cost recoverable from the broad customer base.

WSAA also supported light-handed regulation to provide appropriate flexibility, particularly where users have alternative sources of supply or considerable countervailing power as a buyer. In some cases, efficient pricing may require different prices for different users, reflecting factors such as the different qualities of recycled water and associated costs of supply (which may vary by user and/or location) and willingness to pay.

5.4 Other jurisdictions

Proposed approaches to regulating and setting prices for recycled water in other jurisdictions involve defining broad principles rather than a specific methodology.

IPART - New South Wales

IPART (2006) established that recycled water prices should recover the full direct cost of implementing the recycled water scheme concerned unless:

(a) the scheme gives rise to avoided costs that benefit the water agencies and users other than the direct users of the recycled water and/or

(b) the scheme gives rise to broader external benefits for which external funding is received and/or

(c) the Government formally directs IPART to allow a portion of recycled water costs to be passed on to a water agency's broader customer base.

IPART also considered that the structure of prices should ensure that appropriate signals are sent to recycled water users and should entail appropriate allocation of risk. IPART noted that the LRMC of recycled water will be higher than the LRMC used to set drinking water usage prices.

IPART considered that the total costs that can be recovered from direct users of recycled water is the sum of the capital costs, operating costs and joint costs of the scheme, minus the 'cost offset' amount that can be recovered from other beneficiaries (the broad water and sewerage customer base) or parties (including the Government and developers). The 'cost offset' amount will include direct Government funding to help pay for the scheme, the value of developer-funded recycled water assets, funding from other parties, and the value of avoided or deferred costs in water and sewerage systems due to the recycled water scheme.

For mandated recycled water schemes, IPART (2006) set decision rules for the recycled water price. If demand for recycled water exceeds supply by 10-15%, the price would be 80% of the potable price. Where demand exceeds supply by 15-20%, the recycled price would be 90% of the potable price. Where demand exceeds supply by greater than 20%, the recycled price would equal the potable price.

IPART (2006) applied this methodology to the Rouse Hill development area, a third-pipe scheme supplying recycled water to 17,000 customers. In the 2006 decision, it applied a price path to increase the usage charge from 24% of the potable water charge in 2005-06 to 80% by 2008-09, and reduced the fixed charge.

IPART (2012b) retained the price at 80% of the potable water charge and removed the fixed charge, noting that this pricing arrangement covers operating costs and achieves a balance between supply and demand. IPART also allowed $20 million in avoided costs (for pollutant load) in the RAB for the expansion of the Rouse Hill recycled water scheme. IPART considered that its 2012 decision was the last time it would set prices for Rouse Hill or any mandated recycled water scheme as it moves to light-handed regulation.

ESC - Victoria

The ESC's principles (2008) for recycled water pricing are that:

(a) revenue should be maximised with reference to the price of substitutes and customers' willingness to pay

(b) prices should cover the full cost of providing the service unless there are identified public benefits or the service is required to meet government targets

(c) prices must include a variable component to provide appropriate signals for resource management.

Where costs associated with providing recycled water are not fully recovered, the ESC's decision requires that water businesses demonstrate that:

(a) they have assessed the costs and benefits of the recycled water project

(b) they have identified how any revenue shortfall will be recovered

(c) if the revenue shortfall is to be recovered from customers, the project is required by 'specified obligations' or there has been consultation about willingness to pay for the benefits of increased recycling.

ESC (2008) also set out principles relating to the allocation of recycled water costs among wastewater dischargers and recycled water customers which required:

(a) where water is recycled as a least cost alternative to treating and disposing of effluent or complying with discharge licence standards, the treatment costs should be recovered on a 'polluter pays' basis through sewerage and trade waste charges, with any revenue derived from the beneficial reuse of treated effluent used to offset sewerage and trade waste fixed charges

(b) revenue shortfalls from recycled water initiatives undertaken to meet specified obligations, including Government recycling obligations or supply and demand balancing, may be recovered from the general customer base through variable water charges where such recycling confers benefits on all water customers (through improved availability or security of potable water supplies)

(c) the costs of discretionary projects undertaken for environmental, social or other reasons, not directly related to specified government targets, should generally be recovered from recycled water users. However, to the extent that the broader customer base benefits, there may be a case for spreading an appropriate share of treatment costs across the broader customer base.

Water businesses in Victoria subsequently maintained a two-part tariff for third-pipe recycled water services with the volumetric charge pegged to the first tier price of potable water, with these charges reduced should restrictions be eased (ESC 2009a).

In the 2013 reviews (ESC 2013a, 2013b), South East Water and Yarra Valley Water set the recycled water volumetric charge to 85% of the first tier charge. City West Water and Western Water set the volumetric recycled charge equal to the first tier potable charge. In regional recycling schemes:

(a) Barwon Water set an 80% volumetric charge and no fixed charge for third-pipe estates

(b) Coliban Water set a fixed charge at 50% of the potable price, and the volumetric charge at 75% for third-pipe and Class A recycled water

(c) Westernport Water set the fixed and variable charges at 56% of the potable price for third-pipe and 40% of potable for Class A recycled water customers.

These arrangements were considered consistent with ESC's principles.

ERA - Western Australia

The ERA (2009) considered that recycled water from large plants such as the Kwinana Water Reclamation Plant to industrial customers is a commercial matter with no need for economic regulation. ERA considered the KWRP has little market power and generates positive externalities.

The ERA (2009, 2013) proposed that recycled water prices should comprise three components:

(a) Direct Costs. A charge associated with the costs of delivering the wastewater to the customer, including any incremental costs that might be incurred in treating the wastewater to be fit for purpose

(b) (Minus) Avoidable Costs. A negative adjustment in price to take into account any avoidable costs as a result of selling the wastewater resource. For example, the operating costs of discharging the wastewater to the environment would be part of the avoidable costs. The price of the wastewater resource should be non-negative. Thus, if avoidable costs are greater than direct costs, the price of the wastewater should be zero.

(c) (Plus) Scarcity Premium. Additionally, if the amount of wastewater available to be recycled is less than the demand for the wastewater, then an additional premium would be added to the price to reflect its relative scarcity. The premium should be determined by a neutral tendering process.

ERA did not provide specific recommendations for recycled water prices in its most recent review.

ESCOSA - South Australia

ESCOSA (2013b) aligned its pricing principles for recycled water with those of the NWI.

However, ESCOSA did not prescribe the manner in which retailers are to apply the NWI principles. ESCOSA indicated that where a recycled water scheme is the least cost solution for sewerage effluent disposal, sewerage customers are the beneficiaries and charges should be recovered through sewerage tariffs. The recycled water users would have zero incremental costs.

Where recycled water is not the least cost disposal solution for sewerage effluent disposal, the incremental recycled water scheme costs should be recovered through recycled water charges and the remainder through sewerage tariffs.

ESCOSA proposed that where customers are not willing to pay full incremental costs of a recycled water scheme, the shortfall should be recovered through a CSO payment.

5.5 QCA analysis

Application of specific principles

The pricing of recycled water should be considered in the context of the nature of recycled water schemes in Queensland. Schemes may be categorised as:

(a) Customer specific industrial and/or agricultural water supply schemes (potable substitute). An example is the Luggage Point industrial recycling scheme which provides 3.6GL/year of high quality recycled water for processing purposes to the BP Bulwer Island Refinery under commercial agreement with QUU

(b) Third-pipe recycled water schemes into residential estates. The Pimpama Coomera Waterfutures Master Plan uses Water Sensitive Urban Design (WSUD) principles which includes a third pipe recycling system to provide water to houses for garden watering and toilet flushing. This scheme, commenced in 2003, now supplies 7500 homes and businesses and is being expanded to other estates in the Jacobs Well and Coomera areas. It provides Class A recycled water for gardening, toilet flushing and industrial uses

(c) Large scale recycled water schemes to supplement potable water supplies such as the Western Corridor Recycled Water (WCRW) scheme (indirect potable). The WCRW scheme uses a system of 200km of pipelines to take treated water from 6 sewerage treatment plants to three Advanced Water Treatment Plants for higher quality treatment. Treated water is supplied to power stations, and can be used to supplement surface storages once levels fall below 40%. Large scale schemes are likely not relevant to the water retail entities.

In some cases of potable substitute and third pipe schemes, it may be possible that a recycled scheme can operate viably, with the cost reflective price being able to be set at a level which equates supply and demand for recycled water, even though the recycled water is a differentiated lesser quality product.

This may occur where the avoided costs are particularly high, LRMC based potable water charges are already high, or where the level of treatment required is to a lower degree and can be achieved at low cost. In some agricultural applications, any remaining nutrient content in recycled water may be perceived as a benefit and valued accordingly.

In these likely rare cases, specific pricing principles for recycled water are not required.

Large scale indirect potable schemes such as the WCRW scheme produce a single potable water product that is not differentiated from potable water supply. Such schemes are effectively similar to any other augmentation option, and would be taken into account in LRMC-based prices. The costs are incorporated into the SEQ bulk water charge. The price for power station customers is set under a commercial agreement.

In this case, separate pricing principles are also not required.

Specific pricing principles are required, however, for recycled water schemes where recycling is assessed as cost-effective and efficient, but cost reflective prices are higher than the levels customers are willing to pay. The cost reflective prices may in fact be higher than for potable water - customers may not be willing to pay a higher price for perceived lower quality water.

The willingness of users to pay for recycled water is affected by:

(a) the price, quality and reliability of recycled water, and the sensitivity of demand to changes in price

(b) the price, quality and reliability of drinking water or other alternatives (and their cross-price elasticities)

(c) the real and perceived risks of using recycled water. These may include health, environmental and business risks

(d) general attitudes and perceptions of users. These attitudes may reflect available information and may change over time as knowledge increases and reflects experience

(e) the need for additional on-site infrastructure and other switching costs

(f) general factors affecting demand, including underlying demographic change, incomes and commercial and industrial growth patterns.

Although cost reflective prices are not commercially feasible, the scheme can still be cost effective due to avoided costs which benefit the wider community. These may be in the form of unpriced positive externalities.

Willingness to pay therefore sets an upper bound on the price that can be charged for recycled water. More flexible pricing and funding approaches are therefore required in such circumstances.

Efficient pricing of recycled water

The broadly accepted pricing principle for recycled water (as indeed for any price) is that the price should lie between the incremental cost and an upper bound set as stand-alone cost or a by-pass ceiling (WSAA 2005, NWC 2010).

Incremental cost could be based on marginal costs (SRMC or LRMC) or reflect system-wide incremental costs. The latter is determined by estimating the difference between total costs of supply with and without the recycled water scheme, taking into account the impact of the scheme on other services, such as sewerage. WSAA (2005) noted that system-wide incremental cost can be adjusted for avoided costs (such as potable water supply upgrades, sewerage plant upgrades, or wastewater discharge compliance costs) and externalities can be valued and offset against total costs. Incremental costs may also incorporate a share of joint/common costs and should also take into account revenues from developer charges. The system-wide incremental cost approach is preferred by the NWI.

