



**SPECIAL  
SECRETARIAT  
FOR WATER**



**MINISTRY OF  
ENVIRONMENT  
ENERGY &  
CLIMATE  
CHANGE**

## **REGULATING URBAN WATER AND SEWERAGE TARIFFS**

### **GUIDING PRINCIPLES AND GENERAL APPROACH**

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# 1 Introduction

In line with its recently established responsibilities (Law 4117/2013 and JMD 322/2013), the Special Secretariat for Water is developing a new regulatory framework for the pricing of water and sewerage services in Greece across the entire value chain, from 'catchment to tap'. This will be an evolutionary process, given the absence of a single pricing policy framework at national level. It is noted that the economic regulation of water and sewerage services is a complex task on which we are only just embarking and such a regulatory framework will continue to evolve in consultation with interested parties.

On this basis, the present document is being released only for information purposes and does not reflect final positions. It presents a general regulatory approach for pricing of urban water and sewerage systems, especially those that are privately operated. It is expected that the principles and approach described in the present document will be gradually applied nationwide, although **the framework is likely to be further refined over time and adjusted** (in consultation with all interested parties) to take account of:

- o The specific circumstances of municipal and other service providers across the country (which are typically much smaller and publicly, rather than privately, owned and operated).
- o More detailed rules and guidance that are needed to give effect and greater clarity to many of the mechanisms we are establishing and describe in this paper.
- o Practical experience and lessons learned in applying the principles and approach we describe in the present note.

## 1.1 Overview of the present regulatory framework approach

In general terms, the present regulatory framework approach entails setting a **binding revenue requirement** so that the **reasonable costs** of providing water and sewerage services can be recovered by the regulated entities or service providers, consistent with the requirements of the European Union (EU) Water Framework Directive<sup>1</sup>, as transposed into Greek law (Law 3199/2003 and Presidential Decree 51/2007, and as amended by Law 4117/2013).

Having established the total cost that the service providers would incur in providing the required services efficiently, the providers would then set the actual tariffs to be charged to each customer category subject to the binding allowed revenues and the

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<sup>1</sup>Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy.

approval of the State. The present paper focuses exclusively on tariff levels or revenues that need to ensure that the (efficient) cost of supply is fully recovered, irrespective of the tariff structure chosen.

## 1.2 Structure of this document

This note sets out the proposed approach to setting and adjusting revenues and tariffs in the general manner just described for **urban water and sewerage systems** (and especially those that are privately operated). In particular, the remainder of this paper:

- o Lists the regulatory objectives that we have established and which guide the tariff setting procedures (Section 2).
- o Discusses the proposed form of regulation, including the length of time for which revenues and tariffs are set and whether inflation and tax should be taken into account when calculating allowed revenues (Section 3).
- o Describes the costs comprising the baseline maximum revenue requirement and develops in greater detail the proposed treatment of the various cost elements and also the revenues that might be earned from other business activities (Section 4).
- o Sets out a preliminary approach to adjusting revenues to account for (among other things) outturn costs, uncertainties and service provider performance levels (Section 5).

## 2 Objectives of the pricing regulation framework

The fundamental purpose of regulating and ensuring the effective oversight of the water and sewerage providers is to ensure, in the absence of competition, that **service providers offer services that customers want at reasonable tariffs**. Moreover, the oversight function must be exercised in such a way as to provide both customers and investors with confidence i.e. regulation must be **predictable and transparent**. Consistent with these aims, the objectives of the proposed pricing framework are to:

- o Protect consumers from any potential abuse of monopoly.
- o Provide reasonable assurance that, provided the service providers are efficient, well managed and appropriately financed, they will receive tariff revenues that will cover the costs (including a reasonable return on capital) of providing their services.
- o Provide for efficient and evolving allocations of risk between the service providers and consumers.
- o Facilitate the financing of required and efficient investments in water and sewerage infrastructure.
- o Provide incentives for the service providers to deliver outcomes consistent with consumer needs and priorities.
- o Avoid undue discrimination between consumers with reference to the principles of consistency and cost reflectiveness and to any social objectives directed by the State.
- o Ensure that the framework is transparent, that it follows principles consistently, and that tariff proposals and determinations are evidence-based and are informed by independent assessments and by effective consultation with interested parties.

## 3 Form of regulation

### 3.1 Type of control

Tariff setting calculations generally start with a specification of required revenues. Having established required revenues, a regime can specify a control at a revenue level or an average price level.

A key consideration in this regard is whether or not it is appropriate to leave service providers with volume risk, and a corresponding incentive to maximise consumption. For environmental purposes, the introduction of incentives to maximise consumption is considered undesirable, for this reason **a revenue-based control has been adopted** rather than a price-based control. Moreover, there is evidence that revenue cap regulation permits a lower cost of capital (and therefore lower tariffs) as the service providers are protected from demand risk (which is arguably the main vehicle for systematic risk in the generality of network infrastructure businesses).

As the nature of a revenue cap regime is that service providers are protected for changes in volume, it will be necessary to **allow for adjustments for differences in billed water consumption and the mix across different customer classes between forecast and actual**.

