ERRA Tariff and Pricing Committee

Issue Paper:

Determination of the Regulatory Asset Base after Revaluation of License Holder's Assets. Chart of Accounts

Energy Regulators Regional Association (ERRA)

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Executive Summary

This Issue Paper: Determination of the Regulatory Asset Base after Revaluation of License Holder's Assets. Chart of Account provides deeper insight on the key aspects related to the setting on the RAB. It discusses the key aspects and components of the RAB and reviews the way that regulators in the ERRA countries have determined the RAB. A questionnaire was sent to gather information on the current practice of the ERRA members.

The conceptual part of this Issue Paper explains the key factors to set a reasonable level of RAB taking into consideration of the treatment of capital contributions, construction work in progress, investments and working capital. Moreover information on different asset valuation approaches which impact the RAB, the maximum allowed revenues and consequently, prices are provided.

The Regulatory Asset base is one of the most important factors that regulators and companies have to determine since allowable profits and depreciation depend on the RAB. This in turn affects the revenue requirements of a regulated company and the prices it can charge to its customers. The following recommendations are as follows:

- Any prudent capital expenditure /capital additions (net of capital contributions) should be added;
- The assets included in the RAB should be the assets used for the provision of the regulated services. The regulated company should ensure that costs are not transferred from any unregulated services to regulated service or between regulated services
- The opening value plus a certain percentage of prudent capital expenditure / capital additions minus a certain percentage of disposals;
- Disposals and depreciation shall be deducted to obtain the closing value of the RAB for the given year (which becomes the opening value for the subsequent year);
- Depreciation may be calculated as straight-line depreciation using a pre-determined life per asset group for regulatory purposes. All assets should be depreciated with the exception of land and construction work-in-progress;
- In the case of existing assets, depreciation is calculated on the un-depreciated value of assets minus any disposals; and
- For new assets (prudent expenditure during the regulatory period), depreciation is calculated on the accumulated un-depreciated value of new assets at the start of the year, plus a percentage of additions in that year.
- For setting the RAB between regulatory periods, the regulator should provide clear guidelines on its methodology and procedure. Re-setting pre-agreed levels should be avoided as this will undermine the regulatory regime.

The approach and treatment of the components of the RAB should be set out clearly in the methodology provided by the regulators. This allows the regulated companies to understand and apply the concepts. Furthermore the methodology for determining the RAB should be consistent and transparent and not constantly changed. This will enable a more robust regulatory regime.

1. INTRODUCTION

The Energy Regulatory Regional Association (ERRA) requested KEMA to write an Issue Paper: Determination of the Regulatory Asset Base after Revaluation of License Holder's Assets. Chart of Accounts.

The objective of this issue paper is to assist ERRA's Tariff/pricing Committee in providing insight on the key aspects related to this issue, especially comparing with international best practice. This issue paper will take a closer look into the main components associated with determining the RAB. We will highlight the main factors which influence these areas to identify good practices and measures in order to derive recommendations for minimizing interference and effective regulatory performance. We will also provide best practice based on international experience.

A short questionnaire was sent out to ERRA countries in order to gain a better understanding how RAB are defined in ERRA countries. The questionnaire will include questions on the current rules and procedures for examining the RAB for approvals for setting reasonable level of RAB and the respective regulatory regime currently in place in the individual ERRA countries.

The Issue Paper will be written as a full stand-alone document that will not only provide an "isolated discussion" on the current situation of determination of RAB, but will also provide suggestions and best practice and principles on measures that regulators can adopt to determine the RAB. We will demonstrate practical experience from selected countries where applicable, discuss the principles and methodologies that are applied, and provide recommendations on improving the examination of documents in the ERRA countries.

Chapter 2: Conceptual / Background of establishment of Regulatory Asset Base

This chapter will consist of a general introductory section and explain the rules and procedures that can be used for the examination and approvals of the RAB especially in the context of re-valuating assets.

Chapter 3: Asset Valuation

This chapter presents the different approaches of asset valuation. We will also describe the common pricing principles that regulators adopt.

Chapter 4: Examples of International practice

This chapter provides examples from Germany, Great Britain and Australia on how these regulatory authorities determine RAB for price control purposes.

Chapter 5: Current practice in ERRA countries

This chapter will summarize the results of the survey on the current practices adopted by ERRA countries.

Chapter 6: Regulatory Accounting Aspects

In this chapter we will provide a chart of accounts that can be used for the evaluation and monitoring of the RAB.

Chapter 7: Recommendations and Conclusions

This chapter looks at how ERRA countries could improve their evaluation and monitoring for determining the RAB. This will be based on the findings from the survey and with reference to international best practices.

2. INTRODUCTORY BACKGROUND / CONCEPTUAL PART OF RAB

This section here presents the general background to regulatory asset base. It provides insight on the rationale of establishing RAB for regulatory purposes. Furthermore the different asset base approaches and the components required to establish the RAB are explained.

2.1. RAB for Regulatory Purposes

For regulatory purposes, in order to set the revenue requirements of regulated companies, one of the tasks is to assess the regulated business' capital investment and to establish its RAB.

The inclusion of capital costs in the revenue requirement formula recognises the owner's investment in the regulated utility and also the capital-intensive nature of regulated energy companies. Failure to include adequate capital related costs as part of the revenue requirement of the regulated business risks a reduction in investment in the industry. This could ultimately lead to reductions in cost coverage and quality service levels, hence a reduction of security of supply in medium and long term.

The regulatory asset base usually refers to the measure of the net value of a company's regulated assets used in price regulation.

The regulatory asset base (RAB) drives two of the fundamental building blocks that make up the company's revenue requirements; these are the return on capital (i.e. the return on the RAB) and the depreciation allowance. These two capital-related building blocks are then added to the projected level of non-capital costs to calculate the total revenue requirement for the business that is expected to be recovered from tariffs to consumers of the regulated services.

Consequently, the regulatory decision as to how to value the RAB is of particular importance as, in the context of price regulation, the RAB will be a key determinant of prices that may be charged for regulated services in the future. Hence, the decision on the RAB will most likely have the greatest impact on the balance that the regulator strikes between the interests of the consumers and the interests of the suppliers of the regulated services.

2.2. Components of RAB

This section covers the starting asset base and the treatment for regulatory accounting purposes of various aspects of the RAB.

This includes issues surrounding the treatment of construction work in progress, regulatory depreciation, working capital, capital contributions as well as new investments.

2.2.1. Establishment of initial RAB

The regulated company's assets are usually defined as its tangible assets. It sometimes also includes working capital (please see section 2.2.4.). Intangible assets could also be included

if they are relevant to the provision of the regulated service. However, regulators do not generally recognize intangible assets in the RAB of regulated companies such as goodwill. For example, because goodwill may be largely associated with asset transaction prices, recognising goodwill would likely lock in some degree of excess returns going forward.

The assets included in the RAB should be the assets used for the provision of the regulated services. The regulated company should ensure that costs are not transferred from any unregulated services to regulated service or between regulated services.

The RAB is determined for every year of the regulatory period. There are two major approaches in determining the RAB: net approach and gross approach.

According to the net approach the closing value (value at the end of the year) of the RAB is set equal to the opening value (value at the beginning of the year which is equal to the value at the end of the previous year) of the regulatory assets plus capital expenditures minus regulatory depreciation and minus asset disposals. This value is then adjusted for the variation of the working capital and the variation of capital contributions (see section 2.2.3).

According to the gross approach the closing value of the RAB (for a year of the regulatory period) is determined by the closing value of fixed assets minus the closing value of capital contributions minus the closing value of working capital.

The typical formulae of the RAB according to the net and gross approaches are shown in Appendix II.

In the following sections we explain the treatment of each of the components.

2.2.2. Depreciation

The term ‘depreciation’ means a systematic allocation of the cost of an asset to the accounting periods in which the asset provides benefits to the regulated company. This allocation is designed to mirror the consumption of the service potential or economic benefits associated with an asset over its useful life, resulting from both use (wear and tear) and obsolescence. The purpose of provisions in accounting is to ensure that the cost of the flow of services provided by capital assets is met in the price of these services, and additionally to build up funds for the replacement of these assets.

The revenue requirements of regulated companies normally include an allowance for depreciation. Such an allowance recognises the need to recoup the outlays involved in the purchase of the asset over its useful life. The total net revenue earned from the regulated assets consists of a depreciation charge and the allowed return on assets.

2.2.2.1. Types of Depreciation

In the companies’ accounting, a number of approaches are used for constructing the depreciation schedule. These include:

- Based on historic cost – usually straight line or sometimes accelerated depreciation[1];
- Based on replacement cost estimates – again, straight line or sometimes accelerated depreciation; and
- More flexible arrangements whereby depreciation is adjusted to complement other components of return so that the revenue stream mirrors the behaviour of an annuity.

In traditional regulatory frameworks, straight-line depreciation is often the norm. This approach calculates the write-down of the gross assets value to obtain the depreciated asset value, by assuming a linear relationship between accumulated depreciation and the age of the asset relative to its expected economic life.

Straight-line methodology involves systematic allocations that remain constant from year to year. It is most commonly adopted because of its administrative simplicity. Although the straight-line methodology has been criticised for its failure to recognise the time discount factor in the decline of asset values, it remains the simplest to apply.

For the calculation of depreciation, a distinction should be made for the purposes of calculation between the depreciation of existing assets (i.e. those existing at the start of the new price controls) and new assets/investment (i.e. those acquired after the start of the price controls).

The calculation method for depreciation includes a computation of:

- depreciation on initial assets. This could be done on the basis that: (1) these assets are a single asset which, at the time point of introduction of regulatory cap control, had a remaining life equal to the deemed average remaining life of assets in existence at that time; or (2) these assets consists of asset groups that are depreciated on the basis of their individual assets life;
- depreciation on assets acquired during the regulatory period. This will be done: (1) either by dividing each successive year's investment by a deemed average life for the company's assets; (2) or dividing each successive year's investment components (asset group contained in the investment) by the useful life of these assets groups and consequently aggregating the individual asset groups depreciation.

Accelerated depreciation is front loaded, i.e. it is higher in early years as with a double declining balance, sum of digits, or depreciation on diminishing value as used for taxation purposes in many countries. The reducing balance methodology yields allocations that decrease from year to year. Decreasing allocations are justified where assets can be expected to yield more service in earlier years.

[1] Often the companies' accounting uses accelerated depreciation methods. The mostly used of such methods is the method of 'declining balances'. According to this method, a fixed percentage of the written value of the asset is charged as depreciation each year. The effect of this is that decreasing amounts are charged each year in contrast with the straight-line method, which produces an equal charge each year. The fixed percentage to be used is the percentage, which should be deducted from the written down value each year so that, over the life of the asset, the total installed cost is gradually reduced to the net scrap value. See IPART, Independent Pricing and Regulatory Tribunal of New South Wales: (1999) Rolling Forward the Regulatory Assets Base in the Electricity and Gas Industry, Discussion Paper, January.

The annuity approach generates constant annual amounts that reflect future cash flows required to maintain the operating capacity of the assets.

All assets should be depreciated with the exception of land and construction work-in-progress (CWIP).

2.2.2.2. Asset Life

From one perspective, depreciation is an asset-related cost. From another, it is a measure of the decline in economic value of an entity's asset base over time, as its useful life becomes shorter. One of the major issues regarding the determination of regulatory depreciation is the need to achieve a time profile of revenues that is economically efficient.