In terms of the upper bound, the NWI proposes the lesser of stand-alone cost or willingness to pay. The stand-alone cost is the cost of supplying recycled water customers only, and would include common/joint costs of water and wastewater services to them (WSAA 2005). This cost is likely to be unrealistic as a pricing guide, as it will likely exceed willingness to pay and very little of the recycled water will be used. Willingness to pay will therefore most likely provide the upper bound in practice.

Prices based on willingness-to-pay reflect what the market will bear and will typically be determined on an iterative basis to equate supply and demand. This could change over time as recycled water becomes increasingly accepted as an option.

IPART (2012b) has used this approach for Rouse Hill recycled water pricing, with gradual changes to fixed and variable charges to clear the market.

In SEQ, the 2013-14 volumetric charge for Class A recycled water for both residential and non-residential use associated with the Pimpama Coomera Waterfutures Master Plan, is around half of the charge for potable water (distribution/retail plus bulk). There is no fixed charge (GCCC, 2013).

In practice, therefore, the price that customers are willing to pay will fall below the system wide incremental costs of providing recycled water (and will also be lower than the prevailing price for potable water). This means that unrecovered costs of recycled water must be recouped from other sources.

The allocation of unrecovered costs should have regard to the endpoint objectives of the recycled water scheme (CIE 2010). At the least, avoided costs, such as deferred potable augmentations, can be allocated to the wider customer base, on a beneficiary pays basis. This approach provides incentives for efficient investment in recycled water schemes.

CIE (2010) noted that willingness to pay is likely to shift over time, and that pricing of recycled water needs to be flexible enough to reflect these changes.

This approach may still mean that revenues from the customer base fall short of the target. This may be due to some avoided costs being unpriced externalities for the benefit of the broader community which could be recovered through Government contributions or from other parties using specific levies. These reflect legitimate cost allocations to other parties and are not, in effect, cross subsidies.

If such costs cannot be fully allocated on a beneficiary pays basis, service providers and Governments face limited options and the scheme will require a subsidy (CIE 2010). In general, subsidies are justified where they rectify market failures and meet public interest concerns. Otherwise, subsidies distort market signals and are inefficient.

Transparent Government CSO funding is an option if it can be demonstrated in the public interest and potable and sewerage prices are already at efficient levels. These may include the unpriced environmental benefit of a decrease in the diversion of water from sensitive ecosystems, reduced pollution and the creation or enhancement of wetlands and riparian habitats.

If a service provider is mandated to provide the scheme and is required to fund the gap through an additional charge on potable and sewerage system users, this cross-subsidy should be transparently identified in customer bills. The additional revenue should be recovered through fixed charges so as not to distort usage charges (CIE 2010).

CSOs or cross-subsidies may be required in the early stages of a recycled water scheme to facilitate acceptance. The NWI pricing principles refer to a strategy of 'gradualism' to allow time for communities to adapt to the concept of recycled water.

The QCA's preferred approach is broadly consistent with the NWC and other jurisdictions, with the key principles being:

(a) the system-wide incremental cost should be estimated to establish a revenue requirement for recycled water. This takes into account the direct costs of recycled water, including a share of joint costs, less avoided costs for wastewater treatment and alternative water supply

(b) direct costs, less avoided costs should be allocated on a beneficiary pays basis between potable water users, sewerage system users, recycled water users and the general community. That is -

  (i) Where recycled water customers are not willing to pay their share of direct costs less avoided costs, the gap should be allocated to other parties on a beneficiary pays basis, for example, to the wider customer base or to the general community. Any Government subsidy should be transparent

  (ii) Charges (and any subsidies) should be adjusted over time to reflect changes in willingness to pay of recycled water customers and beneficiaries.

In relation to setting recycled water tariffs, the approach should be to:

(a) establish the volumetric charge, using marginal cost concepts as an initial step. This should reflect the LRMC for the recycled water scheme as established. LRMC should include marginal direct operating costs less marginal avoided costs. This should then be evaluated according to the above principles. Specifically:

  (i) if too high, or higher than the potable price, there will be limited take-up of recycled water

  (ii) if too low, demand and usage of recycled water may exceed supply. Customers may also be enticed to over-substitute for potable water leading to health risks.

(b) adjust the LRMC based volumetric charge if necessary to reflect willingness to pay for recycled water and relative demand sensitivities between recycled and potable water. This will take account of elasticity of demand and the characteristics of the recycled water scheme - quality, reliability, risks, and customer attitudes. The volumetric charge should be set to clear the available supply of recycled water and will generally be lower than the potable water charge. The charges should be varied over time in a process of iteration to achieve a desired outcome.

(c) establish a fixed charge if required. A two-part tariff is appropriate with a fixed charge set to recover any residual system-wide incremental costs not covered through the volumetric charge. This fixed charge will also be subject to willingness to pay considerations and will generally be set at a lower level than the fixed charge for potable water.

In most other jurisdictions, including in SEQ, the recycled water volumetric charge is below LRMC at about 40-80% of the potable water charge. The revenue gap is typically recouped from the wider customer base.

Draft Recommendation

5.1 The revenue requirement for recycled water services be based on the total additional cost of recycling less avoided costs and less developer contributions.

5.2 Direct and avoidable costs be allocated between relevant parties on a beneficiary pays basis.

5.3 Recycled water volumetric prices be based on LRMC for the established recycled water scheme where possible, less marginal avoided costs. Where the volumetric charge is then higher than the potable water volumetric charge, it may be necessary to reflect demand sensitivities to ensure demand clears supply.

5.4 If still required to ensure revenue adequacy, fixed charges in a two-part tariff be set to recover remaining revenues, also subject to willingness to pay.

5.5 If the revenue requirement is still not achievable, unrecovered amounts be allocated to potable and sewerage charges in proportion to avoided cost allocations.

5.6 Charges be periodically reviewed, as customer acceptance increases.

5.6 Sewer mining

Background

Sewer mining refers to the extraction of raw sewage (or wastewater) from a point in the sewerage network for treatment and recycling. Sewer mining may be undertaken by either a third party (such as a golf course) or by the sewerage network operator. Once extracted, sewage may be treated, and in some instances, unwanted materials returned back to the sewerage network for treatment at the sewage treatment plant (CIE, 2010).

Key issues

Issues in pricing sewer mining mainly relate to cost allocation and include:

(a) whether the charge should include the costs of removing sewage from households and businesses to the point of extraction - that is, whether the sewer miner should contribute towards the common costs of the sewerage system, or reflect any avoided costs

(b) whether, subsequent to the sewer being mined, some substances are returned to the sewerage system for treatment and the charges that should apply for this treatment. This could include any treatment for disposal or environmental release.

National commitments and positions

Although the NWI requires jurisdictions to develop pricing principles to apply to recycled water and stormwater, no specific mention is made to sewer mining (NWC, 2004).

Other jurisdictions

IPART - New South Wales

IPART (2006) endorsed Sydney Water's approach that:

(a) no financial return would be sought from enabling sewer mining other than, to avoid losses, costs incurred in enabling the sewer mining connection and its operation, are to be recovered

(b) any financial savings realised from sewer mining (such as cost savings associated with less sewage having to be treated) are to be reflected in Sydney Water's charges.

IPART in effect set the price for sewer mining at zero and considers that prices between sewage service providers and new sewer miners should be subject to negotiation between the parties. This view was recently reiterated in IPART's setting of prices for Sydney Water for the 1 July 2012 to 30 June 2016 regulatory period (IPART, 2012).

ESC - Victoria

ESC (2013a) reported that the sewer mining activities of the greater metropolitan water businesses of Victoria are classified as miscellaneous services. Accordingly, for sewer mining charges, the principles of the recovery of actual costs incurred are determined by the service provider on a case-by-case basis.

Barwon Water (2011) published guidelines to recover actual costs incurred which are to be assessed on a case-by-case basis. Barwon Water considers costs to be recovered include the sewage extracted, the impact of sewer mining on sewerage system infrastructure and other costs that may arise.

ERA - Western Australia

ERA reported that no pricing principles have been established by the economic regulator (or any government agency) for sewer mining in Western Australia (WA).

The Water Corporation, however, as principal supplier in WA of water, wastewater and drainage services, and bulk water to farms for irrigation, has provided an Information Sheet that outlines a range of issues relating to sewer mining, including pricing. Specifically, the Water Corporation (2013b) considers that:

(a) no water resource charge will apply to sewer mining activities providing community benefit (such as the irrigation of parks, sporting ovals and other recreational areas)

(b) commercial arrangements for other sewer mining related activities will be negotiated on a case-by-case basis.

Sewer mining in Queensland

In Queensland, sewer mining is undertaken by QUU at Rocks Riverside Park and at New Farm Park.

Specifically:

(a) Rocks Riverside Park - the project involves removing raw sewage from the sewerage system and treating it to a standard suitable for irrigation of a large urban recreational park. Project benefits include the saving of 360,000 litres of potable water per day. (Engineers Australia, 2010)

(b) New Farm Park - in the Brisbane suburb of New Farm, the project involves removing raw sewage from the sewerage system and treating it to a standard suitable for irrigation. Project benefits include the provision of approximately 49,000 litres per day in summer and approximately 20,000 litres per day in winter to irrigate sporting fields and rose gardens (Eimco, 2007).

QCA analysis

The broadly accepted pricing principle for water/wastewater services is that the price should be between incremental cost and an upper bound reflecting the stand-alone cost or a by-pass ceiling (WSAA 2005, NWC 2010).

WSAA (2012) suggests that as sewage is increasingly used as a source of water, nutrients and energy (particular in periods of resource scarcity), appropriate pricing for cost recovery and resource management needs to be considered.

In instances where volumes of wastewater are diverted for alternative uses, certain costs are incurred (internalised) by the sewer miner (such as treatment and some transport costs). These costs are avoided by the sewerage service provider. These would be conditional on required extraction volumes, the distance between the wastewater source and its ultimate use and the level/type of treatment required.

However, the complicating factor is that in some instances, a volume of wastewater is returned to the sewerage system. In these instances, the service provider should be able to recover the treatment and transport costs incurred.

Sewer mining charges should reflect any incremental costs of extraction from the system incurred by the sewerage service provider (equipment, pumping etc), and subject to the nature of the process, contribute to a share of common sewerage system costs, plus any transport and treatment costs for returns, less avoided costs. In some cases, avoided costs may well offset the share of common costs.

The potential complexity of such arrangements typically means that charges are subject to agreement between the sewer miner and the service provider, and negotiated on a case-by-case basis.

Draft Recommendation

5.7 Charges for sewer mining be set on a case-by-case basis to reflect relevant direct costs, a share of sewerage system common costs, service costs for any returns, less avoided/avoidable costs.

6 STORMWATER REUSE AND DRAINAGE

6.1 Introduction

Under the Ministerial Direction, the QCA is to set out the pricing principles to apply to the water industry including stormwater re-use services.

The Direction does not specifically address stormwater drainage activities. However, as these are related to other drainage services and may be relevant to review of stormwater reuse, pricing principles are considered for stormwater drainage.

6.2 Stormwater re-use

Background

Stormwater harvesting and re-use schemes can be used to provide non-potable supplies to residential users, irrigation of public areas, industrial uses and ornamental ponds and water features. Water may also be provided for small-scale irrigation in urban fringes.