### 3.2 Periodicity of control

The regulatory control period (i.e. the period of time for which the revenue requirement is set) has been established in legislation (Law 4117/2013) as being **five (5) years**. This is consistent with similar regulatory environments elsewhere that generally specify control periods of between four and eight years.

A particular benefit of a relatively long multi-year regulatory period is that it is less burdensome on both the Secretariat (regulator) and the service providers because a detailed review of costs only occurs every few years. Depending on the incentive mechanisms that might be developed, a longer period may also provide stronger incentives on operators to outperform ex ante assumptions for costs and outputs.

### 3.3 Real or nominal

There are two alternative approaches to ensuring that service providers recover the cost of inflation:

- o Forecast costs in nominal terms and not index allowed revenues to inflation.
- o Forecast costs in real terms and index allowed revenues to inflation.

As inflation is largely outside of the service provider's control, **inflation is allowed to be fully passed-through to allowed revenues**. By forecasting costs in nominal terms, the service provider is exposed to differences between projected and actual inflation (until the next revenue adjustment), which under a multi-year regulatory period could expose service providers to significant inflation risk. Hence, **an approach that forecasts costs in real terms and then indexes allowed revenues to inflation is preferable**.

There is also the question of what measure of inflation is appropriate to use. In principle, the chosen index should be one that reflects the likely increases in prices faced by the service providers, as well as being transparent and practical to implement. In practice, it is difficult and contentious to develop a weighted cost index that reflects cost pressures on the wages, materials and other input costs of the service providers. For this reason, the use of a broad-based index, that is free of interpretation and entirely outside of the control of the regulated entities, is preferred and for this purpose **the Greek Consumer Price Index** calculated by the Hellenic Statistical Authority is adopted (at least initially).

### 3.4 Pre-tax or after-tax

There are two main alternative approaches to the treatment of taxation costs where the service provider is a private entity:

- o Incorporate tax through a pre-tax rate of return.
- o Calculate a separate allowance for tax on profits as a separate amount in the composition of the required revenues and use a post-tax rate of return.

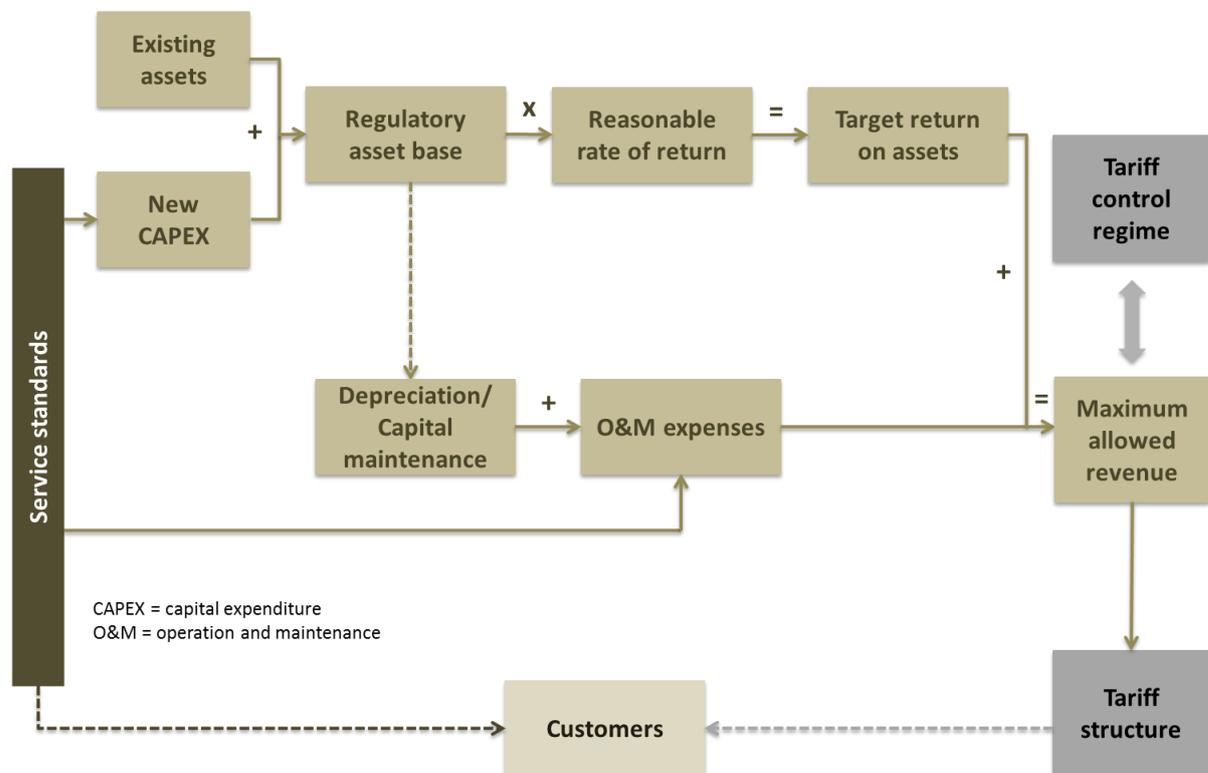
The latter option would more accurately estimate the tax liability that would be achievable by a well-managed privately owned business based on Greece's taxation rules. However, due to the fact that tax law can be complex, a **pre-tax approach** is adopted for setting allowed revenues.