From an accounting point of view, depreciation is important because it matches the cost of an asset with the accounting periods in which revenue is generated by the asset base. It is argued that straight-line depreciation fails to capture the important features of economic depreciation that are evident from the sale value of assets or the pricing of products over the life-cycle of productive assets.

Economic depreciation is identified as a change in the market value of assets. In the absence of a market for the existing asset, market value may be approximated by the change in the asset's service potential. This involves measuring the change in economic value over a given period. Economic depreciation will not generally correspond with conventional measures of accounting depreciation, which are designed to reflect the systematic consumption of service potential and/or the economic benefits provided by the assets to the entity in the defined accounting period.

For example, where there is rapid technological change or diminishing demand for an asset's output its market price can decline much faster than suggested by straight-line depreciation of its real value. The most common concern leading to more rapid reduction in prices is to avoid by-pass by a new entrant able to take advantage of a different (lower-cost) technology. In product pricing, to the extent that depreciation is recognised as a cost of production along with the cost of capital and other input costs, straight-line depreciation would imply that costs, and therefore prices, depend on the age of the productive assets being used (assuming no technological change). In a competitive market, a much flatter time profile of pricing is observed relative to the age of the assets used to supply the goods or services. For example, the pricing of airline tickets bears little relation to the age of the aircraft used by the airline.

A competition-wise approach to depreciation is made up of two aspects. These are: (1) the smoothing of revenue paths (via an annuity approach) designed to avoid anomalous pricing associated with the vintage of the assets employed, e.g. inter-generational pricing disparities; and (2) adjustments to reflect the impact of future potential stranding of identified assets (and possible redundancy of assets) via an accelerated depreciation approach.[2]

For example the German regulator for regulatory purposes (which differ to asset life used for German GAAP) has determined the asset life for different asset groups, though using

[2] The first of these implies that depreciation allowances are greater at the end of an assets life, while the latter requires depreciation to be greater at the start of the assets life. The factor that dominates depends on the expected rate of technological change and anticipated pressures for potential by-pass. Both aspects are motivated by the desire to replicate the pricing that would occur in the presence of competitive forces. For this reason, the approach to depreciation that integrates both of these features is sometimes called "competition depreciation".

straight-line depreciation. For some assets the regulator has provided a range of years for the asset life.

Table 1: Asset Life used by the German Regulator

Groups of fixed assets	Period of time (years)
I. General fixed assets	
1. Land	0
2. Transportation facilities	25-35
3. Operating buildings	50-60
4. Administrative buildings	60-70
5. Railway track, railway carriages	23-27
6. Furniture and Fixtures (without EDP, tools/devices); exchange equipment	8-10
7. Tools/devices	14-18
8. Storage facilities	14-25
9. EDP equipment	
- hardware	4-8
- software	3-5
10. Vehicles	
- light duty vehicles	5
- heavy duty vehicles	8
II. Generation plants	
1. Steam power plants	20-25
2. Nuclear power plants	20-25
3. Hydro power plants	
- storage structures	50-70
- dams, fore bays	40-50
- buildings for transportation	30-35
- machinery, generators	20-25
- power plant network facilities	20-25
- other equipment of hydro buildings	25-30
4. Emergency generators	13-17
5. Other power plant installations	20-25
6. Environmental fittings	10-15
III. Transmission and distribution equipment	
1. Network facilities for HV transmission	
1.1 Networks	
- Overhead lines 110-380 kV	40–50
- Underground cables 220 kV	40–50
- Underground cables 110 kV	40-50
1.2 Substation equipment and auxiliary equipment incl. transformer and switch-gear	35-45
1.3 Protection, measuring and surge protection equipment, remote control, tele-communication, tele-metering and automatic equipment as well as control equipment incl. coupling, transformer and switching stations	25-30
1.4 Other	20-30
2. Network facilities of the distribution	
2.1 Medium-voltage network	
- underground cables	40–45
- overhead lines	30–40

2.2 Low-voltage network	
- Underground cables 1 kV	40–45
- Overhead lines 1 kV	30–40
2.3 Substations with electric equipment:	
- 380/220/110/30/10 kV substations	25–35
- main distribution stations	25–35
- local network substations	30–40
- customer substations	30–40
- substation buildings	30–50
- general substation facilities, auxiliary equipment	
- stationary lifting devices and freight elevators incl. runway rails, outdoor lighting in transforming and switching stations	25–30
- switching equipment	30–35
- ripple control, remote control, telecommunication, tele-metering, automatic equipment, current and voltage transformers, network protection equipment	20-25
2.4 Connections	
- underground cables	35–45
- overhead lines	30-35
2.5 Local network transformers, cable junction cabinets	30-35
2.6 Meters, measurement devices, clocks, AFRC receivers	20-25
2.7 Telephone lines	30-40
2.8 Mobile generating sets	15-25

2.2.3. Capital contributions

Capital contributions comprise of grants obtained from international institutions and/or the government and direct payments by the user of a specific service for an asset, e.g. connection payments.

The assets financed by capital contributions (via one-off payments for generation or customer connections) paid by service users or Government (via investment funding and subsidies) should be excluded from the calculation of the RAB. Accordingly the opening regulatory asset value and the investments during the regulatory period should be considered net of capital contributions. Therefore, it is necessary to disclose the values of capital contributions (for existing assets and for new investments) in order to ensure transparency of the process.

Where assets have been subject of a capital contribution, generally for a new connection or modification to an existing connection, including any augmentation to the network, the regulated businesses must amend the annual revenue requirement as follows:

- The depreciated value of the capital contribution is removed from the net asset value used in estimating the opening RAB; and
- The depreciation of the capital contribution is removed from the estimate of annual depreciation.

Concerning the treatment of capital contributions we summarise a number of points that have been identified with best practice:

- The regulatory accounting guidelines / Price Control Methodology should define what capital contributions are;

- Capital contributions should be shown as provision (liability position) rather than income;
- The net asset value of capital contributions and the relevant accumulated depreciation should be shown separately on the balance sheet for each energy activity;
- Capital contributions should be split into those associated with grants, connection contributions and other capital contributions; and
- Where exact splits cannot be identified the regulated companies should provide estimates as well as an explanation of the methodology adopted and why it is considered appropriate.

This approach will provide the regulator with clarity regarding the proportion of the asset base that relates to capital contributions for each energy activity (and for each licensee). From this information the regulator can consider whether it is appropriate to include or exclude these assets for price control purposes.

2.2.4. Working capital

The regulatory purpose of the revenue requirement is to determine the revenue of the business that is required to recover its costs. The concept of recovering costs includes the concept of the time value of money. Thus, to the extent that the time at which a particular cost is incurred is not matched with its recovery (via tariff revenues), then capital is required to cover the time lag and there is a cost associated with that capital requirement. In order to correct for the implicit assumption in the revenue requirement formula that expenses and revenues occur at the same point in time, an allowance for the time difference is typically included. In other words, an investment in working capital is a necessary part of conducting a regulated business.

In addition, there is also place for a return on the working capital similar to the requirement for a return on capital assets. In both cases, for example investors commit funds at a certain point in time, have their funds returned at some time in the future, and in the meantime require a return on those funds to compensate for the opportunity cost. The only difference between the treatment of working capital and capital expenditures is the length of time during which the funds are tied up within the regulated company.

Although working capital is not always discussed in regulatory jurisdictions, the regulator might decide to consider an allowance for working capital to meet the short-term obligations of the regulated companies. Usually working capital (also referred to as net current assets) is defined as the difference between current assets and current liabilities, where current assets usually include material stock and accounts receivable and the current liabilities include account payables.

Besides, consideration should be given to the use of a good-practice target, to calculate the working capital allowance, which is designed to give companies an incentive to manage working capital well. A simplified approach involves assessing the level of working capital assuming that payments from customers are outstanding for X days from the date of service delivery, and that suppliers are paid Y days after service delivery. Whenever possible a target measure shall be designed to encourage efficient management of working capital.

There are different approaches for working capital treatment in the regulatory price control. The most important ones are described below.

2.2.4.1. Cash Cycle Method

The USA regulatory practices use cash cycle method called lead-lag approach. A lead-lag approach measures the differences in the time frames between:

- The period of time services are rendered and the period of time the revenues for those services are received; and
- The period of time that labour, materials, and services used in providing services are incurred and the period of time they are paid.

Any difference in these periods is expressed in terms of days.

The number of days calculated, multiplied by the average daily operating expense level for each appropriate category of expense is included in the calculation, this produces the cash working capital required to support operations. While performing a lead-lag study may be time-consuming, many USA regulators prefer to rely upon this methodology for determining a utility's cash working capital requirement when possible because it provides a cash working capital allowance level that is based upon a specific analysis of the cash receipt and cash payment patterns of the company being reviewed.

Figure 1 shows an example of a working capital proposal allowance via a lead-lag study. The methodology followed by Newfoundland Power's[3] is consistent with the mainstream utility practice in Canada and it is explained below.

Once the revenue and expense lags are determined, the calculation of the cash working capital (CWC) allowance involves the following steps:

1. Weight each revenue lag[4] by its related revenue stream to calculate the total weighted average revenue lag;
2. Weight each expense lag[5] by its related expense to calculate the total weighted average expense lag;
3. Subtract the weighted average expense lag from the weighted average revenue lag and divide the result by 365 days. This is the CWC factor in figure below;
4. Multiply the CWC factor by the total expenses to calculate the average amount of working capital required to finance the expenses;

[3] Newfoundland Power Inc. operates an integrated generation, transmission and distribution system throughout the island portion of Newfoundland and Labrador.

[4] The revenue lag was calculated by analyzing all of the company's revenue streams and accounts receivable for year n to determine the average number of lag days between when service is provided to customers and when payment for the service is received from customers.

[5] The expense lag was calculated by analyzing each of the company's cash operating expenses for year n to determine the average number of lag days between when service is provided to customers and when payment is made for the goods and services that are acquired to provide service.

5. Add to the amount determined in step 4 the net impact of the collection and payment of the harmonized sales tax ("HST") on working capital. The result is the CWC Allowance.

Figure 1: Newfoundland Power's working capital allowance (million $)

Newfoundland Power Inc.

2008 Cash Working Capital Allowance

	CWC Factor	
1	Revenue Lag Days	39.34
2	Expense Lag Days	(31.61)
3	Net Lag Days	7.73
4		
5	CWC Factor (7.73 days divided by 365 days)	2.1%
6		
7		
8		
9		
10	**CWC Allowance**	
11		
12	Total Cash Operating Expenses	407,634
13	CWC Factor	2.1%
14		8,560
15	HST Adjustment	780
16	**CWC Allowance**	**9,340**

Source: Newfoundland Power Inc. (2008)

A similar approach was applied in the Australian regulation for electricity distribution. The IPART (regulator of New South Wales) had decided to include an allowance for working capital in the cost building blocks. The allowance for working capital for each network service provider is shown in Table 2. This determination applied from 1 July 2004 to 30 June 2009.

Table 2: Allowance for cost of working capital for regulatory period 2004/05 to 2008/09 (nominal values)

Distribution company	2004/05 ($m)	2005/06 ($m)	2006/07 ($m)	2007/08 ($m)	2008/09 ($m)
Energy Australia	6,5	6,1	6,1	6,6	7,2
Integral Energy	2,5	2,7	3,0	3,4	3,8
Country Energy	3,8	4,1	4,5	4,9	5,2

Australian Inland	0,3	0,3	0,3	0,3	0,3

Source: IPART (2004)

Specifically, this approach is based on the amount of time that payments (based on operating and capital expenditure) and receipts (network revenue) are outstanding. The calculation also adds in the value of inventory (which is also based on the level of capital and operating expenditure). The working capital is calculated as follows:

- Receivables (including pre-payments and accrued revenue) @ 45 days of total network revenue (DUOS + TUOS + other network regulated) less
- Payables @ 30 days of operating costs (including TUOS costs) + capital expenditure plus
- Inventory @ number of days of operating costs (excluding TUOS costs) + capital expenditure.