Forms of stormwater Re-use

DEC (2006) noted that no two stormwater schemes are the same, and all require a sophisticated management focus.

Rainwater tanks

Rainwater tanks, on an individual lot scale, make only a small impact on runoff in most capital cities, but provide significant supplementation of urban supplies in many Queensland regional centres.

The main issues with rainwater tanks are their expense, potential health issues for non-potable water use, and unreliability of supply.

According to Hall (2013), the cost of rainwater supply ranges from $2 to $6/kL, while the running costs are typically very low at 2 to 6c/kL. However, the financial payback period of an investment in rainwater tanks may be reduced if some recognition is provided of the benefits available in reduced reliance on reticulated supplies.

Local retention and recycling

Local retention and recycling schemes are typically on a single development or ‘cluster’ scale involving 5 to 20 houses (WBM Oceanics, 1999). Such systems may involve underground water storages integrated with the housing development, with pollution control devices and discharges of excess flows to infiltration systems. In some cases, they involve storage lakes which also have environmental and amenity benefits. Examples include:

(a) the Fig Tree Place development in Newcastle, which has an underground water tank collecting stormwater flows to meet toilet flushing and hot water systems requirements for 27 residential units (DEC 2006). Total water savings are estimated at 60%

(b) the Forest Lake development near Brisbane captures most stormwater runoff in an urban lake for aesthetic appreciation

(c) the Fitzgibbon Chase development north of Brisbane uses two technologies - harvesting of stormwater run-off from a 290ha area to provide 89ML of non-potable water per year, and harvesting of roof run-off into communal tanks for processing into potable water.

The project could provide a 60% saving on mains water use (*Sourceable Industry News and Analysis, New water model bolsters urban self-sufficiency, 3 September 2013*)

(d) private water utility Green Square Water, under agreement with the City of Sydney Council, will, from 2014, access and purify up to 900kL of stormwater each day for use in toilets, laundries and gardens at Green Square, an inner-city urban development with the population projected to be 50,000 in 2030 (Arlington, 2013).

The constraints on such developments include the provision of adequate storage, the need for sufficient land area, integration of infrastructure into urban areas and potential impacts on waterways. Compared to individual rainwater tanks, cluster developments may have economies of scale in being able to use a single pressure pump system for all houses.

Regional recycling

Aquifer storage and recovery (ASR) involves harvesting of stormwater for temporary storage in an aquifer and later retrieval for various applications. South Australia has the highest uptake of wetland-based ASR projects, including the Parafield Airport ASR scheme which diverts stormwater for supply to a wool processing plant. According to SA Government (2004), the cost of this water is less than the price of mains water.

The Mawson Lakes ASR Project involves stormwater and treated water recycling through a system of constructed wetlands, aquifer storage of stormwater and a dual reticulation water supply, to cater for a population of 10,000 (SA Government, 2004).

ASR schemes require that water be suitably treated prior to aquifer injection, while extraction and recharge needs to be balanced on an annual basis.

Hervey Bay uses detention ponds to store, filter and redirect stormwater into the sewerage system at night, adding to wastewater being reused for agricultural irrigation.

Key issues for pricing

The benefits of stormwater harvesting and re-use schemes are, as for recycled water, reduced demand for mains water, for the non-potable uses such as garden watering and toilet flushing. There may also be benefits in reduced stormwater drainage flows and run-off, and reduced stormwater pollution in downstream waterways. This can help to offset the otherwise higher run-off due to reduced infiltration in developed urban areas.

There are significant limitations on the effectiveness of stormwater schemes (DEC 2006):

(a) variations in rainfall means that large storages or back-up supplies may be needed. Stormwater recycling cannot be considered a sole supply option, but may be used to supplement reticulated supplies

(b) impacts on the environment of the storages

(c) health risks and stormwater quality. Water Sensitive Urban Design (WSUD) principles may provide a means to improve stormwater quality. Stormwater quality is influenced by site-specific factors such as population density, land use, soil type, and waste-disposal practices. However, stormwater is usually cleaner than wastewater

(d) high costs per unit of water, although this is usually alleviated by avoided costs elsewhere.

Pricing issues for stormwater harvesting and reuse schemes essentially depend on the nature and scale of the scheme. Small schemes such as property specific rainwater tanks and local retention schemes are typically incorporated in development charges, and passed through to purchasers of new properties.

Larger schemes may be integrated into the water supply system and blended with recycled water schemes.

CIE (2007) noted that the episodic nature of stormwater supply could mean that a large usage charge is not practical. The likelihood that a viable stormwater reuse scheme will need to incur significant fixed costs, and the episodic nature of inflows, implies a greater focus on the fixed charge to ensure revenue adequacy and manage financial risk.

National commitments and positions

The NWC (2010) provides principles that are intended to apply to both recycled water and stormwater reuse. These principles are listed above.

QCA analysis

Because stormwater reuse schemes are generally similar in concept to recycled water schemes, the same pricing principles apply. Stormwater reuse may operate in conjunction with recycled water.

Efficient pricing should take into account the direct additional costs (infrastructure and operating costs) and avoided costs with allocation of any revenue gap to relevant parties on a beneficiary pays basis.

Avoided costs could include deferral of potable water augmentation, reduced stormwater infiltration into sewerage systems and reduced impact of sediment and nutrient discharge into streams.

The key areas of difference between stormwater reuse and recycling are likely to be in regard to the relative magnitude of the costs themselves, for example:

(a) stormwater systems may require larger volumes of storage due to the episodic nature of rainfall. Fixed costs may therefore be higher

(b) water treatment costs would typically be lower as the source water could be expected to be of higher quality

(c) depending on the scale, avoided costs of environmental impacts could be significant, in terms of reduced peak stormwater flows and reduced sedimentation. There may therefore be larger benefits to the broader community justifying CSOs.

Draft Recommendation

6.1 Stormwater reuse pricing be subject to the same pricing principles as recycled water.

6.3 Stormwater drainage

Stormwater drainage charges are relevant to the three council entities. Unitywater and QUU do not manage stormwater drainage systems.

Introduction

The key functions of stormwater drainage infrastructure are to carry runoff from rainfall events (flood mitigation and drainage) and to reduce stormwater pollutants for the purpose of maintaining water quality objectives.

Infrastructure for flood mitigation typically comprises trunk drainage (excavated channels or modified natural watercourses), retention basins (urban lakes, pollution control ponds and artificial or natural wetlands) and dry retardation basins which fill temporarily during storm events. Constructed stormwater infrastructure assets such as drainage channels generally have long lives (typically more than 50 years).

Traditional stormwater quality management infrastructure includes gross pollutant traps (GPTs) to trap litter, debris and coarse sediments, trash racks, floating booms and catch basins, all of which require regular maintenance and cleaning. GPTs are large concrete-lined wet basins designed to slow flow of water and allow sediments to settle. Trash racks collect gross pollutants (litter and debris exceeding 5mm in diameter).

Water-sensitive urban design (WSUD) techniques may be adopted to promote the integration of stormwater, water supply and wastewater management at the development stage (Stormwater Industry Association, 2005). The objectives of WSUD are to:

(a) preserve natural features and surface and groundwater resources

(b) integrate public open space with stormwater drainage lines

(c) minimise impervious area and the use of formal drainage systems

(d) encourage infiltration and stormwater reuse.

WSUD techniques to reduce runoff into stormwater systems or to manage pollutant loads at the source include infiltration systems such as grassed swales, permeable paving, control ponds and constructed wetlands, rainwater tanks and rooftop gardens. Such measures may require large areas of land to promote infiltration.

The cost of infrastructure and associated operating costs for stormwater drainage is largely a function of:

(a) climatic parameters and hydrology – scale and frequency of peak flood flows, duration and intensity of rainfall events

(b) urban density, including impacts of infill developments

(c) pollutant loads and mandated requirements for management of pollutants and their impact on water quality

(d) availability and deployment of WSUD retention and detention strategies such as grassed swales, infiltration zones, urban lakes, wetlands etc, and on-site detention or retention measures by landholders.

For any given property, the volume of runoff may be a function of property area, land use, topography, soil types and proportion of impermeable surfaces or total impermeable land area. For example, an increased proportion of roofed and paved areas contribute to greater run-off. The quantity and quality of runoff may be modified by on-site retention and detention measures such as rainwater tanks.

Typically local governments recover costs from communities by means of levies or charges. Where stormwater management catchment issues overlap local government boundaries, a means of sharing costs must be found. Urbanisation in one local government area may increase flood flows downstream in neighbouring local government areas.

Stormwater management services have particular characteristics which present challenges in establishing regulatory pricing principles. Relevant matters are that:

(a) stormwater drainage services have public good characteristics, whereby many individuals benefit irrespective of whether they pay for the services (non-excludable), and benefits received by one individual do not reduce those of another

(b) an individual customer's use of stormwater drainage services and contribution to the quality of outflows are not easily measurable

(c) stormwater infrastructure comprises a network system, with 'product' generated at the ends of the network and accumulating to increasingly centralised points, the reverse of a water supply or electricity distribution network.

National commitments and positions

There are no specific national commitments or positions to pricing stormwater drainage.

However, the national guidelines, Evaluating Options for Water Sensitive Urban Design (JSCWSC 2009) were developed jointly by the federal, state and territory governments to comply with paragraph 92(ii) of the NWI which requires signatories to:

> *Develop national guidelines for evaluating options for water sensitive urban developments, both in new urban sub-divisions and high-rise buildings by 2006*

One objective of WSUD (as outlined in the national guidelines) is to (inter alia):

> *promote a significant degree of water related self-sufficiency within a development by optimizing the use of water sources from within the development to minimise potable water inflows and water outflows from a development, both stormwater and wastewater.*

The national guidelines promote an integrated approach of combining potable water, wastewater and stormwater quantity and quality management, minimising stormwater pollution and water balance problems by ensuring hydrological regimes change minimally from pre-development conditions. This integrated approach also reduces development costs.

Other jurisdictions

IPART (2012b) reviewed the stormwater drainage charges for the Rouse Hill development scheme, and noted that because the NSW Government set developer charges to zero in 2008 to encourage greenfield development, Sydney Water was unable to recover the cost of new trunk infrastructure. IPART applied a beneficiary pays principle to apportion 70% of the costs to new Rouse Hill residents, and 30% to Sydney Water's sewerage customers (on the basis that all customers benefit from reduction of nutrients in the river systems). This resulted in an annual flat charge of $954 per year for Rouse Hill residents for the 5-year period.

In New South Wales, IPART recommended as early as 1996 that local governments explore a separate drainage charge for stormwater management, with charges dependent on land area, land use, development intensity and pollution potential (IPART 1996).

In New South Water, Hunter Water's stormwater pricing structure from 2013-14 comprises:

(a) for residential connections, one standard service charge to apply to houses and a lower standard service charge to apply to apartments. IPART's rationale is that the revenue collected from residential customers is to reflect the costs incurred in serving those customers

(b) for non-residential connections (to reflect the relationship between land area and run-off) four land-area based charges - namely: small (<1,000sqm), medium (1,001 to 10,000sqm), large (10,001 to 45,000sqm) and very large (>45,0000sqm).