## 4 Setting the allowed revenues

### 4.1 The build-up of allowed revenues

To determine the reasonable costs to be recovered (and therefore set allowed revenues), we will adopt a 'building block' approach that identifies and calculates the financial (forward looking) costs of the water and sewerage service providers. The overall approach to tariff setting and the building blocks are illustrated in Figure 1.

**Figure 1 The building block approach to tariff setting**



The figure shows the various building blocks for determining the cost of service, the summation of which yields the maximum revenue allowed to the service providers (before any adjustments for the factors discussed in Section 5). These tariff levels are then translated by the service providers into tariff structures, which determine the amounts paid by consumers. Finally, the tariff control regime defines how tariff controls extend into the future and for what time duration.

The 'building blocks' or cost components consist of the following:

- o **Operating expenditure** – this includes the cost of operating the water supply and sewerage systems such as labour costs, other input costs

(energy, chemicals, materials), administrative costs, and the cost of employing third parties. Operating costs can include both fixed and variable components.

- o **Maintenance expenditure** – this consists of routine maintenance costs related to keeping assets in serviceable condition throughout their economic or useful life.
- o **Return of capital** – this is broadly the cost of replacing old assets when they reach the end of their useful life and is either measured by a depreciation charge that records the reduction in value of an asset over time or by an average expenditure cost required to maintain the network at existing levels of serviceability.
- o **Return on capital** – this is the return required by debt and equity holders to finance the investment in capital assets. This return applies both to the existing asset base and new (prudent and efficient) capital expenditure.

The building block model can also be broadly represented mathematically with the following two equations – the revenue equation and the asset base roll-forward equation:

$$(1) \text{REV} = \text{opex} + D + \text{ROC} \pm \text{revenue adjustments}$$
$$= \text{opex} + D + (\text{WACC} \times \text{RAB}) \pm \text{revenue adjustments}$$

and

$$(2) \text{New RAB} = \text{Previous RAB} + \text{capex} - D$$

where:

- o REV = regulated revenue requirement
- o opex = operating and maintenance expenditure
- o D = depreciation
- o ROC = return on capital
- o WACC = weighted average cost of capital (real, pre-tax)
- o RAB = regulatory asset base
- o capex = capital expenditure.

Ignoring any revenue adjustments or incentive rewards and penalties, these equations together ensure that the present value of the allowed revenue stream is equal to the present value of the expenditure stream of the regulated service providers.

In the sub-sections that follow we describe the various cost elements in greater detail as well as our proposed treatment of sources of income that service providers may

have other than those deriving from water and sewerage tariffs. Revenue adjustments arising from incentive and other mechanisms are discussed in Section 5.

## 4.2 Operating and maintenance expenditure

### 4.2.1 Cost components

The build-up of operating expenditure consists of all typical and reasonable operating and maintenance expenses, including:

- o Salaries and employee expenses.
- o Contracting and third party costs.
- o Utility expenses.
- o Chemicals, materials and consumables.
- o Routine maintenance.
- o Bad debt costs.
- o Administration costs, including corporate overheads.

### 4.2.2 Raw water costs

In addition to the above costs, an important input cost for all urban water and sewerage service providers is the cost of raw water, the price of which is likely to be administratively set and outside the control of the urban service providers. For the purposes of developing allowed revenues and tariffs for these providers, therefore, **the cost of raw water will be treated as a pass-through parameter** that is recoverable from end-use customers. We realise that treating the full cost of raw water (and not just the unit price) as a pass-through can dilute incentives to reduce ‘non-revenue’ water. However, that can be addressed by developing separate performance obligations that would set penalties/rewards for the target achievement of particular levels or proportions of non-revenue water.

The level of remuneration for the provision of raw water, consisting of the continuing cost of capital maintenance and of the expansion (if needed) of upstream assets and/or the costs of operating those assets, plus additional charges (if any) for the opportunity or resource cost of the water and for economic and environmental externalities, represents a separate and significant work stream of the Special Secretariat for Water. Specifically, the Secretariat will be developing principles and estimates of the cost of raw water for the country as a whole, taking into account the competing uses of water (irrigation, industry, household, electricity production) consistent with Article 9 and Annex III of the EU Water Framework Directive.

### 4.2.3 Principles for assessing the reasonableness of opex forecasts

The assessment of operating expenditure will be informed in the first instance by **forecasts and projections prepared by the service providers**, together with descriptions of material assumptions and explanations for significant changes in levels of spend. The service providers are likely to be best placed to identify and quantify the principal cost drivers.

One of the drivers for operating expenditure forecasts would be the scope for efficiency improvements. It may be appropriate to include top-down efficiency assumptions in operating expenditure forecasts, or, alternatively, the forecasts themselves may include the effects of business responses to changing requirements, so that efficiency improvements are built into the underlying projections.

## 4.3 Capital costs

There are two aspects of capital costs: the cost of maintaining capital (i.e. return *of* capital) and the cost of finance (i.e. return *on* capital).

### 4.3.1 Capital maintenance (depreciation)

In economic terms, the cost of maintaining capital relates to the **physical** capital in the business, its underground and aboveground assets. Maintenance often involves lumpy expenditure, with major renewal or replacement of deteriorating assets, but it is conventional to allocate these costs over the period of service over which the assets deteriorated.