In making its final decision to retain this billing cycle approach, IPART took the view that it is appropriate for the allowance for receivables to be greater than the deduction for payables (45 days versus 30 days) to provide compensation for working capital associated with prepayments and accrued revenue, as there is no explicit allowance for these items under the IPART's simplified billing cycle approach (IPART, 2004).

In the current electricity regulatory control period (from 1 July 2009 to 30 June 2014) AER (Australian Energy Regulator)[6] does not recognize working capital in the post-tax revenue model (PTRM)[7] as all cash-flows (except CAPEX that is recognized in the middle of each year) are assumed to occur on the final day of each year (AER, 2009a and 2009b). With regard to the network service providers, the AER has noted that it intents to consider these timing assumptions further and may amend the PTRM in the future.

2.2.4.2. Simplified approach

Some eastern European regulators allow working capital allowance set equal to 1/8 of the revenue requirements. This is the case for example in Romania and in Bulgaria (for the first regulatory period). To avoid circularity, 1/8 refers to revenue requirements based on RAB without working capital.

In case of vertically integrated companies, the formula is generally based on 1/8 (45/365 days = 1/8) of operation and maintenance cost, exclusive of generating fuel and purchased power costs. This formula is often used by regulators for smaller utilities that do not have a sophisticated cash management department. In such utilities, the cost and time required to perform a more detailed working capital analysis may not be a cost-effective undertaking.

[6] IPART is no longer the regulator for electricity networks in New South Wales (since July 2009). The Australian Energy Regulator (regulator) and the Australian Energy Markets Commission (rule maker) are now responsible for network regulation under the Australian regime.

[7] The PTRM for electricity models forecast revenues and expenditures on an annual basis.

The frequently expressed critical points to the simplified approach (from the regulatory point of view) are that it always provides a "positive" working capital allowance. More importantly, it is not a tailored approach, i.e. it is not based upon a specific analysis of a company's cash receipt and cash payment patterns.

Another simplified approach was adopted in Italy. The value of net working capital was determined for 2008 in the conventional way with reference to the activities of transmission, distribution and metering of electricity. For these activities, the net working capital was set at 1% of net assets recognized for tariff purposes (AEEG, 2008).

2.2.5. Construction work in progress

The long experience and debates between regulators and regulated utilities display the complex nature of this issue. Also regulatory authorities vary widely in their treatment of funds used for construction.

One view is that new capital expenditure should be introduced in the RAB on the basis of actual costs incurred up to the point at which the assets become operational. There seems little point in introducing investments to the asset base until it becomes operational as there are no customers to support associated revenues and the burden would fall to users who are, at least to that stage, not receiving any of the benefits. This raises the question of how the regulated companies should be compensated for expenditure on partially completed assets. One option is to simply add “bridging” finance costs to the eventual value of the asset. However, this may not appropriately compensate for the risks involved. Another option is to roll forward expenditures already incurred with an accumulated rate of return equal to that for operational assets to reflect final cost. The accumulated amount would be the amount added to the RAB when the assets become operational.

Some regulators include construction work in progress (CWIP) in the RAB when construction is to be completed within a relatively short period of time e.g. after the end of the year, for which the RAB is being calculated. Other authorities base the inclusion of CWIP on other factors, such as whether the construction projects are of short duration, or whether the investment in the project is so significant that its exclusion could impair financing, or whether the interest charged to construction represents a substantial portion of the company’s earnings.

There is also the question of prudent investment when considering whether the full cost of new investment should be added to the RAB. Clearly if the full amount of the investment is not required and is not prudent, the regulator should not add the full amount to the RAB. The amount to be added will require judgment. (see section 2.2.6.3 for details on prudency test).

2.2.6. New investments

2.2.6.1. Types of investments

An investment is incurred when a business spends money either to buy fixed assets or to add to the value of an existing fixed asset. Three types of investments may be considered:

- Extension investments: all investments needed for meeting the change of load and generation patterns in the future;
- Replacements investments: all investments related to replacement of aged (technically or economically) equipment;

- Exceptional investments: investment resulting from e.g. new legal obligations. For example, if new labour safety rules require safety measures in substations or high voltage pylons, this probably leads to investments. These investments neither lead to more capacity nor replace aged components.

Some investments cannot be characterized as only one type of investment as given above, but could be allocated to two categories. For example, when an old transformer has to be replaced because of ageing, it could be decided to increase its capacity at the same time. In this case, the investment will be both for network extension and for replacement reasons.

To reduce over-estimation by the regulated companies, this approach should be followed together with an independent assessment of capital expenditure at each major review.

2.2.6.2. Inclusion of capital expenditures

The main issue to be considered in relation to the inclusion of capital expenditure is what measure of new assets is appropriate to incorporate into the asset base at the beginning of the regulatory period.

There is information asymmetry present that must be acknowledged at the outset in relation to capital expenditure. The regulator will not accurately know the appropriate amount of capital expenditure required by the regulated service providers and often will rely on the regulated company to supply this information. In this case, there may be incentives for the regulated entity to inflate the reported capital expenditure relative to the true cost. Therefore, the investments may be examined from two perspectives: ex-ante and ex-post.

Ex-ante assessment

Ex-ante the regulator may conduct an assessment of the accordance and efficiency of a company's proposed investment program for the forthcoming regulatory period considering future demand growth, asset configuration and any other relevant information.

One option for capital intensive businesses would be for the regulator to ask the business to submit its capital expenditure projections broken down into the following categories with explanatory notes:

- Extension expenditure;
- Asset replacement expenditure;
- Exceptional investments, e.g. resulting from new legal obligations.

This classification should facilitate the regulator's assessment of the CAPEX projections, e.g.:

- For the capacity extension CAPEX, the regulator can check whether the data are consistent with the formal investments approvals that have been given to the business and/or study the major extension investment drivers;
- For the replacement category, the regulator can determine perhaps on the basis of comparison with replacement CAPEX in previous years, cumulated available depreciation volumes, asset age structure and other supporting information supplied by the business, whether the levels of proposed replacement CAPEX are reasonable; and

- For the exceptional investments, the regulator can check whether any such investments, perhaps over a certain level of CAPEX, are actually required.

Depending on the approach the regulator may also apply techniques such as: comparative analysis supported by benchmarking studies; reviews by independent consultants and prudency tests (see section 2.2.6.3 below).

Ex-post assessment

Ex-post assessment may be undertaken to supplement the ex-ante investment reviews. In this way regulators aim to identify differences between the capital expenditures allowed in the ex-ante review and the actual investments undertaken by the regulated company. In case the actual investments are lower than the allowed investments, they may be two reasons for this: the difference results from strategic investment deferrals; or the difference results from efficient procurement and management of investments. While the latter represents eligible efficiency gains, the former are associated with strategic behaviour and, therefore, do not represent benefits resulting from management efforts towards efficiency increase.

Regulators should also consider that there may be capital expenditures undertaken in good faith that prove to be imprudent with the benefit of hindsight.

Regulatory ex-post checks can also be undertaken without any previous ex-ante approval of the investments. In this case, the companies are confronted with the uncertainty of whether the undertaken investments will be recognised by the regulator ex-post. The threat that investments may be rejected, or partially disallowed by the regulator would provide an incentive to the regulated company to only undertake efficient investment. On the other hand, the regulatory threat that investments could be disallowed, and then excluded from the regulatory asset base, could discourage regulated companies to implement even good investment projects.

The transparency of the regulatory ex-post tests is an essential factor for the overall credibility of the regulatory regime. Ex-post assessment tests with a high degree of regulatory discretion would increase the regulatory risks and probably discourage even prudent investments. In contrast, formalised and transparent rules on how to carry out the ex-post tests would strengthen the credibility of the regulatory regime and support investment activities.

Table 3 provides a summary of the regulatory approaches adopted in some countries for the assessment of network utility investment plans.

Table 3: Examples of countries with different investment plans treatment

Country / Regulator	Assessment of capital investment plans
UK / Ofgem Electricity and gas networks	• Network companies have to submit a 5 year investment plan • Some flexibility is allowed the regulated company is not committed to implement the investment plan exactly (e.g. scheme by scheme) • There is post-event of outturn investment versus the forecast ex-ante • Network utilities are expected to review their investment plans to accommodate all reasonable events which may arise during the price control pe-

	riod
New Zealand/ Electricity Commission; Commerce Commission Transpower	• Large-scale grid reinforcements /enhancements are subject to the application of an economic test (e.g. Grid Investment Test) by the Electricity Commission • The Commerce Commission sets thresholds for the remaining capital expenditure allowances and operating expenditures • Transpower is subject to a targeted regime under Part 4A of the Commerce Act. The regime is defined as targeted as businesses do not automatically become subject to control of their prices, revenues and /or service quality
Australia / AER Electricity transmission and distribution	• Proposals for investment plans have been submitted by EnergyAustralia, Country Energy and Integral Energy • The National Electricity Rules state that the AER must accept the forecast of required capital expenditure if the costs reflect: (1) the efficient costs of achieving the capital expenditure objectives; (2) the costs that a prudent operator would require to achieve the capital expenditure objectives and (3) realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives
United States /FERC Electricity and gas networks	• The assessment of utility investment plans occurs within the overall process of setting rates • In determining the appropriate treatment of costs incurred by a company, the Commission must consider whether the company's actions, which results in such costs, are prudent. In deciding whether the actions of a utility are prudent, commissions apply the "reasonable person" standard; that is, the standard of care a reasonable person would exercise under the same circumstances confronting the management of the utility at the time of the decision to take such actions

Source: Regulator's websites

For instance, the regulators in the UK, Slovenia, Australia and Romania check investments ex-ante before inclusion in the price control. Generally, two components of capital expenditure are distinguished and analysed: "load-related" and "non-load-related" expenditure. The former is linked to the connection of new customers (partly financed by connection charges which lie outside the price control) and network reinforcement. The latter consists principally of replacement expenditure, also including expenditure on IT, environmental improvement, and quality of service improvement. Increased efficiency in investment is a result of improved procurement, improved design and better information about the condition of assets.

In contrast, the regulators in Germany, Austria and Norway do not check investments separately but rather include them ex-post in their benchmarking models. However, this inclusion is rather complicated and a number of issues resulting form the long-term nature of CAPEX, should be solved before the regulator decides to apply this method. Notable examples of challenges to ensure CAPEX comparability relate to differences in depreciation policy, capitalization policy and network asset age of the regulated companies.

2.2.6.3. Criteria for investment inclusion in the RAB

This section sets out the main types of criteria that can be used by the regulator to assess whether the capital expenditure should be included in a network operator's RAB and hence allowed for in the revenue stream allowed under the price regulation. The main types of criteria include prudency tests, engineering models, total cost benchmarking and standard cost approach. These are further explained below.