As a result of applying IPART's cost-reflective approach (IPART 2012a) to establishing charges coupled with lower proposed expenditures, Hunter Water's stormwater drainage prices for houses and non-residential customers reduced by 30% from 2012-13 to the conclusion of the regulatory period (that is, 2016-17).

Sydney Water (IPART 2012b, 2012c) supplies stormwater drainage services to around 520,000 customers. In 2005 IPART requested Sydney Water to develop an area based stormwater drainage charging scheme to replace the prevailing arrangements of one residential charge and one non-residential charge.

As part of the review for the 1 July 2012 to 30 June 2016 period, Sydney Water submitted that the arrangements be maintained. However, IPART concluded that peak stormwater flow, total volume of water and pollutants were the key cost drivers associated with stormwater drainage. The volume of stormwater is determined by a range of factors including area, slope, proportion of impervious area, land use and soil. Given land area is a key determinant of costs, land area can be used as a proxy for a property's contribution to runoff. Accordingly, IPART consider that land-area based charges are a more cost-reflective approach.

IPART determined for Sydney Water the following pricing structure:

(a) for residential connections, one standard service charge to apply to houses and another standard service charge to apply to apartments

(b) for non-residential connections, four land-area based charges - namely:

    (i) 0 to 200 sqm

    (ii) 201 to 1,000sqm (and low impact)

    (iii) 1,001 to 10,000sqm

    (iv) greater than 10,000sqm.

Melbourne Water’s capital costs associated with installing new drainage infrastructure are recovered from developers through upfront developer charges (ESC, 2013a).

For ongoing costs, Melbourne Water for residential properties applies a single annual service charge. Non-residential properties located within the Urban Growth Boundary and major airports are charged based on property values (net annual value set using 1990 values), subject to a minimum charge. In other areas, a minimum fee will be applied to all non-residential properties including non-residential farm land properties which held an exemption as at 30 June 2013.

The ICRC (2013) presently does not apply separate stormwater drainage charges for ACTEW customers.

The 68 local government authorities in South Australia (LGASA 2012) all levy stormwater drainage charges in general rates.

In the US, many urban centres have more sophisticated charging arrangements. Some such as Tampa, Florida and Columbus, Ohio apply stormwater charges on the basis of average impervious land area, estimated from digitised aerial mapping. Customers in some cities receive mitigation credits for reducing run-off.

In the UK, water companies recover surface drainage costs in a variety of ways, including as part of water charges, on the basis of property rateable value, by property type or by surface area.

Ofwat (2003) has identified as a general principle that charges for surface drainage should reflect the main cost driver, which is the drainable surface area of a property. The major issues identified by Ofwat were:

(a) set-up and administration costs, including measurement of drainable site-areas

(b) impacts on certain customers, such as schools, hospitals and places of worship which typically are built horizontally rather than vertically.

Ofwat concluded that the assessment of whether the benefits of site area charging outweigh the costs was a matter for individual water companies to decide (Ofwat, 2003).

SEQ entities

In Queensland, the costs of stormwater services are generally covered through a combination of developer charges for new infrastructure and rate-based fees for ongoing management. Typically, stormwater drainage costs are aggregated with other costs such as for wastewater or for roads management and maintenance.

QUU and Unitywater do not level any charges associated with stormwater drainage given they have no responsibility for associated infrastructure. In contrast, Gold Coast, Logan City and Redland City Councils include stormwater drainage costs in general rates.

Water by Design (2010), in their Business Case for Best Practice Urban Stormwater Management (prepared for the South East Queensland Healthy Waterways Partnership), report:

(a) costs associated with site acquisition, design and assessment of WSUD measures and with construction, are typically met by developers (directly through infrastructure charges) and households (indirectly through the cost of a dwelling)

(b) ongoing operation and maintenance costs of WSUD assets are typically met by local governments (directly) and households (indirectly through rates). However, these costs tend to be offset (at least partially) through reduced costs of waterway rehabilitation.

QCA analysis

Stormwater infrastructure operating costs include maintenance, cleaning, pollution monitoring, disposal of pollutants and administration.

Costs of stormwater drainage infrastructure and associated operating and maintenance are typically recouped through developer charges or annual service fees charged by the relevant authority or utility to landholders.

The calculation of a developer charge can be complex particularly for infill developments where upgrades may bring forward maintenance or replacement of drainage, saving future costs for existing residents. Where practical, price differentiation on the basis of location is appropriate, (whether developer charges or different ongoing drainage charges) providing marginal pricing signals for incremental developments.

Annual service charges typically recoup the operating costs and common capital costs for stormwater drainage systems which service both private and public areas. Once infrastructure is in place, operating costs are relatively low, including maintenance and cleaning.

Stormwater charges can be based on flat rate fees (average cost pricing), set uniformly on a customer basis to recover total costs. The flat fee approach is simple, keeps administration costs low and minimises revenue risk to the service provider.

It reflects a beneficiary pays basis, whereby all properties serviced by the stormwater system share equally in the benefits, and costs are distributed equally across all beneficiaries.

For the most part, flat uniform charges may not reflect the cost imposed on the drainage system or the level of infrastructure used by a customer.

As an alternative, fixed charges could be based on indicators such as:

(a) site value or unimproved capital value. This variable may be loosely correlated with the volume of runoff. The SEQ councils' approach is consistent with this option

(b) land use zoning. Such information can allow the site to be rated for potential pollution runoff

(c) area of site or allotment size, or frontage. This information is readily available, but may be a crude indicator of runoff as it does not take into account the extent of development

(d) roof area as a proportion of total area. This approach allows the impact of site development density to be taken into account, but involves measurement problems and increased transactions costs

(e) impervious area. Sites may be assessed using geographic information systems (GIS) mapping to identify total impervious area including buildings and paved areas. While more accurate, the costs are also likely to be significant.

Pricing may also serve to provide incentives to reduce discharge and encourage retention of on-site stormwater. Pricing signals are only advantageous where they can lead to modified behaviour. The options for stormwater drainage customers to respond to pricing signals are usually limited. Measures include rainwater tanks, gravel filled trenches, dry wells and grassed swales. Monitoring of such activities in SEQ, in order to provide run-off rebates to customers, is expected to be difficult and impractical, and may not justify the cost.

On balance, the QCA recommends that rate based charges continue to be applied to recover the operating costs and common capital costs for stormwater drainage systems which service both private and public areas.

Rate-based charges take account of land value, land area and zoning and therefore provide a cost effective way for charges to be reflective of the contribution of a landowner to stormwater flows. Such charges are easily designed to ensure recovery of the required revenue. This approach is also consistent with equity/fairness (as those contributing more to stormwater drainage are exposed to higher charges) and simplicity/transparency (as this approach is more easily understood by stakeholders).

The QCA also recommends that for rate-based charges a separate stormwater drainage charge be clearly identified on the billing/rates notice issued by the regulated entities, where practical.

Draft Recommendation

6.2 Rate-based charges continue to be used for recovery of stormwater drainage costs.

6.3 Charges for stormwater drainage be transparently identified on customer bills.

7 INDUSTRY-WIDE PRICING ISSUES

7.1 Introduction

There are a number of issues that could apply to any or all of the water and sewerage or related activities of the entities.

These include:

(a) pricing for externalities

(b) pricing for third party access

(c) cost allocation

(d) price transitioning

7.2 Pricing for externalities

Introduction

Externalities may be defined as the side effects or spill-overs of an activity that are not reflected in market prices. In 2000, a High Level Steering Group on Water defined externalities in an economic manner, as ‘the indirect or accidental consequences of actions associated with economic activity’. Bowers and Young (2000) noted that externalities are unintended consequences, that can be either positive (social benefit) or negative (social cost).

Bowers and Young also categorised externalities as either tangible, where a market can provide information on the valuation, or intangible, where there is no market. A tangible example would be the repair cost of pollution damage, while an intangible example would be damage to wildlife and loss of biodiversity.

Externalities relevant to the entities' activities could include:

(a) storage related externalities - negative impacts on the environment at the storage site, on river and groundwater systems. Positive impacts could include tourism, amenity, flood mitigation and wildlife

(b) manufactured water externalities - desalination and recycling requires energy that could have implications for greenhouse gas emissions and climate change. Positive externalities could arise from recycling due to avoided impacts of wastewater discharge

(c) wastewater treatment externalities - negative impacts include infrastructure and water quality risks such as increased prevalence of corrosive substances, disease-causing organisms and heavy metals. Positive externalities include the protection of aquatic species and reduction in coastal pollution

(d) stormwater impacts - negative stormwater externalities such as contaminants discharged downstream are caused by factors other than water use. Stormwater capture and re-use as part of the urban water supply may alleviate negative externalities.

Issues in pricing externalities mainly relate to identification and valuation. The issue is whether pricing can also provide a flexible and cost-effective way of achieving environmental management objectives. A further issue is to ensure that externality pricing does not 'double-charge' for an impact already being managed by other policy instruments (Frontier Economics 2011b).

Who pays

The allocation of the cost of externalities to relevant parties may be on the basis of:

(a) impactor (or polluter) pays. The costs can be attributed to a specific group in the community, for example, water users, or a large emitter who then have an incentive to manage impacts

(b) beneficiary pays concepts. Beneficiaries may also be identifiable as a specific group. In some cases, the entire community is seen as a beneficiary. The costs may be charged through broader charging mechanisms or be funded as a CSO.

The preferred cost allocation option in any particular scenario can be established by ensuring that appropriate incentives are provided to relevant parties to minimise external impacts or to implement on-site remedial works to manage impacts.

For example, the impactor pays option provides incentives for the direct contributors (polluters) to reduce their impacts. An externality charge could be directly applied for example to an industrial emitter. Beneficiaries typically refer to the wider community, or the customer base of the service provider, so that prices that include externality costs provide a general incentive for customers to use less water or sewerage services.

For many externalities, for example managing wastewater discharges, the impactors and the beneficiaries are virtually indistinguishable.

Water planning and management charges

The costs of managing externalities may be already reflected to some extent in water planning and management activities of Government, and already incorporated in resource management charges. For example, appropriate catchment planning may minimise or avert external impacts. Regulations and standards may be imposed to manage externalities with resulting compliance costs. Property rights and licence conditions may apply to limit extraction and manage external impacts. Education and information services may also help to manage impacts.

Water planning and management costs may include catchment and regional based planning, hydrological modelling, licensing entitlements, managing trade of water entitlements, and monitoring of streams and water quality.

The activities could include collection and analysis of data on the impacts of extraction, developing policies to manage the resource, developing plans and frameworks and monitoring compliance, administering water entitlements, metering and trading.

Resource management charges can provide an additional signal in regard to efficient water use. Key issues in setting such resource management charges are:

(a) determining the efficient costs of water planning and management services

(b) allocation between water users and other beneficiaries

(c) identifying cost variations between catchments, regions and over time.

Most water planning and management activities are undertaken by Governments, although some are undertaken by bulk supply entities. The SEQ entities are unlikely to directly incur costs in water resource planning and management activities, although some costs may be incurred in terms of sewerage, trade waste and stormwater drainage. Some water planning and management costs are likely to be passed through to the entities in bulk water charges.