There are two conventional accounting concepts:

- o One is forward-looking, recognising that the costs of providing a service today include some of the cost of remedying the deterioration of assets at some time in the future (some of the deterioration would be associated with the service provided today). This is a replacement cost accounting concept.
- o The other concept is a backward-looking concept, recognising that the costs of providing a service today include some of the original cost of the assets that are deteriorating. This is a historical cost accounting concept.

For water and sewerage businesses, it is commonly recognised that accounting for the maintenance of underground assets using a backward-looking concept is problematic as it is often difficult or meaningless to determine a finite asset life. Instead, a depreciation charge can be determined on a forward-looking basis as the estimated, anticipated level of annual expenditure required to maintain the operating capability of the network over a reasonably long period of time.

Moreover, for charging purposes **there should be 'broad equivalence' between capital maintenance or depreciation charges and the anticipated annual costs of maintaining the physical asset base.** Any material divergence between the amounts charged to consumers and the anticipated annual spend over a period of time will tilt the profile of charges between today's customers and tomorrow's customers.

Given these considerations, the proposed approach is for depreciation to be assessed with reference to the following principles:

- o There should be a systematic return of value in the regulatory asset base to the service provider over the expected service lives of the relevant assets – it is noted that the reference here is to useful or economic asset lives rather than accounting asset lives. Accounting lives are set for tax and other reasons and often bear little resemblance to the actual useful lives of assets.
- o There should be broad equivalence between the allowance for depreciation and the prospective average annualised costs of maintaining and renewing the relevant assets.
- o In exceptional circumstances and if properly justified, it may be appropriate to defer or accelerate depreciation to facilitate financing or to provide an acceptable transition to a changed level of tariffs.

#### 4.3.2 Financing costs (return on capital)

There is an important distinction between the physical assets, which drive the costs of capital maintenance (as discussed in Section 4.3.1 immediately above), and the **financial net investment** by the owner/operator in those assets, which drives the cost of finance.

The purpose of recognising financing costs, particularly in the context of private ownership/operation, is to maintain the confidence of investors and to provide a foundation for incentives for continuing investment. Confidence is typically established through:

- o An initial value of an asset base that corresponds with the reasonable expectations of investors, and
- o A mechanism for rolling that value forward that takes account of both new investment and the amounts charged to consumers in respect of capital maintenance charges (depreciation).

To ensure the present value of future cash flows corresponds with those values, an allowance for financing costs on that value must be included as part of the building block of the revenue requirement, and thus tariffs. **The financing costs are typically accounted for through a weighted average cost of capital (WACC) applied to the whole asset base, with the latter calculated as the average of the start of year and end of year regulatory asset values.** Below an approach to setting a rate of return and the treatment of the regulatory asset base (RAB) is set out.

## The allowed return on capital

The rate of return or WACC takes into account the two components of the cost of capital, the cost of debt and the cost of equity, and is calculated by taking the weighted average of the two, weighted by the relative importance of each type of financing in a company's capital structure.

Consistent with our tax treatment discussed in Section 3.4, a **pre-tax WACC is employed**. Under this approach, a pre-tax cost of equity percentage must be determined that incorporates both the rate of profit reasonably expected by shareholders (after tax) and the level of tax on that profit. Mathematically, this requires multiplying the after-tax cost of equity by the factor  $1/(1 - t)$ , the 'tax wedge'.

### *Cost of equity*

In estimating the cost of equity, the fundamental question to be addressed is what rate of return would be necessary to attract equity finance? For this purpose, **the Capital Asset Pricing Model (CAPM) is adopted**, the conventional model generally employed (outside North America) to address this question, although another theoretical model would be considered, if there is a consensus view among leading regulatory authorities in the EU and elsewhere that the other model better meets the objectives of similar regulatory arrangements for water and sewerage infrastructure-based businesses.

The central tenet of CAPM is that the main explanatory factor for the rates of return implicit in market valuations is an asset's (perceived) sensitivity to systematic risk (also known as non-diversifiable risk or market risk). The level of systematic risk is represented by a number referred to as beta ( $\beta$ ). The standard CAPM formula for the minimum expected rate of return (after taxes) on an investment ( $r_{\text{expected}}$ ) that would make the investment attractive to investors is:

$$r_{\text{expected}} = \text{RFR} + \text{MRP} \cdot \beta_{\text{investment}}$$

In this formula:

- o The RFR is the risk-free rate, the rate of return that would be available from a risk-free investment
- o The MRP is the market risk premium, the additional return (over the risk-free rate) that can be expected from a balanced portfolio of investments in an investment market
- o  $\beta_{\text{investment}}$  is the exposure to market risk in the investment, the extent to which the investment's returns and the returns from the wider market are expected to co-vary (i.e. vary in sympathy).

The theory applies to any investment asset, but is most useful when thinking about the cost of equity (CoE), post-tax, with reference to an equity beta:

$$\text{CoE}_{\text{post-tax}} = \text{RFR} + \text{MRP} \cdot \beta_{\text{equity}}$$

Each of these variables needs to be estimated, and it is probably fair to say they are all contentious. In deriving our estimates **we will examine regulatory precedents on the cost of capital** in both the water sector and related sectors (e.g. energy networks in Greece) and also refer to international data and comparator companies where necessary to inform the estimation of certain parameters.