Prudency tests

Prudency tests have been applied traditionally in USA in an environment of rate of return regulation and in Australia in an incentive regulation environment. These tests provide the regulator with a set of criteria that can be used to determine (ex-post), on the basis of the prudence of the investment, whether an investment that has been carried out should be included in the RAB. The tests can also be used on an ex-ante basis to assess whether a proposed investment is likely to pass the prudence test. Indeed, a regulator may encourage network operators to carry out such a test themselves so they tend to only undertake investment that will be deemed later on an ex-post basis to pass the test and be included in the RAB. A general formulation of the test is as follows.

The amount by which the capital base may be increased is the amount of the actual capital cost incurred provided that:

- The amount does not exceed the amount that would be invested by a prudent network service provider acting efficiently in accordance with good industry practice and to achieve the lowest sustainable cost of delivering services; and
- One of the following conditions is satisfied:
    - The anticipated incremental revenue generated by the capital expenditure exceeds the investment cost;
    - The network service provider can satisfy the regulator that the new capital expenditure has system wide benefits that in the regulator's opinion justify its inclusion in the capital base; or
    - The new capital expenditure is necessary to maintain safety and integrity in the system.

Should the actual capital cost incurred be deemed excessive by the regulator, the prudent amount of expenditure may be added to the RAB. The excess amount may be recorded in the regulatory accounts and rolled forward at the regulatory rate of return for possible transfer to the RAB at a later date.

The use of a prudency test would imply that, at a price review, prudent expenditures that were required and took place in the prior price control period, but were not previously forecasted, would be rolled into the RAB.

Engineering models

Engineering models are an alternative benchmarking approach and are useful to fill the gap that traditional benchmarking models cannot cover. If benchmarking is defined as the comparison of the existing with the optimal option, traditional benchmarking models aim to identify the optimal options by means of comparing existing options and choosing the best one. Engineering models on the other do not need existing options, but rather create these options on the basis of predetermined economic and engineering criteria. Thus, an Engineering Model can be used without the need of a sample in principle, which significantly adds to the flexibility of the regulatory process.

Engineering Models are particularly useful when put in the context of assessing future capital expenditure allowances for the regulated industry. Traditional benchmarking techniques, such as Data Envelopment Analysis (DEA) or Stochastic Frontier Analysis (SFA) are inherently limited by the fact that a sufficiently large data sample is required in order to obtain sensible comparisons. When the data sample is very small or even unavailable, such techniques clearly cannot be applied effectively.

Total cost (TOTEX) benchmarking

The TOTEX approach is based on the idea that all (controllable) costs are subject to incentives and efficiency analysis; i.e. no differentiation is made between OPEX and CAPEX. These two cost items are treated in the similar way and for both costs, a single efficiency target is set.

From the regulatory perspective, the advantage of the TOTEX approach is that it can capture the trade-off that is generally present between the two categories of cost i.e substitution.. Secondly, and more importantly, is that it removes the incentive for over-capitalisation.

Under a TOTEX approach there is no need to explicitly evaluate the companies' future CAPEX projections. In principle one would not distinguish between OPEX and CAPEX in the economic sense, however in practice it is still needed to measure these costs. This means that the regulator still needs to collect information about both OPEX and CAPEX cost elements. Even more, it becomes increasingly important that these costs are measured uniformly throughout the industry in order to make sure that the efficiency scores from the benchmarking analysis are driven by genuine performance differences and not influenced by errors in the data.

The main issue with the TOTEX approach is to find a methodology that captures the differences in several aspects of cost across the industry. This is especially true in the way CAPEX is standardised in order for it to be comparable throughout. The main reason why CAPEX is not normally used in the economic benchmarking of cost for revenue requirements' setting purposes is that CAPEX is not easy at all to standardise across different companies. Benchmarking CAPEX only is difficult due to data problems.

Standard cost approach

The standard cost approach prescribes certain maximum unit prices for investment group components. In this way the regulators attempt to ensure that investments are procured in an economic way. This method resembles the replacement cost method, however in this case it's application is not to revalue the existing assets but ex-ante towards the new investments.

The notion of 'standard cost' implies that to each part ('unit') of the network is assigned a standard cost, depending on the type and characteristics of the installation. These units or standard costs are determined for the entire industry and are then applied to each company; they cover both capital and operating expenses. The sum of these standard costs then serves as the basis for the allowed revenues of a particular company. As a result, an individual company's allowed revenues are thus not related to its actual costs.

This concept of applying generalised cost to an individual network company might be further extended by the envisaged use of a so-called 'area reference network'. The underlying principle is to relate a company's allowed revenues to the standardised cost of a theoretically 'optimal network'. Hence, an individual company's remuneration would not be based on the (standardised) cost of its real networks but on the cost of the (theoretical) area reference network instead.

Under the standard cost approach, actual investment costs are allowed, based on unit costs for different types of equipment, such as overhead and cable lines (€/km), substations (€/unit) and transformers (€/MVA). These values are differentiated by voltage level and may be subject to further correction factors.

2.2.7. Used and useful Concepts

One task of the regulator when assessing the regulated companies' asset base for price control purposes is also to consider whether these assets are sufficient to carry the regulated activity. On the other hand if a regulated company has excessive number of assets e.g. overhead lines, transformers the regulator may decide not to include these assets in the RAB. The rationale behind this is although the assets are being 'used' the question is whether they are actually 'useful'. For example an electricity distribution company has a number of lines and all the lines are used but some of them are not required. This means that the distribution company can nevertheless operate and provide the same level of service using fewer lines.

In order for regulators to assess whether assets are used / useful, information is required on the network area/region that a regulated operates in. This information among others can include for example details on the existing assets, load, peak demand, number of customers, electricity distributed. For new investments the regulators can assess whether the investment is prudent. Please see section 2.2.6.3 for details on prudency tests.

2.2.8. Revenue Re-setting between regulatory periods

The treatment of the RAB between regulatory periods is important. Depending on the regulatory regime, the approach that regulators adopt should be set out clearly in the price control guidelines/methodology. This is to provide consistency and transparency of the regulatory regime.

As part of the regulatory price review, under incentive regulation, regulators have to set the allowed revenue requirements of each regulated company based on the regulatory regime in place. For example, one element is to set the efficiency targets for the next price control period, the regulator may adopt benchmarking analysis[8] of the regulated companies. The

[8] Difference benchmarking techiques e.g. Data Envelopment Analysis (DEA),

benchmarking is usually based on controllable costs e.g. operating expenditure. Efficiency targets for the regulated company are then set based on the benchmarking results for each year of the regulated period. These are normally fixed and are not subject to change. Resetting the pre-agreed target levels of the Opex, or individual Opex components, and clawing back efficiency savings is not compatible with the fundamentals of incentive regulation. A re-opening of the regulatory commitment would undermine the regulatory credibility and diminish the incentives to company to increase efficiency.

Claw back means a retrospective adjustment by which the benefits of a company's extra efforts to improve efficiency in one period are confiscated during the next regulatory period, perhaps through a downward adjustment to the revenue requirements in the following period. There are various reasons why actual profits may be higher than expected, some of which may be genuinely economic, such as improved maintenance practices or capital expenditures management. In compliance with the principles of incentive regulation, regulators should therefore not be seeking claw-back and should allow that regulated service providers retain the efficiency gains during the current regulatory period, or even better, during the next regulatory period. Clawing back money could create perverse incentives for companies. If there is an expectation of unspent money being clawed back, companies will tend to ensure that they spend all that they are forecast to, thus removing the incentive to become efficient

In terms of setting the RAB, depending on the regulatory regime, regulators usually take the closing RAB value of the last available year and depending on the treatment of the different components as discussed (new investments, construction work in progress, depreciation working capital) the RAB for the following regulatory period is determined. Again, a clear and consistent approach should be adopted by the regulator.

2.2.9. Usage of joint assets for the provision of regulated and non-regulated services

When a utility carries out other activities which are not regulated, e.g. generation and supply or other activities, this has to be separated. Normally, companies which operate more than one activity present their national statutory accounting information in a consolidated format.

In many cases the regulated business, e.g. networks, provide more than one service. Typical is the transit of electricity / gas where the same networks / pipelines are used to provide national transport service and international transit service. In such cases these are joint costs. In its classical definition, joint cost is a cost of a production process with technically indivisible products (cased by the technical nature of the production process).

Apportioning the total cost of the combined delivery of products to more than one customer group implies splitting of savings resulting from the combined delivery. It is logically not possible to attribute fairly the cost savings to either consumer group. Some argue that cost savings should be given to that customer group entering the joint supply coalition last. However, this allocation rule is simply too arbitrary. It could just as well be argued that the customer group entering the joint supply coalition last saves on its stand-alone cost and should thus give some of the benefits to the incumbents in the coalition.

The economic theory states that no firm solutions exist for allocation of costs between two services, in this case namely national transport service and international transit service. There are, however, principles that should be observed in costs allocation in order to avoid cross subsidisation and creating wrong incentives for the network users to bypass the existing network.

First, the allocated costs should not be less than avoidable cost (or incremental), i.e. the costs that the service provider would avoid if it did not meet the demands of the particular class of customers. Second, allocated costs should not be higher than the stand-alone cost of efficient provision of network service as it could create incentives for the users to bypass the existing network.

To summarise, these rules imply that stand-alone costs serve as a price ceiling and incremental cost serve as price floor. If the price is set at the ceiling for a particular group, this group does not participate in the cost savings from joint supply. If the price is set at the floor the total cost savings accrue to this customer group.

In the practice regulators apply two solutions:

- Use a physical key (e.g., demand, energy) to allocate cost to and price both services;
- Allocate total cost to one of the product and deduct the revenue earned by the company in selling the second product.

3. ASSET VALUATION

One of the most important aspects of determining the RAB is the choice of the asset valuation methodology. Depending on the asset valuation methodology, this could have significant consequences for the RAB, the maximum allowed revenues and consequently, prices.

Arguments about asset valuation vary from insisting ownership rights to be recognised, to questioning whether any value should be attributed to sunk investment. The regulators usually endorse particular asset valuation methodology.

Asset valuation issues must be considered with regard to the functional adequacy of regulated assets, market assets value, and overall profitability of the regulated business and sustainable cash flows of the business as well as equity considerations.

The different methodologies and their advantages and disadvantages are explained in the following sections.

3.1.1. Historic Cost

The historic cost methodology values assets at their original purchase price. It has the advantages that it is administratively efficient and can be easily audited because the data should be available from financial statements; it is relatively inexpensive since it does not require experts to determine costs; and it is objective because it relies on actual data rather than judgements. The historic cost method exhibits some disadvantages. Historic costs may understate asset prices in times of high inflation and overstate asset prices in times of technological change. Secondly, this method may lead to unstable prices (e.g. prices may rise when new, more expensive assets replace existing assets). Thirdly, data may be inadequate (especially for assets that have been acquired a long time ago) and returns may also be inadequate to support the funding of new investments.

Historic costs are generally applied in the regulatory price control in the USA. Also, a number of regulatory authorities in Europe apply book values from financial statements of the regulated service providers for asset valuation purposes in regulatory accounting.

3.1.2. Indexation

In general, “indexation” refers to the procedure for adjusting the value of the asset base for the effect of inflation. The value of the regulatory asset base is adjusted (increased or decreased) to reflect changes in the underlying index. There is some debate as to whether the index chosen should reflect price changes in the particular industry under examination, or price changes in the economy as a whole.