As there are no water planning and management charges in place in SEQ, the QCA has not considered this further.

National commitments and positions

In the 1994 COAG agreement, the cost recovery principles included externalities as costs to be recovered in the lower bound. These were then defined as environmental and natural resource management costs attributable to and incurred by water businesses.

In 2004 the NWI (NWC 2004) required States to:

(a) manage environmental externalities through regulatory measures such as through extraction limits in water management plans

(b) examine the feasibility of using market based mechanisms such as pricing to account for positive and negative externalities associated with water use

(c) implement pricing that includes externalities where feasible and practical.

The NWI Pricing Principles (NWC 2010) refer to externalities as part of the efficient costs of urban water services.

The NWI also has detailed principles for water planning and management charges, but these are not considered relevant in the SEQ context.

Other jurisdictions

There are few examples of urban water externalities being incorporated in pricing in practice.

The ACT Government has a water abstraction charge (WAC) which includes a component for environmental costs such as environmental flows. The WAC is a volumetric charge, was previously a transparent separate charge in customers' bills, but is now incorporated in overall operating costs.

The ERA (2009) considered including an externality premium to reflect the environmental cost of groundwater abstraction. An externality premium of $0.24 to $0.33/kL was estimated, but was considered to be already included in the Water Corporation's estimate of LRMC. The ERA considered that LRMC based pricing was already a form of externality pricing as it included the consequences of one consumer's decision to use more water on the price that future users will have to pay.

In its investigation of GAWB's pricing practices, the QCA incorporated the costs of operating a fish hatchery in storage management costs, as these reflected actual costs in managing environmental externalities (QCA, 2005).

In SA the load-based licence fees are set taking account of salinity impacts on an area basis (Young 2000).

QCA analysis

The inclusion of externalities is consistent with full cost recovery principles as outlined in various national agreements. Economic efficiency requires that externalities attributable to a water activity be incorporated into the costs and the charges for services.

Bowers and Young (2000) suggest the key steps in pricing externalities are to:

(a) identify the externality, and attribute to a water service or charge category

(b) determine the physical magnitude - a line of causality from an impactor to an affected party, typically using dose-response modelling. The 'dose' relates to the actions of the impactor (for example, a dirty water discharge) and the 'response' relates to the impact on affected parties (for example, impact on wildlife).

(c) value the impacts - tangible impacts can be valued using market data to assess the LRMC of damage repair, loss of production, health costs etc. Intangibles could be valued by estimating costs of averting the impact or exercising duty of care through minimum standards or engineering solutions; revealed preference techniques such as travel cost methods; and contingent valuation and choice modelling approaches which derive values from a hypothetical market.

(d) apply an appropriate adjustment to service charges. This needs to take into account costs already being included in charges to manage externalities.

To provide effective signals, the charge should reflect the cost of the externality as closely as possible, and be set on a location basis (for example, catchment) where practical. Intangible externalities of a public good nature that cannot be allocated to a region or catchment may be reflected in a uniform charge to users. The charge for externalities should be based on LRMC prices to provide use-related signals to impactors.

Externality charges should not affect service providers' revenue adequacy. The revenue from the charge should be directed to mitigating impacts where possible.

The means of charging should maximise the transparency of the charge and the charge should be separately identified in bills to the impactors. An example is the water abstraction charge that previously applied in the ACT but is now included in the total bill. In this case, the impactors are the service provider's customers, a group that generally coincides with the beneficiaries.

Frontier Economics (2011b) has comprehensively reviewed the applicability of externality pricing on behalf of the NWC.

Frontier concluded that externalities associated with the urban water cycle are already being managed through non-price means, by regulation, planning and property rights. Frontier's view was that management of externalities has significantly improved, limiting the circumstances under which externality pricing is likely to be worthwhile.

They considered that the circumstances where externality pricing is likely to be most feasible are where:

(a) the assessed externality is material

(b) there are differences in the costs applicable to different parties and mechanisms are not flexible enough to reflect these differences

(c) the externality charge is likely to lead to a change in behaviour or innovation

(d) the activity can be measured and monitored accurately and cost effectively.

Frontier Economics (2011b) noted that in many cases these conditions do not hold, while in other cases arrangements obviate the need for externality pricing. Valuation of externalities can be a complex and costly exercise and the costs may well outweigh the benefits. Further, information and data constraints may impinge on dose-response and valuation modelling.

Frontier Economics (2011b) recommended that all jurisdictions determine the source and materiality of urban water externalities, determine which party has management accountability and assess the potential to improve the approach through externality pricing.

The QCA concurs with this approach, and recommends that entities consider identifying and valuing any externalities arising from their activities. However, noting that their valuation can be complex, other mechanisms than incorporating an estimate in the price may be more appropriate.

In general, externalities are related to the level of use, and to that extent should be reflected in volumetric charges.

Other mechanisms

Other mechanisms, albeit outside of the jurisdiction of the entities, may be considered to manage externalities:

(a) motivational mechanisms, such as 'tidy town' competitions and clean-up days may assist with managing negative externalities associated with urban water use (Young 2000)

(b) load-based licensing, where wastewater treatment plants and other emitters obtain a licence to dispose of contaminants, up to a specified limit. Such licences are a precursor to introducing tradeable emission rights systems. A variation is bubble licences, which stipulate a fixed total load of contaminants but which enables the emitter to change the source of the load. This provides incentives for the emitter to seek cheaper ways to reduce the contaminant load

(c) tradeable emission rights or quotas, whereby polluters can trade their licences to discharge and therefore have an incentive to manage negative externalities. These are more complex mechanisms to establish, given the likely differences between externalities and their costs.

Market mechanisms, such as load based licences and tradeable emission rights require some form of state and/or federal framework to be in place. These approaches are relevant where the benefits in the form of incentives to manage and reduce externalities outweigh the costs of establishing and administering potentially complex mechanisms.

Draft Recommendation

7.1 The inclusion of externality prices be supported where material impacts can be valued accurately and cost effectively.

7.2 Prices incorporating estimates of externalities avoid duplication with other mechanisms and be transparent.

7.3 Licences and market mechanisms (where practical) be considered by Government where the benefits are considered to justify the costs.

7.3 Pricing for third party access

Introduction

Principles to establish third party access prices influence the effectiveness of an access regime as they affect the manner in which new entrants compete with established service providers in those potentially competitive elements of water and wastewater businesses.

National commitments and positions

COAG

COAG's Competition Principles Agreement (CPA) (1995) required State, Territory or Commonwealth access regimes to ensure that regulated access prices are set so as to:

(a) generate expected revenue for a regulated service or services that is at least sufficient to meet the efficient costs of providing access to the regulated service or services and include a return on investment commensurate with the regulatory and commercial risks involved

(b) allow multi-part pricing and price discrimination when it aids efficiency

(c) not allow a vertically integrated access provider to set terms and conditions that discriminate in favour of its downstream operations, except to the extent that the cost of providing access to other operators is higher

(d) provide incentives to reduce costs or otherwise improve productivity.

Section 6 (4)(a) of the CPA states that where possible, third party access should be on the basis of terms and conditions agreed between the owner of the facility and the access seeker.

Competition and Consumer Act 2010

The Australian Competition and Consumer Commission (ACCC) enforces the *Competition and Consumer Act 2010* (CC Act), which provides a generic, procedural framework for third party access (section 44G).

Neither the CPA, nor the CC Act, identify specific methods for access pricing consistent with the general pricing principles identified above.

Key issues in determining access prices

An access provider may choose to set an access price at SRMC to recover only the short term additional costs imposed by the access seeker. Alternatively, pricing at LRMC would also include the cost of future infrastructure brought forward by the access seeker.

Pricing at SRMC or LRMC may be appropriate where there are no joint fixed costs to be recovered, or where the access seeker is a subsidiary of the provider. However, such prices would rarely be cost-reflective.

Access prices are usually considered in terms of two alternative theoretical concepts:

(a) total service long run incremental costs (TSLRIC), the incremental costs the provider incurs in the long term in providing the service (ACCC 1997, PC 2001). TSLRIC is a cost-based approach that usually includes a share of common or joint costs

(b) efficient component pricing rule (ECPR) recommends that the access seeker compensate the provider for the costs of providing access, including the opportunity costs of any foregone revenues and profits due to the entry of the access seeker (Baumol and Sidak 1994). In practice, the ECPR takes the retail price, adds the additional costs of serving the access seeker, and subtracts the costs avoided.

In regulatory applications, these methods have been generalised into two main methods for practical purposes - the cost of service and retail minus methods (ESC 2009b, ACCC 2007).

The cost of service (or 'bottom-up') method calculates access prices by estimating the cost to an infrastructure provider of sharing the use of particular infrastructure with an access seeker. It requires a separate revenue requirement to be established (using building blocks of operating costs, depreciation and return on assets) reflecting those assets that are the subject of access. This may include any additional costs incurred to allow access to the new entrant. Once the revenue requirement is established, an access price is set to recover allowable costs.

Under the retail-minus methodology, the access price is determined by taking the established regulated retail price for a bundled service and applying a discount (representing net avoided or avoidable costs) to account for services the access seeker does not require of the infrastructure provider. If required, the additional costs incurred to allow access to the new entrant are also included. As an example, access seekers typically seek access only to components of an infrastructure provider's network (such as the below-rail component of an established rail network or the water transport services associated with distribution/retail activities).

The discount associated with the retail-minus methodology can be based on the short-run marginal costs of the services not provided typically only operating costs (avoided costs) or the long-run marginal costs of the services not provided (avoidable costs). Avoidable costs may be established through a separate building blocks process and include depreciation and return on assets.

The retail minus approach may incorporate any monopoly rents (profits) or inefficiencies that are already incorporated into the retail price.

The ESC (2009b) noted that the cost of service and retail minus approaches can result in the same access price, but in practice difficulties in identifying all relevant costs may result in the two methods giving different prices.

Other jurisdictions

The ACCC's determination of an access dispute between Services Sydney Pty Ltd and Sydney Water relating to declared sewage transportation services was the first application of access pricing to the water and sewerage industry in Australia (ACCC 2007).

During arbitration, Services Sydney proposed a bottom-up building block method while Sydney Water proposed a retail minus approach with avoidable costs calculated using the building block approach.

The ACCC determined that the charge for access to sewerage networks be based on the retail minus method – that is, the charge should be Sydney Water's retail price to each relevant customer (as determined by IPART), less avoidable costs, plus any additional costs incurred to facilitate access. The ACCC noted that the choice of method took account of the upstream and downstream markets and associated demand, and the nature of the costs associated with infrastructure facilities. The ACCC agreed with Sydney Water's proposal to calculate avoidable costs using building blocks.

Principles have been established for third party access for rail sector infrastructure (QR Network 2010). Specifically, principles for the provision of below rail services are:

(a) limits on price differentiation - access charges only to vary from the reference tariff to reflect cost (or risk) differences in providing access

(b) upper and lower bounds to charges such that access charges -

  (i) do not fall below the incremental cost of providing access

  (ii) do not exceed the expected stand-alone cost of providing access

(c) rail infrastructure utilisation principle – given rail networks typically serve a variety of markets (e.g. coal and agriculture), different access charges for operators serving different markets is allowed. This allows Aurizon Network (previously QR Network) to maximise revenue/capacity while meeting (in aggregate) common costs of providing the infrastructure

(d) revenue adequacy - ensures revenue from the provision of access recovers the efficient costs of providing the services.