### *Cost of debt*

In principle, identifying the cost of debt can be relatively straightforward – it is the interest payable on the regulated entity’s debt, which can usually be observed from the service provider’s financial accounts. In practice, it is not that straightforward as the cost of debt allowance in the WACC is generally estimated in advance, so accounts are not yet available.

In broad terms, there are two methods for estimating the cost of debt:

- o Embedded cost of debt – the cost of debt is determined on the basis of the actual cost of debt of the regulated company in question.
- o Market based estimation – the cost of debt is estimated by reference to businesses with comparable regulatory and business risks. This can be done by assessing observed yields for an index of companies or through a combination of the risk free rate and a debt premium.

A significant problem with the second approach is determining the benchmark entities that might be relevant for Greek water and sewerage service providers. There are no obvious comparators within Greece for these companies and the question is whether there would be any relevance in assessing yields of companies that are generally listed and of investment grade in other countries. This approach therefore intends to rely on the embedded costs of debt (where relevant) and also attempts to assess what the future cost of debt might be through recent issues and other markers, to derive a **weighted average cost of debt**.

### *Weighted average cost of capital (WACC)*

As mentioned above, the cost of capital is applied as a percentage to the Regulatory Asset Base to determine the return that companies are allowed on their investment. The weighted average cost of capital (WACC) can be calculated from the cost of equity, CoE and the cost of debt, CoD, calculated on the basis we have described above, together with a company’s gearing(g), i.e. the proportion of a company’s capital that is made up of debt as follows:

$$\text{WACC (pre-tax)} = g \times \text{CoD} + (1 - g) \times \text{CoE} \times \frac{1}{(1 - t)}$$

where t is the corporation tax rate.

## The asset base

A core feature of water and sewerage businesses is that they are capital intensive. The network assets are economically sunk costs with practically no alternative use. They require continuing investment to maintain and extend their service capabilities and adapt to changing patterns of demand and supply. To secure finance, it is necessary to create the conditions for owners, lenders and service providers to be confident that the business will be able to sustain high enough revenues to remunerate that finance.

The concept of the Regulatory Asset Base (RAB) provides the foundation for this confidence, as it is effectively an expression of regulatory commitment regarding the basis of remunerating finance. The design of the mechanisms and safeguards surrounding the RAB is therefore critically important. More particularly, the critical objective is to underpin confidence that the opening value and the basis for rolling forward the RAB are permanent, and will provide a firm foundation for future investment decisions. This is considered a necessary condition for effective investment incentives and a low cost of capital (and hence customer tariffs).

### *Setting an opening asset value*

In line with this objective, the following criteria for establishing the opening value of the RAB for any regulatory decision are indentified (they are presented in order of importance):

- o A value that rolls forward directly from the value used in previous decisions.
- o A value that reflects any explicit, implied or perceived regulatory commitment in previous decisions.
- o A value that, moving forward, keeps the balance of interests between customers and service providers broadly stable but that remedies any widely perceived current inequity in the balance of interests between customers and service providers.
- o A value derived from an accounting methodology for the underlying fixed assets.

In an established regime, the first three of these criteria will coincide and it would normally only be appropriate to depart from them if the perception of inequity were strong enough to render the RAB unsustainable without a correction. Given the absence of an explicit regulatory framework in the past, **it would be expected the opening value of the RAB to largely reflect prevailing prices for water and sewerage services.**

The fifth criterion is still widely used by many regulators, but it is believed it may be unimportant by itself (except where there has been a history of setting prices to cover a level of return on an accounting value of fixed assets). There are two factors, one

theoretical and one practical, which can make accounting measures of value an unsafe basis for continuing economic regulation:

- o Unlike business assets in many industries, the cost of creating a water/sewerage network asset is largely unrelated to the cost of renewing and replacing it. An extension to the network will typically be installed in a single project, as a whole, but it is relatively unusual to be replaced as a whole. More usually, the asset will be renewed or replaced incrementally as parts of it deteriorate, and the costs of incremental renewal will be structured differently to the cost of creation. This means that accounting measures of value, which generally relate to the sunk cost of creating (or re-creating) assets, will have only qualified relevance to any economic measure of on-going cost and efficient pricing decisions.
- o Accounting measures of value typically depend on judgements relating to asset lives (and, for current cost methods, replacement costs), so that new information or changes in asset management techniques may lead to unanticipated changes in accounting values. We consider such changes to be counter-productive in an incentive-based regulatory regime.

### *Rolling forward the asset base*

The basis for rolling forward the value of the asset base is given by the asset base roll-forward equation in Section 4.1, that is:

$$\text{New RAB} = \text{Previous RAB} + \text{capex} - D$$

It is generally accepted that statutory accounting frameworks are not suitable for rolling forward an asset base underwritten by private participants because accounting policies cannot be sufficiently constrained to meet the criteria for effective economic regulation. **It is therefore appropriate (and likely) for the value of RAB to diverge from conventional accounting asset values.**

As discussed in Section 3.3, the adoption of inflation indexation of allowed revenues is proposed. By indexing revenues to inflation, **the RAB is effectively indexing to inflation** as well, given that both depreciation and return on capital are components of allowed revenue. This means that at the end of the regulatory period, the RAB will also need to be adjusted for inflation.