The mechanism by which the asset base is adjusted for the effect of inflation must be consistent with the asset valuation method adopted. As the regulatory asset base represents a financial asset it is appropriate that indexation as such allows for the general erosion in purchasing power across the broader economy. This view is consistent with that adopted in the UK where all regulators index the regulatory asset base in terms of the UK RPI. Under the view that the regulatory asset base is valued on a replacement cost basis to the firm it is more appropriate that the indexation to be applied is representative of the costs of the specific components of the physical asset base.

Indexation should measure movements in the current replacement cost of the assets. A set of industry-based indices would be more accurate than a single general index. However, application of a set of factors has the potential of becoming excessively complex with limited transparency. A compromise would be the use of a single industry specific index that presents an appropriate balance between accuracy and objectivity.

3.1.3. Replacement Cost

On the presumption that some compensation for asset or capital devaluation through inflation must be conveyed to the investors in order to allow for its long run operation (new investments have to be paid for in current values and must be partly financed by revenues received in the past),´. Inflation compensation can in principle be achieved through the inclusion of assets replacement costs in the regulatory schemes.

The replacement cost methodology calculates the cost of replacing an asset with another asset (not necessarily the same) that will provide the same services and capacity as the existing asset. The assets are valued based on what it would cost to replace then today.

The main economic principle for assessing the economic value of any assets is that their value to investors be equal to the net present value of the expected future cash flows generated by those assets. The practical difficulty in making this assessment for regulated monopoly businesses is that the future revenue derived from the assets is itself determined by the regulator – hence the issue of circularity associated with the use of discounted future cash streams as a methodology to value sunk assets. This potential circularity could be eliminated by the use of a replacement cost approach. The value of a network is the sum of the depreciated replacement cost of the assets that would be used if the system were notionally reconfigured so as to minimise the forward looking costs of service delivery.

One interpretation of depreciated replacement costs is that it is the valuation methodology that would be consistent with the price charged by an efficient new entrant into an industry, and so it is consistent with the price that would prevail in the industry in a long-run equilibrium.

A second interpretation is that replacement costs reflect the price that a firm with a certain service requirement would pay for existing assets in preference to replicating the assets.

Replacement cost methods have a number of advantages. Assets are valued in current prices, which may provide an incentive for efficient investment decisions as it allows the regulator to reduce the value of the assets once it becomes aware that a more efficient low-cost alternative asset is available. In this way, the regulatory asset base reflects the cost of replacing existing assets' service potential. It approximates the asset value above that the regulated companies will be subject to bypass risks. This reduces the risk of economically inefficient duplication of infrastructure. Moreover, the revenue profile using replacement costs and applying a real rate of return is more stable than using historic costs and applying a nominal rate of return.

The disadvantages of replacement cost valuations are that they entail a degree of estimation and judgment. Secondly, the information is more expensive to collect than historic cost data because it may require expert advice (e.g. from engineers and accountants) on a number of network assets.

3.1.4. Deprival value

The replacement cost method could be extended through the application of the optimal deprival value method. This method recognizes that, as a result of being deprived of an asset, e.g. by selling it, or it being worn out after years of use as a fixed asset) the economic value foregone may be less than the value based on the depreciated replacement costs. The question here what would the owner of an asset lose if it were deprived of this asset? In other words, it is a measurement of the additional value accruing to the business as a result of owning the asset.

The *deprival value of an asset* can be defined as the lower of its:-

- replacement cost (if it can be replaced) and
- its recoverable value

The term (the recoverable value) can be defined as the higher of:-

- what the company could sell it for - i.e. its value in exchange, in the market,
- the value that the company could create by using the asset within the business

. If the recoverable amount exceeds the replacement cost, then then the company were 'deprived' of the asset it would buy another to replace it.. The replacement cost therefore sets a maximum on the loss that the company would suffer through the deprival.

Where the recoverable value is less than replacement cost, replacement of the asset would not be justified.

How the recoverable value is calculated, two alternatives can be considered - either sell it or use it. Whichever one of these alternatives has the highest return would be the logic option to choose.

In calculating the sale of the asset (exit value) this can be defined as the sales proceeds minus the future cost of sale.

To determine the 'use' of the asset, it is the present value of future cash flows as a result of the continued use of an asset, including the disposal of the asset. The use of discounting future cash flows is normally applied.

An advantage of this approach is that it discourages inefficient investment because regulators will re-value inefficient assets down to their optimised replacement cost.

However, a disadvantage is that there is a circularity problem with using this approach as assets value depends on the future cash flow but the latter depends, at the same time, on the initial asset value. In many cases, these valuations may also be subject to legal challenge. .

4. EXAMPLES OF INTERNATIONAL EXPERIENCE

From our experience of regulatory regimes in Europe and elsewhere, examples of international practices of RAB determination provide not only valuable insight but also to learn and adopt best practices, where possible. In addition to the information which will be collected from the questionnaire to the ERRA members, we provide examples from the Great Britain, Australia and Germany and their regulatory approach to RAB determination for price control purposes. This section will cover the regulatory principles, the rules and procedures, and the methodology and approaches which are adopted in these regulatory jurisdictions to determine the RAB.

4.1. Australia

4.1.1. Regulatory Framework

The Australian Energy Regulator (AER) is responsible for electricity transmission and distribution networks and interconnectors in the National Electricity Market (NEM). This covers the states of Queensland, New South Wales, ACT, Victoria, Tasmania and South Australia and the Australian Capital Territory. The AER regulates electricity and gas transmission and distribution networks based on the framework established in the National Electricity Rules (NER). The regulation of Australian distribution companies within the NEM is moving from jurisdictional regulators to being undertaken by a single national body, the AER. The AER will be responsible for the establishment of future price controls for the distribution network companies once the current controls expire. Periods for regulatory price setting are normally 5 years in the NEM areas, although only 4.5 years in Tasmania. This is likely to be standardised once all regions are regulated by the AER. The AER is not responsible for regulation of distribution companies in States outside the NEM, which covers Western Australia and the Northern Territory. The AER is responsible for regulation in Western Australia with a price control period of 3 years.

In this chapter we look at the regulatory framework for the state of Victoria. The regulatory authority is the Essential Services Commission (hereafter the Commission). The current five-year regulatory period for gas ended on 31 Dec 2007, and for electricity on 31 Dec 2010. However, the jurisdictional regulators will remain responsible for compliance and monitoring for the current set of price determinations.

The Victorian Tariff Order sets out requirements that the Commission must comply with when determining the distributors' regulatory asset bases. The Tariff Order sets out regulatory asset bases for each distributor as at 1 July 1994 and requires that at each regulatory period these values be adjusted for inflation, capital expenditure, depreciation, customer contributions and disposals over regulatory periods. This is referred to as the roll forward method.

The Commission uses a 'building blocks' approach to determine the revenue required by a distributor. Under this approach, the Commission builds up revenue from an assessment of the key cost components comprising operating and maintenance expenditure, cost of capital financing requirements (return on and of capital), forecast tax liability and any efficiency carryover amounts resulting from efficiency gains earned in the preceding regulatory period.

The return on capital is determined by rolling forward the value of the regulatory asset base taking into account, among other things, capital expenditure requirements and then applying a weighted average cost of capital to the rolled forward asset value.

The Commission provides Regulatory Accounting Guidelines to the regulated companies which they have to abide by. The information is used for a number of purposes by the Commission including to inform Electricity Distribution Price Controls. The Regulatory Accounting Guideline aims to provide considerable support to the companies, particularly in terms of the allocation of shared costs, capitalisation, provisions and related party transactions.

4.1.2. Establishment of Regulatory Asset Base

The Victoria distribution company's regulatory asset bases represent the value, as assessed and approved by the Commission, of past network investments that are necessary for the regulated business. This value is the amount on which the regulated company can expect to earn a return (return on capital), and the value that is returned to the asset owner over the economic life of the assets (as regulatory depreciation).

To establish the opening RAB for the first year of the regulatory period (electricity distribution) is calculated as follows:

$$OpeningRAB_{2006} = OpeningRAB_{2001} + CapitalExpenditure2001to2005 -$$
$$CustomerContributions2001to2005 - \mathrm{Re}\,gulatoryDepreciation2001to2005 - Disposal2001to2005$$

Once the opening value has been established, the same approach is then used to determine the opening value for each year of the regulatory period. Forecasts of capital expenditure, customer contributions, regulatory depreciation and disposals are used in this calculation.

Opening RAB

The opening regulatory asset bases used to set the revenue requirements for the 2006-10 regulatory period have been based on the assumed capital expenditure (and disposals) for 2005. For the purposes of the regulatory period (2006-2010), an adjustment will be required for any difference between assumed and actual year 2005 capital expenditure (and disposals). Here capital expenditure include operating and maintenance expenditure (Opex). The Commission conducts benchmarking analysis on Opex.

To determine the regulatory asset base at 1 January 2006, the Commission used the capital expenditure amounts as provided by the regulated companies. The Commission places considerable weight on the distributors' historical expenditure, therefore the information for the years 2001 – 2004 were submitted to the Commission.

The Commission did not have all the information it required to update the value of the distributors' regulatory asset bases to 1 January 2006 because information on capital expenditure, customer contributions and disposals for the year 2005 was not available at the time. Therefore the Commission used the estimates of capital expenditure, customer contributions, disposals and regulatory depreciation used in the 2001 price review to determine the 2005 revenue requirements.

An adjustment will be made in 2010 for any difference between assumed and actual net capital expenditure for 2005, when the opening regulatory asset bases are calculated for the next

regulatory period (which begins in January 2011). Regulatory depreciation will remain the same as that estimated for this price review.

This information (reported expenditure) was carefully reviewed by the Commission and a number of adjustments were made. For example adjustments for the allocation of costs to prescribed distribution services where those costs are not properly associated with the provision of those services, for example, costs associated with any retail interests, excluded services and other activities.

These capital expenditure amounts and each distributor's reported customer contributions and disposals have been used to roll forward the 1 January 2000 value of the regulatory asset base to 1 January 2005. An adjustment has also been made for the difference between the forecasts for year 2000 used in the last price review and the actual amounts reported, except for depreciation which is the regulatory depreciation estimate made for 2000.

To establish a value for the opening regulatory asset base for the 2006-10 regulatory period, adjustments have been made to the actual outcomes of the 2001-05 regulatory period using an appropriate measure of inflation.

Regulatory depreciation

The Commission has applied the straight-line method for the calculation of regulatory depreciation for the 2006-10 period. The values of regulatory depreciation used to establish the regulatory asset bases for the 2006-10 period are calculated using the depreciation profiles (straight-line on an inflation indexed asset base) and effective lives proposed by the distribution companies. The Commission did not adopt a standardised set of asset lives or classes but rather this 'hands-off' approach to determine regulatory depreciation as this reflects the fact that the rate of depreciation affects only the timing (rather than value) of cash flows.

The measure of inflation that the Commission has used to roll forward the regulatory asset bases for the 2001-05 period is the All Groups Consumer Price Index[9] . This is used as the measure of actual inflation which is relevant for changes to the purchasing power of money in the Australian market.

4.2. Germany

In Germany, the Federal Network Agency (Bundesnetzagentur, or BNetzA) which was previously called the Regulatory Authority for Telecommunications and Post, was established on the 1st January 1998 as a higher federal authority within the scope of business of the Federal Ministry of Economic and Technology (BMWi). As a result of the amended Energy Act 2005, it was assigned additional functions and renamed the Federal Network Agency for electricity, gas, telecommunications, post and railway in 2005. The Federal Network Agency's task is, through regulation of networks to promote competition in the telecoms, postal, railway and energy sector to ensure the provision of appropriate and adequate services, efficient use of network charges and to guarantee non-discriminatory third-party access to networks.