For below rail services in Queensland, the cost of service approach has been adopted, as:

(a) reference to the retail minus methodology is impractical as contract (not retail) prices are in place

(b) the reference tariff (calculated by the QCA to inform third party access negotiations between Aurizon Network as infrastructure provider and access seekers) is calculated using the cost of service (or building blocks) methodology.

Ofwat (2013) noted that in the past, the costs principle was applied to determine access prices, for UK water companies, that is, costs that the monopoly supplier avoids, reduces or recovers in other ways. Ofwat is now proposing new charging rules which it is in the process of developing.

An issue is that the Regulatory Capital Value (RCV) (or RAB) at the time of privatisation of the water companies and as rolled forward is now well below the modern equivalent replacement values. This means that access prices may be well below efficient levels due to the RCV discount. Ofwat suggested that a means of allocating the RCV-based discounts to different services is required in order that incumbents do not have an advantage over efficient entrants.

QCA analysis

To date, the QCA has not been called upon to make an access determination or to consider for approval a draft access undertaking involving water and/or wastewater infrastructure. In addition, no SEQ entity has finalised, through negotiation, any third party access agreement.

The Competition Principles Agreement principles for regulated access pricing (see above) are reflected in QCA Act (and reflected in section 168A). The QCA is to have regard to these principles when making an access determination or when considering approval of a draft access undertaking.

These pricing principles for third party access can provide guidance to negotiations between parties to a proposed access agreement. These pricing principles also provide a framework for determining access prices by the QCA should these parties not reach agreement.

There is general support for the retail minus methodology on the basis that:

(a) it is usually simpler and less costly to apply, particularly where a regulated retail price is in place (ESC 2009b)

(b) it is preferred in instances where the existing retail price is regulated as it -

 (i) reflects an assessment of prudent and efficient costs (ESC 2009b, ACCC 2007)

 (ii) is consistent with existing tariff structures (ERA 2008)

 (iii) promotes efficient entry such that the infrastructure provider and access seeker compete on merit, taking into account relative efficiency, product differentiation and customer service (ACCC 2007)

 (iv) maintains the legitimate interests of the infrastructure provider (ACCC 2007)

(c) where the retail price reflects average costs it minimises the risk of ‘cherry-picking’ (that is where an access seeker isolates infrastructure where actual costs are lower than average costs), thereby setting retail prices lower than the access provider (ACCC 2007, ERA 2008, ESC 2009b).

However, successful implementation of the retail minus methodology requires regulation of retail prices to ensure tariffs reflect prudent and efficient costs of service (ERA 2008). Otherwise, the method embeds any monopoly rents or subsidies applied by the infrastructure owner.

Issues may also arise in determining avoidable costs. As noted by the ACCC, this may require a separate building block process which itself requires detailed cost information.

The cost of service method is more information intensive requiring a separate revenue requirement to be established. A disadvantage is that where postage stamp tariffs are in place across a service area, the method may result in 'cherry-picking' of access whereby new entrants target low cost customers leaving the access provider to service high cost customers.

To address this, the ACCC (2007) proposed including an allowance for postage stamp pricing – access prices that do not include such a contribution would have adverse implications for efficient entry and competition in the downstream market. ESC (2009b) noted that the cost of service approach in combination with an averaging process will be as effective as the retail minus approach in preventing 'cherry-picking'.

The cost of service method constitutes a clearer relationship between access prices and the costs of providing access, thereby being easier for stakeholders to understand (ESC 2009b). The method has advantages in instances where costs associated with providing an infrastructure service can be (but perhaps have not yet been) readily identified (such as for standalone infrastructure).

The cost of service approach if applied to SEQ entities would, as in the case of UK water companies (Ofwat 2013) be affected by legacy valuations of the RAB. Hence, a bottom-up approach would need to reflect the value of assets that are subject to access as a proportion of the relevant asset class.

In general, for the SEQ entities where contractual obligations do not prohibit third party access, the cost of service method is preferred on the basis that:

(a) it represents a clearer relationship between prices and the costs of providing access

(b) it does not rely on the retail price being determined by the economic regulator

(c) it is the most appropriate approach where there are significant additional infrastructure costs required to meet the access seeker's needs (likely to be the case for SEQ entities)

(d) efficient costs may be more readily discernible as the SEQ entities have been subject to price monitoring by the QCA. However, cost allocation methodologies have not been reviewed (and would need to be).

Any concerns regarding 'cherry-picking' can be resolved through averaging to ensure that access prices do not result in increased costs of service delivery for remaining customers. An adjustment to the access price may therefore be included.

Draft Recommendation

7.4 Third party access prices be based on the cost of service methodology, and take account of relevant joint or common costs. Any departure from this methodology (such as applying the retail minus methodology) is to be justified.

7.5 Where retail prices are averaged across user groups (postage stamp tariffs) an adjustment apply to ensure that access prices do not result in increased costs of service delivery for remaining customers.

7.4 Cost allocation

Equity and fairness issues arise in practice where common costs need to be allocated between market participants.

The appropriate allocation of costs may be an issue in determining cost reflective pricing signals for the different services provided by the SEQ entities.

Cost allocation may be a problem where there are joint or common costs that need to be allocated:

(a) between services, for example, between water and sewerage

(b) between customer types, for example, between residential and non-residential customers

(c) where there are prices differentiated by cost causation , eg location, service quality standard, peak periods etc

Cost allocation issues were discussed in the QCA's Position Paper - Long term regulatory framework for SEQ entities (QCA 2014) in the context of allocating indirect costs.

Principles for cost allocation

General economic guidance is that cost allocation should avoid cross-subsidies, that is, any method for attributing costs should satisfy the stand-alone cost test and the incremental cost test.

The stand-alone cost test comprises two elements:

(a) each user's (service or customer) share of the cost must not be greater than the user's stand-alone cost. That is, no user can do better on its own than under the proposed cost allocation.

(b) the cost share for any group of users must not be greater than their combined costs (combinatorial test). That is, no group of users can do better on its own than under the proposed cost allocation.

The incremental cost test is satisfied if the cost allocated to any user group is at least as much as the incremental costs of including that group on the system. If this condition is satisfied, no single group will be subsidising another. The principles are reviewed in more detail in QCA (2014).

QCA analysis

In practice, the band between incremental and stand-alone cost is usually wide, and a range of cost allocation solutions may satisfy the cross-subsidy test. Stand-alone cost at the individual and combinatorial levels is also difficult to estimate.

In practice therefore, costs are typically allocated using simpler methods which distribute costs to user groups in proportion to some allocator or cost driver (or cost allocation base) perceived as 'reasonable', such as output or usage quantities, revenues, or costs directly attributed.

In QCA (2014), it was noted that the use of direct costs as the allocator, where applicable, may be a superior approach for the assignment of indirect costs to user groups. For example, the proportion of direct costs may be a useful indicator for allocating costs between water and sewerage activities.

The use of such fully distributed cost allocation methods relies on sometimes arbitrary judgements about the appropriate allocator variable but may nonetheless be the only feasible options available (QCA 2013).

In other cost allocation examples, the common cost pool should be allocated to services and customers on the basis of a reasonable attempt to proxy the causal relationship between the costs incurred and the water or sewerage or other service performed.

Cost allocators also need to be assessed for their ease and cost of use and therefore should not be overly complex or data intensive.

Draft Recommendation

7.6 Common costs be allocated to services and customers on the basis of a causal relationship between the costs incurred and the water, sewerage, recycled water or other service performed.

7.7 If a causal relationship cannot be established between costs incurred and the relevant service, a reasonable cost allocator needs to be established.

7.5 Price paths

Introduction

The Ministerial Direction requires the QCA's framework to allow for the management of potential price shocks for customers including price paths within and across regulatory periods, changes in pricing policies including tariff structures and the provision and treatment of subsidies.

Price paths could apply for any of the water, sewerage or trade waste services where a significant price shock is to be managed.

Other jurisdictions

ESC (2009a) approved the businesses' proposals to smooth their price paths in order to minimise the impact of price changes on customer bills. ESC noted that while smoothing implies that the water businesses' revenues will not necessarily match their expenditures in any particular year, the total revenue recovered by each business is expected to be sufficient to meet its total expenditure over the four years of the regulatory period.

ESC (2009a) stated that, in general, it would expect a proposed price path to:

(a) provide the same revenue over the five year regulatory period in net present value terms

(b) have been set with regard to customer preferences

(c) not result in a significant price shock in the first year of the subsequent regulatory period.

IPART (2009) set final price levels so that the present value of SCA's target revenue equates with the present value of its notional revenue requirement over the determination period. The price path adopted had prices increasing by a significant but reasonable amount in the first year and then increase smoothly and more gradually in the remaining two years of the determination period.

QCA analysis

Price transitioning through price paths provides a mechanism through which price shocks to customers can be moderated.

Prices to customers should be transitioned where there is a significant increase and there are demonstrable issues regarding customers' ability to pay the increment in one stage.

The QCA has previously noted in its GAWB (2010) review that, as a general principle, any transitioning arrangement should be revenue neutral to ensure that there is no permanent impact on the entity's revenue.

Any price transitioning that is not NPV neutral could impact on an entity's financial performance and possibly its financial viability. The longer prices remain below the entity's underlying costs, the more the entity's accumulated revenue shortfall would grow, with negative implications for its capacity to deliver services to customers and for its financial viability. Eventually prices would have to be increased above costs to allow the business to recover the revenue shortfall.

It is therefore important to ensure that prices are not suppressed as this could lead to larger price rises in the future. Where prices need to increase substantially the entity should propose a price path that minimises the impact of substantial price increases on customers and the service provider's financial viability.

In general, the QCA prefers that the price path should not be unnecessarily prolonged, as this will increase the accumulated shortfall that must be recouped later and could leave customers uncertain about the future direction of prices. The ESC approach of a significant, but 'reasonable' initial increase followed by more gradual increases provides greater certainty for customers and reduces revenue risk to the entity. However, entities should take account of the demand elasticity - price path increases could reduce demand and therefore revenues, requiring more increases or an extension of the price path.

In SEQ, the bulk water charge is increasing on a price path through to 2017-18. This should be taken into account by the entities in establishing any price path arrangements for recovery of their own cost increases. The bulk water price path could 'crowd out' scope for the entities to put in place their own price paths.

Transitional arrangements may also be required where major tariff reform is implemented. For example, a move away from IBTs to single volumetric charges could result in higher bills for some customers, and lower bills for others, and such changes should be staged over a number of years. Since such changes should not have implications for overall revenue of the entity, the staging of such changes can be more gradual.

In general, the QCA suggests that subsidies should not be provided in price paths, that is, they should be revenue neutral. However, concessions and rebates and hardship arrangements may apply to some customer groups (see Chapter 2). Where subsidies are provided they should be transparent.