### *Capital expenditure*

Capital expenditure is an input to the RAB and thus a factor in the assessment of financing costs. In broad terms, there are two alternatives with regards to the timing of capex additions to the RAB:

- o Capex is added to the RAB when it is incurred/spent.
- o Capex is added to the RAB when it is commissioned, with the total value grossed up to account for returns on the asset during construction.

Both approaches have largely the same effect on the incentives of the service providers because (assuming the total value is grossed up for returns during construction correctly) both are equivalent in present value terms. The key advantage of **adding capex when it is incurred** (the first option and our preferred approach) is that it is easier to administer because there are no complexities related to capex being incurred in one regulatory period but not commissioned until the next. The key disadvantage is that consumers may pay for capex that is not yet operational and will not be for some years ahead (thereby distorting allocative efficiency). However, this effect is only significant for large assets with long construction periods, and is somewhat muted by revenue smoothing (see Section 5.4) anyway.

As with opex forecasts, we would wish to ensure there are adequate safeguards in place to ensure that the consumer interest is suitably protected. These may involve:

- o Detailed **scrutiny of capital programmes** to acquire evidence of need and cost.
- o Information from sector participants to verify the assessment of need and willingness to pay for enhancements. This may involve consultation processes led by service providers or ourselves.

Finally, it is noted that any **capital expenditure funded by third parties**, including customer contributions and government grants, **should be excluded from the RAB** on the basis that the service provider did not provide funding for the asset, and therefore should not be entitled to earn a return on it.

## 4.4 The treatment of other revenues

The specification of allowed revenues discussed thus far has implicitly assumed that it relates to the delivery of 'core' water and sewerage services, which typically include:

- o Treatment of water and sewage.
- o Transportation of water and sewage through a network of water supply and sewerage pipelines.
- o Collection and disposal of sewage and sludge.
- o Selling (and billing for) water and sewerage services to customers.

In addition to the provision of these 'core' activities, service providers also generate (or may potentially earn) revenues from:

- o Related but peripheral sources such as new connection charges, disconnection charges, meter replacement charges, fees for repairing faults, and network extensions and branching (involving private contributions).

- o Other permitted business activities that relate to markets outside the normal scope of activities for water and sewerage businesses - these may consist for example of flood protection and management of storm water drainage systems, the operation of industrial waste, power generation from renewable energy sources, construction activities, and laying fibre optic cables and offering telecommunications services.

These activities generate both costs and revenues and therefore must be dealt with in some way for the purposes of deriving the allowed revenues. There are generally two possible approaches:

- o The projected revenues from the other activities can be used to reduce the revenue requirement; or
- o Costs and revenues from the core and other services are treated separately, so that the revenue requirement for the core services is set to recover costs for that part of the business only and it is not reduced to take account of any revenue earned from the other services.

The decision on which approach to adopt is usually made on practical grounds - it can be difficult to accurately separate out the costs associated with non-core activities and therefore revenues (or a proportion of revenues) are simply deducted. It is therefore **proposed allowing the costs to be excluded if the service providers can accurately estimate (and verify) them, with a fall-back option to deduct the projected revenues from these other activities.**

## 5 Revenue adjustments

The baseline revenue requirement is set on an ex ante basis for the regulatory control period. However, there may be a need to adjust revenues either to account for outturn costs and activities (i.e. on an ex post basis) or to modify the profile of revenues to smooth out any large fluctuations in underlying costs. It is proposed any such mechanisms be specified on an ex ante basis, so that they inform future decisions by the service providers and do not retrospectively alter the impact on service providers of their past decisions.

The mechanisms for this part of the regulatory regime require further development, but some initial thoughts and key issues are set out here:

- o **Efficiency sharing mechanisms** i.e. adjustments to revenues deriving from opex and capex savings (compared to projections used for setting the revenue requirement), but applied in a way that incentivises service providers to pursue such efficiencies while simultaneously ensuring that the benefits are shared with end-use customers.
- o Those that **reflect the uncertain nature of costs** and therefore reduce the risks of the service providers for those matters that are largely or entirely outside their control, including straight cost pass-through mechanisms.
- o **Incentive payments and penalties** that increase/decrease the realised revenues (and therefore profits) of the service providers consistent with a transparent performance regime that sets clear quality and performance targets.
- o **Smoothing mechanisms** that moderate changes in revenues and the impact on customers.

Finally, as it is impossible to foresee and account for all conceivable eventualities, it is believed that in some limited and exceptional circumstances there may be a case for re-opening the revenue determination. This matter is discussed at the end of this section.

### 5.1 Treatment of capex and opex underspends

#### 5.1.1 Capital expenditure savings

##### No sharing within the regulatory control period

Capital expenditure affects service providers' revenues through the return on capital and depreciation components of allowed revenues. Some revenue cap regimes

incentivise efficient capital expenditure by setting allowed revenues using forecast expenditure and not making any adjustments for the difference between forecast and actual until the end of the regulatory period. **At the end of the regulatory period the RAB is updated based on actual capital expenditure** undertaken during the period and actual or forecast depreciation, but there is no reconciliation for the over/under-recovery of allowed revenues due to capex under/over spends. This means that:

- o If the service provider 'beats' the capex allowance underpinning the return on capital calculation used for setting allowed revenues, then it keeps the difference (the return on the expenditure not undertaken) until the next regulatory period
- o From the next regulatory period onwards, revenues are set based on the actual capex incurred, and therefore consumers would reap the benefit of more efficient capital expenditure.