In the field of energy its role is to:

[9] Average of the eight Australian State Capitals, as published by the Australian Bureau of Statistics.

- as far as possible, a secure, cost-efficient, consumer-friendly, efficient and environmentally compatible wired provision of electricity and gas to the general public;
- working and undistorted competition in the provision of electricity and gas and ensures the efficient operation of energy supply networks on a long-term basis;

In Germany there is a division of labour between the Federal Regulator (Bundesnetzagentur) and the regulators of the federal states (Landesregulierungsbehörden).

- The regulation authority of the federal states are responsible for all network operators (electricity and gas) with less than 100,000 customers connected directly or indirectly to their grid.
- The Federal Regulator i.e. the Bundesnetzagentur is responsible for all network operators with more than 100,000 customers and with network area located in more than one Federal State.

Some of the federal states made use of the possibility to transfer the responsibility for regulation to the federal regulator. In this case the BNetzA is also responsible for the smaller network operators.

The regulatory authorities of the federal states have equivalent powers in relation to the utilities that they regulate. A working group has been set up comprising of the federal regulator and the various authorities of the federal states. The purpose is to exchange information and to maintain a consistent regulatory approach for all utilities.

4.2.1. Regulatory Framework

The BNetzA is responsible for regulating the monopolistic areas of the gas and electricity network. The first price control under incentive regulation started for the first time from 1 January 2009 to 31 December 2013. The Ordinance for Incentive Regulation contains the rules for calculating the allowed revenues of the regulated network operators for electricity and gas, for both transmission and distribution networks. Under the Ordinance, the electricity transmission network activities are subject to a revenue cap regulation and for distribution network operators a hybrid revenue cap.

The first regulatory period is five years long, from 2009-2013 for both transmission and distribution. For the gas network operators the regulatory period is four years 2009-2012.

The ordinance indicates that 2006 cost data of the regulated companies is used in establishing the opening value for the base year 2009, the first year of the regulatory period.

4.2.2. Establishment of Regulatory Asset Base

The section provides a description of the establishment of RAB under the German TOTEX[10] regime. This methodology is the same for electricity and gas transmission and distribution companies.

[10] Please see section 2.2.6.3 for details on TOTEX regime.

There are four components to establish the initial values: These are called imputed capital costs.

- Imputed Return on Equity
- Imputed Return on Debt
- Imputed Depreciation
- Imputed Trade Tax

4.2.3. Asset Valuation

The German regulatory regime allows separate items for return on equity and return on debt. It does not use the WACC concept. BNetzA determines the allowed rate of return on debt and on equity.

As there was a change in the asset valuation concept, the German model comprises two concepts of asset valuation. Therefore, for the calculation of imputed return on equity and imputed depreciation, the method differentiates between the treatment of fixed assets acquired before 1 January 2006 and after 31 December 2005.

- Physical asset maintenance concept (*Nettosubstanzerhaltungskonzept*) for assets acquired before 1 January 2006, and

- Financial capital maintenance concept (*Realkapitalerhaltungskonzept*) for assets acquired after 31 December 2005.

The first approach uses depreciation based on replacement costs, however only for the equity funded part, and a real rate of return on equity (9,29%). The second approach uses depreciation based on historic costs and nominal rate of return on equity (7,26%).

The rules and procedures regarding these concepts are set out in the Ordinance on Use of Network Charges. The first approach (physical asset maintenance) calculates the imputed depreciation for the portion of the assets funded by equity using the replacement cost asset valuation method. In this way the regulated company can collect over the asset life sufficient equity and finance the asset replacement without increasing the debt level, i.e. the gearing remains constant over time. The regulator calculates replacement cost values by using indices for the major asset groups as published by the German Statistical Office. Depreciation for the portion of the assets funded by debt is based on historic cost. As the compensation for inflation is provided on the asset side BNetzA allows real rate of return on equity and nominal return on debt.

The second approach (financial capital maintenance) is applied for assets acquired after 31 December 2005 and uses depreciation based on historic cost with a nominal rate of return on equity. The inflation is compensated in the allowed rate of return on equity. In this way the equity remains constant in real terms and grows with the general inflation in nominal terms. The rate of return on debt is also defined in nominal terms. As compensation for inflation is provided in the asset valuation, BNetzA allows a real rate of return on equity and a nominal return on debt.

The following sections describe the steps required to calculate the imputed capital costs.

4.2.4. Imputed Return on Equity

The procedure to calculate the return on equity consists of three main steps:

1. The first step is to calculate the equity ratio

2. The second step is to calculate the assets necessary for operation (BNV II)

3. The next step is to calculate the return on equity based on the equity necessary for operation (Betriebsnotwendiges Eigenkapital - BEK II)

Step 1: Equity Ratio

The maximal allowed equity ratio for regulatory purposes is capped at 40 %. This is the first cap applied by the regulator. To calculate the equity ratio, this is the Equity Necessary for Operation (BEK I) divided by the assets necessary for Operation (BNV I)

To calculate the assets necessary for operation (Betriebsnotwendiges Vemögen – BNV I), it is the sum of the following:

- Average residual value of fixed assets as of the end of 2006 acquired before 1. January 2006 valued at historical acquisition and production cost;
- Average Residual Value of fixed assets as of the end of 2006 acquired after 31. December 2005 valued at historical acquisition and production cost
- Balance Sheet values Values of Financial Assets as of the end of 2006;
- Balance Sheet Values of Current Assets (including receivables, materials and cash) as of the end of 2006.

To determine Equity Necessary for Operation (BEK I), the Interest free capital and interest bearing capital are deducted from BNVI.

Step 2: Assets necessary for operation (BNV II)

The second step is to calculate the assets necessary for operation (Betriebsnotwendiges Vermögen – BNV II). This is the sum of the following:

- Average Residual value of fixed assets as of the end of 2006 acquired before 1 January 2006 at historical cost multiplied by the debt ratio *(1 minus equity ratio)*
- Average Residual value of fixed assets as of the end of 2006 acquired before 1 January 2006 at replacement value multiplied by the *equity ratio (max 40%)*
- Average Residual value of fixed assets as of the end of 2006 acquired after 31. December 2005 valued at historical acquisition and production cost
- Balance Sheet values of Financial Assets as of the end of 2006
- Balance Sheet values of Current Assets as of the end of 2006

Step 3: Equity necessary for operation (BEK II)

The last step is to take the value assets necessary for operation (BNV II) to calculate the equity necessary for operation (BEK II). The following items are deducted from the Assets Necessary for Operation (BNV II).

To determine Equity Necessary for Operation (BEK II), the Interest free capital and interest bearing capital are deducted from BNVII.

The second cap applied by the regulator relates to the level of the Equity Necessary for Operation II (BEK II). The regulated companies are allowed to receive rate of return on Equity Necessary for Operation II only on the portion of Equity Necessary for Operation II (BEK II) which is less than 40 % of the Assets Necessary for Operation II (BNV II). The portion of Equity Necessary for Operation II (BNV II) in excess of 40% is treated as debt.

4.2.5. Imputed Return on Debt

This Regulator allows some freedom in the determination of the return on debt. It uses as-market-based return on debt the average market rate of the last 10 years on bonds issued by domestic institutions (yields on debt securities outstanding issued by domestic private and public institutions. In this case, the average from 1995-2006 were taken.

4.2.6. Regulatory depreciation

For electricity transmission and distribution companies the regulator has determined 35 asset groups and the respective life for each asset group. For gas transmission and distribution there are 44 asset groups. The asset life for regulatory depreciation differs from the asset life for financial accounting as set in the German GAAP. For price control purposes the regulatory asset life are used. Regulatory Depreciation is a straight line method.

To calculate the regulatory depreciation of assets, again this is differentiated between:

- Residual assets value acquired before 1 January 2006 valued (a) at replacement cost[11] for the equity-funded portion and (b) at historic cost for the debt-funded portion
- Residual asset values based on historic costs acquired after 31 December 2005.

To calculate the imputed depreciation differentiated between replacement value and historic cost for assets acquired before 1 January 2006. This is done by multiplying the respective debt and equity ratios:

- Depreciation for assets financed from equity = Annual depreciation of asset acquired before 1 January 2006 based on replacement value x equity ratio capped at 40%.

- Depreciation for assets financed from debt = Annual depreciation of historic cost for assets acquired before 1 January 2006 x (1-equity ratio).

[11] For the calculation of the imputed depreciation based on the replacement value. BNetzA calculates indices based on data of the German statistical office. The BNetzA uses these indices for the calculations of the replacement values in the photo year (2006).

4.2.7. Imputed Trade Tax

The basis for the calculation of imputed trade tax (taxable income for regulatory purposes) is the imputed return on equity. The components for trade tax are:

Trade tax rate (T) = municipal rate fixed by the municipality * Rate for the assessment of trade tax

4.3. Great Britain

4.3.1. Regulatory Framework

In Great Britain, there is a single regulatory body, Ofgem, responsible for the regulation of the gas and electricity markets. A fundamental part of its responsibility is the regulation of the transmission and distribution network businesses within each of these energy markets.

Ofgem was established as a combined electricity and gas regulatory body from its predecessors OFFER (electricity) and OFGAS (gas) by UK government legislation under the Utilities Act of 2000.

Under its statute, the principle duty of Ofgem is protecting consumers, which it undertakes in two ways:

- Promoting effective competition, wherever appropriate; and
- Regulating effectively the monopoly companies which run the gas pipes and the electricity wires.

There are 14 regional electricity companies (REC) in Great Britain (GB); each responsible for a distribution service area. Britain is currently in its fourth electricity distribution price control, set for a period of five years (the current price control runs from April 2005 to March 2010).

There are eight gas distribution networks (GDNs) each covering a separate geographical region of Britain. In addition, there are a number of smaller networks owned and operated by Independent Gas Transporters (IGTs). The current price control runs from April 2008 to March 2013.

National Grid Electricity Transmission (NGET) owns and maintains the network of electricity transmission assets in England & Wales and is also the System Operator of the GB electricity transmission system. National Grid Gas (NGG NTS) is Transmission Owner and System Operator for the GB gas transmission system. The current price control runs from April 2007 to March 2012 and is based on a revenue cap.

4.3.2. Electricity Distribution

Rolling forward the asset base

The network's regulatory value is "rolled forward" by adding capital expenditure and deducting depreciation incurred each year.

The initial RAB in the case of the regional electricity companies was based on their market capitalisation at privatization. The RAB at 31 March 1998 was established as part of the last

price control review. This was then rolled forward to 2005 by adding actual capital investment and adjusting for depreciation and inflation. A further adjustment was undertaken by Ofgem to correct the treatment of the margins on intra-group charges.

The RAB calculations rely on the DNOs' own forecasts of 2004/05 capital expenditure (on the understanding that these were best estimates at the time). In the event that actual 2004 /2005 RAB additions turn out to be materially different than the estimate used, Ofgem may decide to claw back the benefits of any under-spend against the estimate used at the next review (if the difference is not due to genuine efficiencies).

New capital investments are increasingly driving the regulated revenue of Distribution Network Operators (DNOs), as operating expenditures fall and new investments are added to a growing RAB. The process for assessing the required level of capital expenditure over a price control period is as follows. Utilities must draft business plans which include projected capital expenditure. These are then audited by a firm of engineering consultants, working for Ofgem.