Draft Recommendation

7.8 Price paths be applied where there are substantial price increases, having regard to customers' ability to pay and the impacts on the service provider's financial viability.

7.9 Price paths be set on a revenue neutral basis.

APPENDIX A: MINISTERS' DIRECTION NOTICE

QUEENSLAND COMPETITION AUTHORITY ACT 1997
SECTIONS 10(e)
MINISTERS' DIRECTION NOTICE

Referral

As the responsible Ministers, pursuant to section 10(e) of the *Queensland Competition Authority Act 1997* (the QCA Act), we direct the Queensland Competition Authority (QCA) to investigate and report on a long-term regulatory framework for the monopoly distribution and retail water and sewerage activities (the activities) of the following entities (the DRs):

- Northern SEQ Distributor-Retailer (Unitywater);
- Central SEQ Distributor-Retailer (Queensland Urban Utilities);
- Logan City Council;
- Redland City Council; and
- Gold Coast City Council;

For the purposes of the investigation and report, the Authority is directed to investigate and report on the regulatory framework which would apply from 1 July 2015, including reporting requirements, based on the following overarching regulatory objective:

> *'To protect the long term interests of the users of SEQ water and sewerage services by ensuring the prices of these services reflect prudent and efficient costs, while promoting efficient investment in and use of these services, having regard to service reliability, safety and security over the long term'.*

For the purposes of developing and implementing such a framework, the QCA is directed to:

a) develop a regulatory framework for the identified businesses and the QCA to operate from 1 July 2015 onwards – this must set out:
   i. pricing principles to apply to the industry (including water, sewerage, trade-waste, recycled water services and stormwater re-use services);
   ii. form of regulation; and
   iii. the preferred length of the regulatory period.

b) outline how the regulatory framework will be implemented on an ongoing basis;

c) assist the businesses to develop a strategic approach to long term investment in the water sector; and

d) assist with transition toward best practice stakeholder engagement.

Conduct of the QCA pursuant to this referral

1. The development of the regulatory framework should consider the following over-arching principles:
   a) ensure the costs of implementing the regulatory regime do not exceed the benefits;
   b) appropriate levels of customer engagement for the framework;
   c) sufficient co-ordination with other regulatory and regulatory review processes taking into consideration things such as Netserv plans, Total Water Cycle Management Plans, environmental regulation and land use planning;

d) ensure that opportunities for a whole-of-sector approach to solutions for the industry are encouraged under the regulatory framework (including non-infrastructure and efficient demand side management initiatives).

e) taking account of the different characteristics, in particular, size of the DRs.

2. The framework should recommend treatment of the following regulatory parameters:

a) the roll-forward of the regulatory asset base (RAB), within and across regulatory periods. A revaluation of the initial RAB (established for the purpose of the 2010-13 price monitoring period) is not to be considered;

b) the Weighted Average Cost of Capital (WACC);

c) calculating the return of capital;

d) assessing efficient and prudent operating and capital costs, including the process the Authority will apply in assessing prudency and efficiency;

e) principles to guide the treatment of capital revenues, including gifted assets and infrastructure charges; and

f) incentive mechanisms to support innovation and other efficiencies.

3. In developing and implementing the regulatory framework, the following supplementary regulatory objectives will be considered:

a) the form of prices oversight applied should be proportionate with the risk of misuse of market power by the DRs to ensure that the costs of implementing the framework do not exceed the benefits;

b) the framework should be developed to allow for the management of potential price shocks for customers, including:

i. price paths within and across regulatory periods, where appropriate;
ii. changes in pricing policies, including tariff structures;
iii. the provision of subsidies and how they may be treated;

c) the form of prices oversight applied should seek to minimise the administrative burden on DRs, including the number of, and detail required in, information returns provided to the Authority and duplication in reporting requirements;

d) the Authority must develop service quality performance reporting, in consultation with the DRs and other stakeholders, based on service quality indicators of relevance to residential and non-residential customers, with the objective of informing these customers about the comparative performance of SEQ DRs.

In doing so, the QCA should ensure that the framework is not excessively onerous or costly to implement by focusing on a reasonable range of meaningful indicators in the following areas: baseline (contextual) information; water and sewerage network reliability and service (including water) quality; water consumption, recycling and reuse; customer responsiveness and service;

e) the treatment of aggregate annual revenue under/over-recoveries in relation to core water and sewerage services should be considered as part of the permanent price monitoring framework in a manner that balances the interests of the DRs and their customers;

f) the long-term framework should facilitate the DRs moving to more light-handed prices oversight over time; and

g) a primary focus of the long-term framework should be on assisting customer understanding of how the costs of water and sewerage services influence prices by;

   i. identifying the key drivers of existing retail price levels and annual price increases, particularly where prices increase by more than the rate of general inflation; and

   ii. reinforcing and promoting understanding of accountabilities for retail prices and service outcomes.

Consultation

The Authority must undertake an open consultation process including all relevant parties and consider all submissions.

For this purpose, the Authority must prepare, in consultation with relevant stakeholders, and publish, a work program, which provides for the release of appropriately sequenced position papers (incorporating draft recommendations).

Consistent with section 34 of the QCA Act, all information papers, submissions and the Final Report must be published on the Authority's website.

Timetable

The Authority must provide to the Ministers and the Minister for Energy and Water Supply a Final Report by 30 September 2014.

[redacted]

[redacted]

TIM NICHOLLS
Treasurer and Minister for Trade

JARROD BLEIJIE
Attorney-General and Minister for Justice

GLOSSARY

A	
AIC	Average incremental cost
ACTEW	Australian Capital Territory Electricity and Water
ASR	Aquifer Storage and Recovery
B	
BOD	Biochemical oxygen demand
C	
CIE	Centre for International Economics
COD	Chemical Oxygen Demand
CSO	Community service obligation
COAG	Council of Australian Governments
D	
DBT	Declining Block Tariff
DR	Distributor-retailer
E	
ECPR	Efficient component pricing rule
EP	Equivalent persons/population
ERA	Economic Regulation Authority (Western Australia)
ESC	Essential Services Commission (Victoria)
ESCOSA	Essential Services Commission of South Australia
ET	Equivalent tenement
G	
GCCC	Gold Coast City Council
GAWB	Gladstone Area Water Board
GPT	Gross pollutant trap
GRV	Gross Rental Value
I	
IBT	Inclining block tariff
ICRC	Independent Competition and Regulatory Commission (ACT)
IPART	Independent Pricing and Regulatory Tribunal (NSW)
iSDP	Integrated Supply-Demand Planning model
ITDS	Inorganic total dissolved solids
L	
LRMC	Long Run Marginal Cost

M	
MCC	Marginal Capacity Cost
MJA	Marsden Jacob Associates
MAR	Maximum allowable revenue
N	
NFR	Non-filterable residue
NPV	Net present value
NCC	National Competition Council
NWC	National Water Commission
NWI	National Water Initiative
O	
OESR	Office of Economic and Statistical Research
OTTER	Office of the Tasmanian Economic Regulator
Ofwat	Office of the water regulator (UK)
P	
PC	Productivity Commission
Q	
QCA	Queensland Competition Authority
QUU	Queensland Urban Utilities
S	
SCA	Sydney Catchment Authority
SDP	Sydney Desalination Plant
SEQ	South East Queensland
SRMC	Short Run Marginal Cost
SS	Suspended solids
T	
TDS	Total dissolved solids
TKN	Total kjeldahl nitrogen
TP	Total phosphorus
TOUT	Time of use tariffs
TSLRIC	Total service long run incremental cost
TWEMP	Trade Waste Environmental Management Plan

W	
WAC	Water abstraction charge
WACC	Weighted Average Cost of Capital
WCRW	Western Corridor Recycled Water
WIRO	Water Industry Regulatory Order (Victoria)
WSAA	Water Services Association of Australia
WSUD	Water sensitive urban design
WTP	Willingness to Pay
WWTP	Waste Water Treatment Plant
Y	
YVW	Yarra Valley Water

REFERENCES

ACCC (2007), Access dispute between Services Sydney Pty Ltd and Sydney Water Corporation – Arbitration report, 19 July 2007, ISBN 978 1 921393 21 1 (July)

ACCC (1997), Access pricing principles - Telecommunications, July

ACTEW Water (2013), *Water and sewerage - Schedule of charges from 1 July 2013*

Arlington, K (2013), *Green Square plan to recycle stormwater for residents*, Sydney Morning Herald, 23 September

Ben Lomond Water (2012), *Price and Service Plan for the Period 1 July 2012 to 30 June 2015* (June)

Barwon Water (2011), *Barwon Water Sewer Mining Guidelines - A toolkit for the establishment of a sewer mining project in the Geelong region* (February)

Baumol WJ and Sidak JG (1994), *The pricing of inputs sold to competitors*, Yale Journal of Regulation, Vol 11(1) pp171-202

Baumol W and Bradford D (1970), *Optimal departures from marginal cost pricing*, American Economic Review, Vol 60, June

Berg S.V (1999), *Basics of Rate Design: Pricing Principles and Self-Selecting Two-Part Tariffs*, University of Florida

Bonbright J, A Stern, and D Kamerschen (1988), *Principles of public utility rates*, Public Utilities Reports Inc, Arlington, Virginia.

Bowers J and Young M (2000) *Valuing Externalities: A method for urban water use*, CSIRO Urban Water Program

Campbell H. (1999), *Principles for pricing urban water*, Research report commissioned by the QCA, September

Cradle Mountain Water (2012), *Price and Service Plan - 2012-13 to 2014-15*

CIE (2007), Pric*ing Principles for recycled water and stormwater reuse*, paper prepared for the Steering Group on Water Charges (April)

CIE (2010), *Pricing principles for recycled water and stormwater reuse*, NWC Waterlines Report No 31 (October)

City West Water (2012), *Water Plan 2013-18*

City West Water (2013), *Pricing Handbook, July 2013 - June 2014*

COAG (1995), *Competition Principles Agreement*, Canberra

Cole, G. (2011), *Time of Use Tariffs: Reforming the economics of urban water supply*. Waterlines Report Series No 63. (October)

Coliban Water (2013), *Schedule of Fees and Charges 2013/14*

DEC (Department of Environment and Conservation), NSW, (2006), *Managing Urban Stormwater - Harvesting and Reuse*

Engineers Australia 2010*, Infrastructure Report Card 2010 - Queensland*

Eimco Engineering Technologies (2007), New Farm Park Water Mining Research & Development Trial Report (May)

ERA (2013), January, *Inquiry into the Efficient Costs and Tariffs of the Water Corporation, Aqwest and the Busselton Water Board*

ERA (2009), *Inquiry into Tariffs of Water Corporation, Aqwest and Busselton Water*, Final Report (August)

ERA (2008), Final Report – *Inquiry on Competition in the Water and Wastewater Services Sector* (June)

ERA (2005), *Inquiry on urban water and wastewater pricing*, Final Report, November

ESC (2013a), *Water Price Review 2013: Greater Metropolitan Water Businesses*, Final Report, Volume 1 (June)

ESC (2013b) *Water Price Review 2013: Regional Urban Water Businesses*, Final Decision, Volume 1

ESC (2012), *Trade Waste Customer Service Code - Metropolitan Retail and Regional Water Businesses* 2012 (January)

ESC (2009a), *2009 Metropolitan Melbourne Water Price Review*, Final Decision (June)

ESC (2009b), *Inquiry Into An Access Regime For Water and Sewerage Infrastructure Services* – Final Report Volume II: Analysis and Discussion of Issues (September)

ESC (2008), *2008 water Price Review, Regional and Rural Businesses' Water Plans 2008-13* (June)

ESC (2005), *Estimating Long Run Marginal Cost; Implications for Future Water Prices*

ESCOSA (2013a), *SA Water's Water and Sewerage Revenues 2013/14 - 2015/16*, Final Determination Statement of Reasons, May

ESCOSA (2013b), *Economic Regulation of Minor and Intermediate Retailers of Water and Sewerage Services*, Final Decision (June)

ESCOSA (2013c), *Sewerage, Trade Waste & Property-Based Charging*, Issues paper No.3 (August)

Frontier Economics (2013), *Review of urban water customer choice options, policy drivers and regulatory instruments*, A Report prepared for the National Water Commission, July.