### **Efficiency benefit sharing mechanism**

The key weakness of the above approach to incentivising efficient capital expenditure is that it discourages savings late in the regulatory period, because the service providers will keep the benefit for a shorter period. Service providers therefore have an incentive to delay expenditure until the beginning of the next regulatory period and retain the benefit for longer.

**A capital expenditure sharing mechanism could be used to achieve constant incentives in each year of the period.** A sharing mechanism could operate as follows:

- o At the regulatory review, the over/under spend on capex is calculated for the recently completed regulatory period
- o The value of the cumulative over/under spend is calculated in present value terms
- o Apply a particular sharing ratio to this amount. The ratio applied to under/over-spending can be asymmetric, to further protect against consumers from the risk of the service provider over-spending.
- o The above calculations then result in an adjustment to allowed revenues for the forthcoming regulatory period.

This is not the only mechanism that might be employed. An equivalent or similar outcome could be achieved through 'rolling incentive mechanisms', which would allow the service providers to retain the benefits of an efficiency improvement for a period of time (say, five years), after which the improvement is incorporated into the revenue requirement calculations. For example, if an efficiency gain is made in year three of the regulatory control period, the revenue requirement would not adjust to incorporate this until year three of the next control period.

Our assessment is that while capital expenditure sharing mechanisms would ensure that the incentives on the service providers are constant in each year of the

regulatory period, they add more complexity to what is a nascent regulatory regime. It is therefore **proposed adopting a simple incentive based regime initially (i.e. with no clawing back of savings during the control period *with the exception of unjustified deferral of capital expenditure*), and consider more complex sharing mechanisms in future.**

## **Ex post reviews**

Another regulatory tool is the conduct of ex post reviews of capital expenditure. **If certain criteria are met, the disallowed portion of the capital expenditure would be excluded from the RAB.** The criteria against which capital expenditure on an ex post basis could be disallowed might be as follows:

- o Capital expenditure incurred that was above the allowance and is deemed to be inefficient or imprudent
- o Capital expenditure incurred due to inflated 'related party' margins
- o Capitalised operating expenditure resulting from a change in capitalisation policy that had already been recovered through allowances for operating expenditure.

As intimated above, we would also wish to make **ex post adjustments for capital expenditure that was deferred without adequate justification.** This is because service providers should be rewarded for reducing construction costs, for example, or identifying alternative less expensive projects that achieve similar outcomes, but not for simply deferring capex to spend less than the regulatory allowance.

### **5.1.2 Operating expenditure savings**

#### **Opex incentive mechanisms**

As with capital expenditure, one way to incentivise efficient opex is to:

- o Set allowed revenues using forecast operating expenditure and make no adjustments for the difference between forecast and actual expenditure, but
- o When allowed revenues are set for the next regulatory period, the starting point would reflect historical operating expenditure (and therefore usually be lower if savings were made in the last regulatory period) which would benefit consumers (the 'ratchet effect').

Alternatively, an operating expenditure sharing mechanism could be adopted that would work much the same as a capital expenditure sharing mechanism – allowed revenues would be adjusted at regulatory reviews to ensure that the benefit/cost of opex under/over-spends are always kept (for a fixed period of time) based on a sharing factor, regardless of when they occur. Another possibility would be allowing the service providers to retain the benefits of an efficiency improvement for five

years, after which the improvement is incorporated into the base revenue requirement calculations.

## Difference between incentive mechanisms for capex and opex

Opex and capex sharing mechanisms have slightly different implications due to the way they are incorporated into allowed revenues (opex directly, capex indirectly through depreciation and return on capital over time). The use of capex sharing mechanisms is primarily about ensuring constant incentives throughout the regulatory period. Even in the absence of a capex sharing mechanism, capex under/over-spends are shared between service providers and consumers through lower/higher future depreciation (if actual rather than forecast depreciation is used in the asset base roll forward equation) and return on capital. Depending on the return on capital, the asset life and when the under/over-spend occurs, service providers receive approximately 10% to 30% of the benefit/cost, with consumers receiving the rest.

Opex is different. If service providers under-spend on opex, they keep the full benefit in that year and consumers do not share any direct benefit (only indirect benefits in the form of lower opex allowances in the next regulatory period). Therefore, a case can be made for applying an opex sharing mechanism to guarantee that opex savings are directly shared between service providers and consumers. However, as with capex, the **intention is to apply a simple incentive mechanism initially and consider implementing a more complex opex sharing mechanism later** as the regulatory regime matures.

## 5.2 Pass-through and uncertainty mechanisms

The rules for adjusting allowed revenues often allow changes in the costs of certain inputs to be passed through to customers. These cost pass-throughs allocate the risks of the cost of these inputs to customers. It is believed that **cost pass-throughs should only comprise a share of operating expenditure that is deemed to be uncertain, significant, and outside of the control of the service providers**. As mentioned in Section 4.2.2, the cost of raw water for urban service providers would be treated as such a cost pass-through.