In order to roll forward the RAB from April 2005 to March 2010, the categories of costs to be included in the RAB are the following:

- 100% of net non-fault operational CAPEX[12];
- 23,5% of OPEX plus fault costs;
- 57,7% of pension costs; and
- no part of other costs.

Ofgem might disallow costs from any of these categories if they do not relate to the distribution business or are demonstrably inefficient or wasteful.

Ofgem has developed a sliding scale mechanism to accommodate the wide range of approaches between DNOs in relation to capital expenditure projections. It applies to RAB additions excluding pension costs.

Asset valuation and regulatory depreciation

The pre-vesting assets (the assets at privatisation) were valued separately to those acquired since vesting (privatization). The value of the pre-vesting assets was based on the market value on flotation of the each company at privatisation. These values were written off on a uniform annual basis, typically 10 to 15 years, depending on the average age of the assets at privatisation.

Investment made since privatisation is also written off on a uniform annual basis, over a period of 33 years, reflecting the company's accounting treatment of these assets, which involves depreciation at 3%. The RAB has been adjusted so that it takes into account actual, not projected, capital expenditure in the previous price review period, provided that the actual expenditure represented a prudent level of spending. The capital expenditure was also ad-

[12] The non-fault operational CAPEX is net of customer contributions; cash proceeds of sale (or market value of intra-group transfer) of operational CAPEX disposals and costs logged up an agreement between the DNO concerned and Ofgem in relation to undergrounding in national parks or areas of outstanding natural beauty.

justed to take account of changes in capitalisation policy by some companies, to ensure that the company did not gain by changing its capitalisation policy.

As the vesting depreciation allowances come to an end for each company, there would likely be a sharp fall in depreciation, followed by a gradual increase. To stabilise in the longer term, both the path of consumer prices and the financial position of the distribution businesses, Ofgem has decided in the current price control to tilt the depreciation on the post-vesting assets, assuming a 20 year asset life with the one-off adjustment smoothed over 15 years (see Table 4). The changes are only made when the pre-vesting depreciation allowances end.

Table 4: Vesting asset lives

Distribution Operator	Assumed vesting asset life	Depreciation smoothing applied
CN – Midlands	15	From 2006/07
CN – East Midlands	15	From 2006/07
United Utilities	11	From 2002/03
CE - NEDL	14	From 2005/06
CE - YEDL	15	From 2006/07
WPD – South West	15	From 2006/07
WPD – South Wales	11	From 2002/03
EDF - LPN	15	From 2006/07
EDF - SPN	13	From 2004/05
EDF - EPN	14	From 2005/06
SP Distribution	20	n/a this price control period
SP Manweb	15	From 2006/07
SSE - Hydro	20	n/a this price control period
SSE - Southern	15	From 2006/07

Source: Ofgem (2004)

4.3.3. Gas Distribution

Rolling forward the asset base

The legal framework for gas distribution is set in the "Gas Distribution Price Control Review: Final Proposals" (December 2007).

The RAB roll forwards for 2005-06 and 2006-07 was updated to reflect actual expenditure.[13] Table 5 sets out the RAB roll forward from 1 April 2002 to 31 March 2008. Table 6 shows the projected RAB roll forward for 2008-13.

Table 5: RAB roll forward 2002-03 to 2007-08, all GDNs

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
	£m	£m	£m	£m	£m	£m
Opening value bf from previous price control	10.634,7					
Additions to pre-2002	91,8					
Revised opening value bf	10.726,5	10.909,1	10.995,6	11.058,3	11.232,7	11.465,8
Depreciation	-376,4	-382,1	-385,8	-389,0	-394,7	-401,9
Net CAPEX additions	570,4	467,4	447,7	567,8	631,3	652,4
Disposals	-11,4	1,2	0,8	-4,5	-3,5	0,0
Closing value	10.909,1	10.995,6	11.058,3	11.232,7	11.465,8	11.716,2

Source: Ofgem (2007)

As shown in Table 6 the closing RAB is equal to opening RAB + RAB additions less RAB depreciation plus disposals. Disposals are assumed to be zero for 2007-08.

The allowed revenue for 2008-13 includes also the present value of change in RAB. The present value of change is given by RAB = Opening RAB – Closing RAB / (1 + vanilla WACC[14]). The allowance for this is calculated in mid-year prices by multiplying by (1 + vanilla WACC) ^ 0.5, since all price control allowances are assumed to be earned evenly through the year.

The RAB additions include a return on RAB and depreciation based on assessment of the required CAPEX and REPEX adjusted by the Information Quality Incentive (IQI). The IQI mechanism intents to encourage GDNs to bid their best view on the capital and replacement expenditure. This incentive consent to compare the GDNs' forecast against the Ofgem's analysis and use the IQI ratio to determine:

- An appropriate level of allowance for CAPEX and REPEX;
- The incentive rate to be applied to the under /overspend of CAPEX; and
- A reward for those GDNs that forecast close to Ofgem's analysis (or a penalty for those where there is wide deviation).

[13] Note that for the one-year control (i.e. 2005-06 and 2006-07) the RAV roll forwards was provisional based on forecast expenditure.

[14] The vanilla WACC is equal to 4,94%.

The IQI is simplified by setting a single IQI rate for each ownership group and a single IQI rate across the five years of the price control.

Eventual adjustments to allowed revenue arising from variations in GDNS' actual spend from the CAPEX and REPEX assessment will be taken into account in the 2013-18 price control review.[15]

Table 6: RAB roll forward 2008-09 to 2012-13, all GDNs

	2008-09	2009-10	2010-11	2011-12	2012-13
	£m	£m	£m	£m	£m
Opening value brought forward	11.716,2	12.053,2	12.382,6	12.616,9	12.877,1
Depreciation	-409,7	-419,6	-429,5	-437,6	-446,3
Net CAPEX additions	746,7	749,0	663,8	697,7	673,6
Disposals	0,0	0,0	0,0	0,0	0,0
Closing value	12.053,2	12.382,6	12.616,9	12.877,1	13.104,4

Source: Ofgem (2007)

The main criteria applied in the ex-ante assessment of CAPEX requirements are the following:

- CAPEX is investment in assets whose benefits can be expected to last for some years. This includes e.g. expenditure on extending or reinforcement the pipe network or adding new connections;
- REPEX is expenditure on replacing component mains and services. Only 50% of it enters the RAB;
- Expenditure is included net of customer contributions with the exception of connections CAPEX relating to new housing or larger non-domestic customers[16];
- Where CAPEX is provided by a related party or affiliate, any margin charged by that related party or affiliate should be removed; and
- Expenditure that is a result of diseconomies of scale arising from GDN sales is not eligible for inclusion in the RAB.

Ofgem decided to adjust the RAB to reflect the net disposal of large physical asset base (including property and land). In order to incentivise GDNs to dispose of assets it is applied a rolling incentive mechanism. The RAB disposals do not impact the allowed return on RAB for

[15] Exception of expenditure on mains and service REPEX where differences in unit costs are adjusted during the year of spend.

[16] For connections to new housing and larger the net connections CAPEX that will be included in the RAB are the costs associated with the ten-metre rule and final connections allowances excluding any related party margins associated with this work.

five years. After five years, the income-earning RAB will be then adjusted for gross disposals net of direct costs of disposal.

Regulatory depreciation

There are two methods for calculating depreciation on gas distribution assets depending on whether they were acquired prior or after March 2002. The depreciation on pre-2002 assets is determined as follows.

$$Depreciation\ on\ \ pre-2002\ assets = gross\ opening\ \ assets * depreciation\ \ factor$$

Where:

$$Depreciation\ \ \ factor = \frac{(28*2+1)-i}{\left(\frac{(28*2)(28*2+1)}{2}\right)}$$ for i=1 to 56 i.e. numerator goes from 56 to zero, and denominator is sum of 1 to 56, i.e. 57/2 * 56. These depreciation factors were used in the 2002-07 price control. The formula has been checked to add to one if rolled out for 56 years. The formula is equivalent to assuming that the assets were purchased evenly over time, and that each has a life of 56 years.

Conversely assets purchased following March 2002 and allowed for in the price control allowances is determined according to the following formula.

$$Annual\ \ depreciation = cumulative\ \cos t \Big/ 45.$$

Indexation

The RAB is indexed to Retail Price Index (RPI) in order to allow for the effects of inflation on the licensee's capital allowances for the regulatory depreciation and also for the return investors are estimated to require to provide the capital. There is a "Regulatory Indexation Allowance" in each year which is applied to the RAB (both Gross Additions and Cumulative Depreciation). All nominal RAB calculations are therefore at year end RPI:

- Opening RAB (gross RAB and cumulative depreciation) is indexed from the 31 March opening RPI to the 31 March closing RPI;
- All depreciation is calculated off this closing balance; and
- All additions to and removals from the RAB are forward valued to the year end RPI prior to addition to the RAB.

As a result the RAB reconciliation is therefore done by comparing the Nominal RAB, divided by the difference in year end RPI and 2005-06 average RPI, to the real RAB.

4.3.4. Electricity and Gas Transmission

Rolling forward the asset base

The legal framework for electricity and gas transmission is set in the "Transmission Price Control Review: Final Proposals", which was published in December 2006. A similar regulatory regime applies to both electricity and gas transmission activities.

In order to determine the level of "baseline capital expenditure" required for the five year period (2007/08 – 2011/12), Ofgem's analysis has included an efficiency review of historical capital expenditure up to 2005/06 and an assessment of forecast capital expenditure for 2006/07 to 2011/12. The opening RAB for NGET and NGG on 1 April 2007 reflects the depreciated value of actual expenditure incurred by NGET in the period 2001/02 to 2005/06 and Ofgem's adjusted view of capital expenditure in 2006/07.

The calculation of the movement in the RAB might be described as follows: in each year total capital expenditure is added to the opening RAB and the allowed level of depreciation is subtracted from it to give a closing asset value. The closing value in any year then becomes the next year's opening value. The categories of costs which will be included within the RAB are the following:

- 100% of baseline net operational capital expenditure;
- Incremental net operational capital expenditure triggered by the automatic revenue drivers;
- A consistent proportion of capitalized operating costs and pensions to those reflected in setting the price controls, excluding non-operational CAPEX that are assumed to be fully expensed; and
- No part of other costs or taxes (including VAT).

The default starting point is that all capital expenditure will be included in the RAB, with the exception of expenditure which is judged to be demonstrably inefficient or unnecessary. However, in the case of the transmission licensees, due to the lumpy and multi-year nature of transmission investments a significant emphasis will be place on an ex-post efficiency review of costs and volumes to determine efficient and economic spend. A key consideration in forming a view at future price control reviews on the efficiency of load related CAPEX will be the extent to which the investment decisions were based on strong evidence of long term demand for capacity from network users (backed by financial commitment).

Ofgem proposed a "safety net" mechanism that would trigger if at any stage in the five-year control period annual expenditure is more than 20% below the capital expenditure allowance for that year. Under this mechanism, it was proposed that a company would retain the benefit of its actions during the period up to the time when the mechanism was triggered. Once the mechanism was triggered, Ofgem would assess the level of expenditure relative to the information provided by regulated companies during the price control review and would expect to reset CAPEX allowances for the remainder of the price control period.

Ofgem's approach to resetting the RAB for 1 April 2012 might be summarized as follows: efficiently incurred expenditure against the baseline will enter the RAB in the year that it is incurred. All such expenditure will be subject to 25% CAPEX incentive, unless as alternative

treatment has been agreed for specific items. For instance, the incentive will not apply to specified items of uncertain costs which should be logged up (such as underground cable tunnels and telecoms infrastructure). The 25% incentive will be applied through a one-off revenue adjustment on 1 April 2012 (if applicable).