Frontier Economics (2011a) *Efficient water resource pricing in Australia: an assessment of administered scarcity pricing in urban areas*, Waterlines Report Series No 44 (April)

Frontier Economics (2011b), *Externality pricing in the Australian water sector*, Waterlines No 43 (April)

Frontier Economics (2008), *Approaches to Urban Water Pricing*, NWC Waterlines Occasional Paper No 7 (July)

Gold Coast Water (2014), *Submission re SEQ Price Monitoring for 2013-15*. February

Goulburn Valley Water (2013) *Tariff Schedule 2013/14*

Goulburn Valley Water (2012), *Water Plan 2013-18*, Supporting Document F, Demand Forecast

Grafton Q and Kompas T (2007), *Pricing Sydney Water*, Australian Journal of Agricultural and Resource Economics 51(3), 227-241.

Grafton, R.Q. and Ward, M. (2007), '*Prices versus rationing: Marshallian surplus and mandatory water restrictions*', Australian National University Economics and Environment Network Working Paper EEN0707, October.

Hall M R (2013), *Review of Rainfall Tank Cost-Effectiveness in South East Queensland*, Urban Water Security Research Alliance Technical Report No.105 (February)

Hoffmann M, Worthington A, and Higgs H (2006), '*Urban water demand with fixed volumetric charging in a large municipality: the case of Brisbane*', The Australian Journal of Agricultural Economics, 50 (3), 347-59.

ICRC (2013), *Regulated water and Sewerage Services*, 1 July 2013 to 30 June 2019, Final Report (June)

ICRC (2007) August, *Water and Wastewater Discussion Paper 3: Prices*

ICRC (2004), *Investigation into prices for water and wastewater services in the ACT*, Final Report and Price Direction, March

IPART (2013) *Hunter Water Corporation, Prices of water, sewerage, stormwater drainage and other services*, 1 July 2013 to 30 June 2017, Final Report (June)

IPART (2012a), *Review of Prices for the Sydney Catchment Authority from 1 July 2012 to 30 June 2016*, Final Report

IPART (2012b) *Review of prices for Sydney Water Corporation's water, sewerage, stormwater drainage and other services, from 1 July 2012*, Final Report

IPART (2009), *Review of Prices for the Sydney Catchment Authority*, Final Report, June

IPART (2008), *Review of prices for Sydney Water Corporation's water, sewerage, stormwater and other services*, From 1 July 2008, Final Determination

IPART (2006), Pricing arrangements for recycled water and sewer mining - Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council (September)

IPART (1996), *Wyong Shire Council - Prices of water Supply and Sewerage Services*, July.

Joint Steering Committee for Water Sensitive Cities (2009), *Evaluating Options for Water Sensitive Urban Design - A National Guide* (July)

Local Government Association of South Australia (LGASA) (2012), *Fact Sheet 01 - Council Services* (July)

London Economics (1997), *Water pricing: the importance of long run marginal costs*, Report prepared for Ofwat (February)

London Economics (1995), *Pricing principles for water, sewerage and drainage service* (April)

Mackay Regional Council (2012), *Automatic Meter Reading*, Fact Sheet

Marsden Jacob Associates (MJA) (2004), *Estimation of Long Run Marginal Cost (LRMC), Report commissioned by the QCA* (October)

NERA Economic Consulting (2012), *Final Report - An Economic Framework for Estimating Long Run Marginal Costs in the Victorian Water Industry* (January)

NSW Government (2006), *Water Industry Competition Act 2006*

NSW Government, (1992) *Independent Pricing and Regulatory Tribunal Act* 1992

National Water Commission (NWC) (2011a), *The National Water Initiative - Securing Australia's Water Future* - 2011 Assessment (September)

NWC (2011b), *Review of Pricing Reform in the Australian Water Sector*

NWC (2010), *National Water Initiative (NWI) Pricing Principles*.

NWC (2007), *Using Recycled Water for Drinking: and Introduction*, Waterlines Occasional Paper No 2.

NWC (2004), *National Water Initiative*

Ofwat (undated), *Report A: The role of LRMC in the provision and regulation of water services*.

Ofwat (2013), *Future access pricing in the water sector*, A discussion paper.

Ofwat (2012), *Charging principles and guidelines: planned revisions* published September 2012.

Ofwat (2009), *Future water and sewerage charges 2010-15*: Final determinations.

Ofwat (2003), *Surface Water Drainage Charging Policy*, RD 35/03, September

Ofwat (2001), *Guidance on LRMC Estimation*, MD170, Report C, May

OTTER (2012), *2012 Price Determination Investigation – Regulated Water and Sewerage Services in Tasmania* – Final Report

Productivity Commission (PC) (2013), *National Access Regime – Draft Inquiry Report*, Canberra (May)

PC (2011), *Australia's Urban Water Sector*, Inquiry Report, August.

PC (2008), *Towards urban water reform*: a discussion paper, Melbourne

PC (2001), *Telecommunications Competition Regulation*, Inquiry Report, December

QR Network (2010), *QR Network's 2010 Access Undertaking* – As approved 1 October 2010 (October)

Queensland Urban Utilities (QUU). (2013a), *QCA Interim Price Monitoring Information Return 2013-15.* June

QUU (2013b), *QUU Schedule of Fees and Charges* http://www.urbanutilities.com.au/Your_account/Water_and_sewerage_charges/

QUU (2013c), *Initial Submission - Long-term Regulatory Framework for South East Queensland Water Entities.* August

QUU (2012), *Water Netserv Plan Part A*

QUU (2011), Trade Waste – Environmental Management Plan (July)

QWC (2010) *South East Queensland Water Strategy*

Queensland Competition Authority (QCA) (2014), *Long term regulatory framework for SEQ water entities*, Position Paper, February

QCA (2013), *Statement of Regulatory Pricing Principles*, August.

QCA (2010), *Gladstone Area Water Board: Investigation of Pricing Practices*. Final Report

QCA (2005), *Gladstone Area Water Board: Investigation of Pricing Practices*. Final Report

QCA (2002), *Gladstone Area Water Board: Investigation of Pricing Practices*. Final Report

QCA (2000), *Statement of Regulatory Pricing Principles for the Water Sector*

Queensland Competition Authority Act (QCA) (1997)

QCOSS (2012) *Ebbs and Flows: Low Income Consumers and Water in Queensland*, Draft for comment, October

Redland City Council (2013), *Fact Sheet - Water and Wastewater Charges 2013/14* http://www.redland.qld.gov.au/SiteCollectionDocuments/Fact_Sheets/Water/FS500%20Water%20Charges%202013-2014.pdf

SA Water (2013), *Trade Waste General Policy* - Fact Sheet (January)

SA Government (2013), *Water Industry Act 2012*

SA Government (2002), *Essential Services Commission Act*

SKM (2013), *Review of Demand Projections For Queensland Urban Utilities and Unitywater* - Final Report to the Queensland Competition Authority (January)

Southern Water (2012), *Price and Service Plan* - 2012-2015

South East Water (2013), *South East Water Price Manual, 2013-14 Tariffs and Charges*

South East Water (2011), *Productivity Commission, Draft Report, Australia's Urban Water Sector, South East Water Response*. Melbourne: South East Water.

Tasmanian Government (2008), *Water and Sewerage Industry Act*

Taswater (2013), *Unconnected Serviced land fees and charges*, www.taswater.com.au/your-account/Other-Fees-and-Charges/Unconnected-Serviced-Land

Taswater (2012), *Corporate Plan*

Tilton, J.E. (1995), *Assigning the liability for past pollution: lessons from the US mining industry*, Journal of Institutional and Theoretical Economics 151 (1), pp.139-154

Townsville City Council (2013)*, Utility Charges - Water Charges.*

Turvey R, (2000), *What are marginal costs and how to estimate them?,* Technical Paper 13.

Turvey R, (1976), *Analysing the Marginal Cost of Water Supply*, Land Economics 52(2) May.

Unitywater (2013a), Price monitoring submission 2013-15, submitted to the QCA, June

Unitywater (2013b), Unitywater New Pricing Structure http://www.unitywater.com/pricing#pricing_structure_overview

Unitywater (2013c), *Long term regulatory framework for SEQ entities*, submission to the QCA, August.

Unitywater (2011), Trade Waste Management Plan, No. 03967 (December)

Victorian Government (2012), *Water Industry Regulatory Order (WIRO).*

Victorian Government (1989), *Water Act 1989*

Water by Design (2010), *A Business Case for Best Practice Urban Stormwater Management* (Version 1.1), South East Queensland Healthy Waterways Partnership (September)

Water Corporation (2013a), *Rates and Charges*, http://www.watercorporation.com.au/home/business/my-account/rates-and-charges

Water Corporation (2013b), *Sewer Mining - Information Sheet* (April)

Water Services Association of Australia (WSAA) (2012), *Australian Sewage Quality Management Guidelines* (June)

WSAA (2005), *Pricing for Recycled Water*, Occasional Paper No 12, February.

WSAA (2003), *Urban Water Demand Forecasting and Demand Management*, Occasional Paper No 9. November

WBM Oceanics (1999), *Stormwater Reuse - a Balanced Assessment*, Stormwater Industry Association Conference, Sydney.

Westernport Water (2011), *Westernport Water Response to the 2013 Water Price Review*.

Watkinson G (2006), *Water Pricing: Concepts and Principles*, Presentation to the IIR Water Pricing Conference, Sydney, October.

Worthington A, Higgs H and Hoffmann, M (2006), *Modelling residential water Demand in Queensland, Australia: a comparative analysis of pricing structures and estimation techniques*, Working Papers Series, 06/26, University of Wollongong.

Xayavong, V., Burton, M. and White, B. (2008), *'Estimating Urban Residential Water Demand With Increasing Block Prices: The Case of Perth, Western Australia'*, Paper prepared for presentation at the 52nd Annual Conference for the Australian Agricultural and Resource Economics Society, Canberra, February

Yarra Valley Water (2012), *Water Plan 2013/14 to 2017/18*, October.

Young, M (2000), *Managing Externalities: Opportunities to Improve Urban Water Use*, CSIRO Urban Water Program.