There may also be a case for other elements of operating and/or capital expenditure to be treated in the same way if they can be shown to be substantially outside the influence of the service providers and are significant enough to have a material distorting impact on the service providers' ability to finance their activities. It is difficult to pre-empt what such costs might be. Also, **depending on the nature of these costs there may be a need to treat them differently to straight pass-throughs and instead employ other 'uncertainty mechanisms'**. Without pre-empting, limiting or prescribing the uncertainty mechanisms that may be developed in this regard, these may include:

- o Output-driven adjustments where the revenue requirement is set based on a unit price or allowance for an operating or capital expenditure item

multiplied by a forecast driver for that item (for example, the number of connections or metres of pipeline). Any difference in outputs (for example, higher connections or additional pipeline) between that used for setting the revenue requirement and the outturn would result in an adjustment in the next regulatory control period (i.e. the adjustment would be calculated as the allowed unit rate multiplied by the actual driver output less the allowed unit rate multiplied by the forecast driver output);

- o Recognition, in setting the revenue requirement, of a category of cost, the magnitude or timing of which might be uncertain (e.g. because it depends on or is impacted by impending changes to government laws or regulations) and therefore there is an ex post adjustment in the subsequent regulatory control period for efficient costs incurred. This would be similar to, but distinct from, pass-through costs in that the adjustment would not be automatic, but subject to an ex post efficiency or prudence review; and/or
- o Contingent projects - if it is unclear whether a project will be needed during the forthcoming regulatory control period due to difficulty in forecasting demand or other parameters, a project may be entered into the revenue requirement as a 'contingent project' with the service provider being able to recover the costs of the project only if a pre-specified trigger event occurs.

It is noted that any such uncertainty mechanisms would be separate from any other arrangements that encourage service providers to contain their costs (i.e. through efficiency benefit sharing incentives discussed above) or to fully protect the service providers against cost items deemed to be completely outside their control (pass-through costs).

### 5.3 Incentive payments and penalties for quality performance

A well-designed incentive regulation regime should have incentives for service providers to maintain or improve service quality levels as well as to reduce costs. This would **ensure that improvements in cost efficiency are not at the expense of quality of service.**

The regulation of quality in the urban water and sewerage sector is multi-faceted and many operational aspects will already be regulated through minimum standards and regulations (e.g. for drinking water and effluent quality). However, beyond such standards, **a performance regime for service providers** may be introduced. This performance regime, would initially be limited to a small number of factors that concentrate attention on those aspects that are likely to be important to consumers and for which there is going to be reliable and useful data.

Once key performance indicators are established, rewards and penalties would be developed for their achievement or failure. These **rewards and penalties would then be applied as adjustments to the allowed revenues**. This approach has many benefits in that it:

- o Can be used to target various aspects of quality of service (that may be valued by consumers)
- o Provides strong incentives for achievement (if the payments are set at the right level), as the rewards/penalties directly impact services providers' profitability
- o Ensures a sufficient degree of certainty to service providers of the consequences of being within the targeted quality range
- o Should not entail significant ongoing transaction costs (although there will be some establishment costs to design the performance regime).

## 5.4 Revenue smoothing

Smoothing of revenues within the regulatory period could be used to moderate the effect of large investments (occurring part way through a regulatory period) on customers by effectively averaging out forecast costs. **There might be a case for smoothing revenues and tariffs** in this way, as consumers value predictable and stable prices. In practical terms, this is a mechanical calculation that could be undertaken at regulatory reviews and can be simplified as follows:

- o The costs of the service providers are forecast for each year of the regulatory period
- o Allowed revenues, which are constant in each year of the regulatory period, are determined such that the present value of forecast costs is equal to the present value of allowed revenues over the regulatory period.

If significant changes in volume are expected over the period, revenues can be smoothed such that the average tariff is equal in each year. Technically, this is done by dividing the present value of forecast costs by the present value of forecast volumes.

Whenever revenues are smoothed the cash flow impacts on service providers must also be considered. Smoothed revenues mean that the service providers' annual revenues may be substantially different to their annual costs, which could cause difficulties for financing large investments. Hence, any **smoothing should not jeopardise the ability of providers efficiently financing their activities**.

## 5.5 Re-opening the revenue determination

Even with a carefully designed regulatory regime and the development of more detailed rules regarding the various revenue adjustment mechanisms discussed above (and other aspects of the framework), circumstances can change in ways that cause the service providers to suffer very large financial losses or make significant profits. Under such circumstances there should be the possibility for either a service provider or the Secretariat to initiate a re-opening of the revenue determination (i.e. prior to the normal periodic review) to deal with the specific extraordinary circumstances.

Additionally, any such **re-opening should be strictly limited to situations where a major unforeseen event occurs that is outside the control of the service provider and which has a significant financial impact (positive or negative) on the service provider**. By definition, the need for any such re-openings can only be assessed on a case-by-case basis, but certain materiality thresholds for the financial impacts (say, 10 per cent of the RAB value) may be employed to provide greater transparency and certainty to both consumers and service providers about the bounds of any such re-openings.