The incentive mechanism applies to RAB additions whether above or below the level of the allowance. It should be noted that for electricity transmission licensees, Ofgem proposed that the allowance to which the CAPEX incentive applies is the allowance as adjusted for CAPEX differences implied by the load related revenue drivers. In case of incremental gas transmission expenditure, Ofgem proposed that actual expenditure incurred will enter the RAB five years after the unit cost allowance[17] has been triggered in relation to the delivery of that incremental capacity.

Regulatory depreciation

Once pre-vesting assets become fully depreciated, Ofgem intended to reduce post-vesting regulatory asset lives to 20 years for all electricity transmission companies, with company specific smoothing adjustments in relation to post-vesting assets already installed. Ofgem decided to adopt a 15 year smoothing period for SPTL, 30 years for SHETL, and 50 years for NGET. Ofgem also decided to adopt a 20 year depreciation period in respect of the approved Transmission Investment for Renewable Generation (TIRG) schemes.

[17] An unit cost allowance is a parameter set for each entry point in order to reflect the cost of providing additional capacity at that point on the network.

5. CURRENT PRACTICE IN ERRA COUNTRIES

In order to gain a better insight on the current regulatory practice in ERRA countries, a questionnaire was distributed to the ERRA countries in English and Russian. The purpose of the questionnaire is to seek more information on how RAB are defined and set in the respective countries and the methodologies adopted. Please refer to Appendix I for the questionnaire.

In this section we summarize the questionnaire responses that were received.

5.1. Albania

In Albania the generation activity is regulated through the rate of return approach. Conversely, the regulatory approach adopted for transmission and distribution electricity consists of a price cap tariff approach. Regulatory accounting guidelines requiring a specific treatment of capital cost are not applied in Albania.

The RAB consists of tangible and intangible assets less accumulated depreciation plus working capital allowance less capital contributions. Disposal of assets are deducted from the RAB. Assets in construction are not included in the RAB. With regards to new or future investment, only prudent levels of investment approved by the regulator may be included in the RAB by the DSO's.

The straight-line depreciation is the depreciation method applied to the RAB. Asset lives of the individual assets are based on the latest engineering study prepared by the DSO and approved by the regulator and it should comply with IAS principles. Usually, the regulator applies "tax lives on assets" for regulatory purposes. However, in specific cases the regulator may use a different approach to determine the asset life.

The determination of the working capital allowance (WCA) is based on a study of the funds required to maintain a suitable level of materials and supplies and the cash required to meet current obligations and to maintain minimum back accounts. The licensed company shall propose to ERE its preferred method for calculating the WCA and ERE will check whether the proposed method is adequate. Alternatively, the DSO may use an estimate of the WCA with proper justification. In any case the WCA will not exceed 1/12 of OPEX.

The asset valuation methodology normally used by the regulator consists of historic cost however; the licensee may propose a different method to the regulator.

The tariff methodology allows for the revaluation of tangible assets by the DSO in accordance with the Albanian Accountancy Act and IAS. In 2005 it took place a revaluation of tangible assets (based on the market value) by the integrated company (Council of Ministers Decision no. 40, 13.1.2005). This revaluation has been taken into account by the regulator.

5.2. Armenia

The regulatory approach currently in place in Armenia consists of rate of return or cost plus approach.

The regulator allows recover (through tariffs) of all investments intended to increase or replace the useful and used assets after their completion. CWIP are not considered in the RAB.

New and future investments are included in the RAB once the expenditure has been incurred (ex-post). The straight-line depreciation method is the depreciation method applied to the RAB. For the determination of the asset life the concept of efficient and useful assets applies.

Capital contributions (after their realization) are partly or fully allowed to be included in the RAB by the Regulatory Commission. The disposal of assets is deducted from the RAB.

The working capital allowance is given by the difference between current assets and current liabilities and it takes into account the amount of available funds, materials and spare parts, which are necessary in conducting the network business. This allowance is subject to regulatory approval.

The asset valuation methodology used by the regulator is the historic cost. The assets have been revalued only once and the value of revalued assets has been used for tariff regulation according to the Law of PA (Public Services Regulatory Commission).

5.3. Azerbaijan

In Azerbaijan cost plus regulation is the regulatory approach adopted by the Tariff (Price) Council. Assets in construction are allowed in the RAB. With regards to new /future investment in the RAB the regulator allows an estimate of the cost of investment (ex ante) to be included into the RAB and then at some point in the future (ex post) the actual cost will be used to replace the estimate. Assets funded by capital contributions are deducted from purchase cost.

The following depreciation rates areapplied:

Buildings and premises – 7%

Machines, equipment, facilities – 25%

Non-material assets – 10%

Other main assets – 20%.

The asset valuation methodology used by the regulator is conducted in accordance with the International Accounting Standards assets and have not been subject to revaluation.

5.4. Bosnia and Herzegovina

In Bosnia and Herzegovina (BiH) the rate of return is the regulatory approach adopted by the regulator (SERC). Regulatory accounting guidelines requiring a specific treatment of capital cost are not applied in BiH.

The RAB is determined based on the Tariff Pricing Methodology for Electricity Transmission, System Operation and Ancillary Services. The RAB determination may be expressed by the following formula:

$$RAB = PV - AD - GA + WC$$

Where:

PV Purchase value of fixed assets;

AD Value of accumulated depreciation of fixed assets;

GA Value of granted assets (i.e. assets received free of charge); and

WC Value of net working capital (given by the difference between current assets and current liabilities).

The RAB shall include only those assets that are used for the performance of the regulated activities. In addition, assets in construction are not allowed to be included in the RAB.

In order to perform an assessment of investments in fixed assets the SERC will check:

- Rational for an investment based on its potential to improve quality and security of supply, in accordance with the projected demand; and
- Coherence of investments with the existing development programs.

In addition, the SERC may require the auditing of the RAB in any regulatory period.

The regulator only takes account of the investment (new and future investment) once the expenditure has been incurred.

The straight-line depreciation is the depreciation method applied to the RAB. Regarding the asset lives in years they depend on the type of asset. For example, the asset life of buildings is 50 years and for HV lines and power transformers is 40 years.

The asset life for financial accounting purposes is the approach used by the regulator to determine the asset life.

There is no allowance for working capital and disposal of assets are deducted from the RAB.

The asset valuation methodology used by the regulator consists of historic cost and assets have not been subject to revaluation.

5.5. Bulgaria

In Bulgaria prices at which producers sell electricity to the public provider, prices for transmission and for access to the transmission network are regulated through a rate of return method. A revenue cap regulation method applies to prices for transmission over the respective distribution networks, to prices for access to distribution networks and prices at which the end suppliers sell electricity to “protected customers”.

In determining the return on capital the State Energy and Water Regulatory Commission (SEWRC) applies two general principles:

- The return on equity is determined by the SEWRC;
- The return on debt is calculated as a weighted average value of the agreed annual interest rates on loans and the relative weight of the respective loan in the total amount of debt capital.

Article 14 of the “Ordinance on Regulating Electricity Prices” defines RAB as the sum of recognised value of assets (valued at the acquisition price) plus allowance for working capital and forecasted investments (nominal value) approved by the Commission minus book value of capital contributions minus regulatory depreciation (computed using the straight-line depreciation method). Eventual assets in construction are not allowed in the RAB.

With regards to new /future investment in the RAB the regulator allows an estimate of the cost of investment (ex-ante) to be included in the RAB and then at some point in the future (ex-post) the actual cost will be used to replace the estimate.

Asset lives are determined according to the useful life of assets approach and they are as follows:

- Building: between 25-50 years;
- Plant and equipment: between 10-25 years;
- Inventory: 6-7 years;
- Transformers and substations: 10-20 years.

The working capital allowance is computed in one of the following ways:

- Difference between the current assets and current liabilities, or
- As a part of the expenses related to the licensed activity based on the net working capital cycle method.

The regulator includes in the RAB the book value of assets that are used and directly related to the licensed activity. The value of the fixed assets does not include:

- The costs of acquisition of assets in the form of assets in construction;
- Assets acquired by a financial lease contract if not directly related to the licensed activity;
- Assets that are not related to the licensed activity (incl. recreational and other social facilities) and/or rented, conserved, decommissioned assets, etc.;
- Assets obtained by grant schemes, donations, aid, etc.;
- Assets acquired in the previous regulatory period exceeding the market levels for similar assets; and
- Assets with residual value that are expected to be decommissioned in the regulatory period.

The last revaluation of assets occurred in 2004. Since then the RAB for the electricity distribution companies and suppliers includes the value of assets before revaluation multiplied by two.

5.6. Croatia

In Croatia the regulatory approach currently in place consists of rate of return regulation. Within the Croatian framework there are no regulatory accounting guidelines requiring a specific treatment of capital cost.

The RAB is defined in Art. no. 23.3 of the "Tariff system for electricity distribution". According to that, the value of the regulated assets (RIk) at the end of the year is expressed as follows:

$$RIk = RIp + NI - BI - A - OR$$

Where:

NI Value of new investments in the relevant year, financed from depreciation, profit, credits, co-financing, donations and from issuing bonds and other securities (expressed in kn);

BI Value of assets received free of charge in the relevant year (expressed in kn); and

OR decommissioned assets (expressed in kn).

Assets in construction are allowed to be included in the RAB.

In Croatia the regulator allows an estimate of the cost of investment (ex-ante) to be included into the RAB and then at some point in the future the actual cost will be used to replace the estimate.

The depreciation method applied to the RAB is the straight-line depreciation method. The asset life for financial accounting purposes is the approach adopted by the regulator. The asset lives of the individual assets are shown in the following table.

Asset lives (in years)	Assets
40	- sub-stations 400, 220, 110 kV (buildings, power transformers) - sub-stations 35 kV (buildings) - overhead lines 400, 220, 110 kV - cables 110 kV
35	- sub-stations 20, 10 kV (buildings) - overhead lines 35 kV
33	- power transformers 35kV - primary equipment 400, 220, 110, 35 kV - electric parts of overhead lines 20, 10 kV - under-sea cables
30	- cables 35, 20, 10 kV - civil part of overhead lines 20, 10 kV (concrete, iron poles)
25	- primary equipment 20, 10 kV - power transformers 20, 10 kV - electric parts of overhead lines 0,4 kV - cables 0,4 kV - secondary equipment 400, 220, 110, 35 kV
20	- civil parts of overhead lines on wooden poles - induction meters
15	- electronic meters
10	- control equipment

The value of assets funded by capital contributions are not considered in the RAB and disposal of assets are deducted in the RAB. In addition, there is no allowance for working capital.

The asset valuation methodology used by the regulator is the historic cost. The assets have not been revalued as part of the tariff regulation process.

5.7. Estonia

In Estonia both regulatory regimes i.e. rate of return and incentive regulation are used.

The Competition Authority (CA) defines the year since the capital expenditures are calculated. Capital expenditure on fixed assets acquired before that year shall be considered at its residual value, whereas capital expenditures acquired as of the defined year shall be reported at the acquisition cost.

In case significant changes occur, the cost of fixed assets acquired before the defined year and the depreciation rates may be changed. In addition, regulated companies may cluster its fixed assets using different depreciation rates for different groups of fixed assets (if the CA permits so).

The RAB is defined as fixed assets and working capital used in the regulated activity. It does not include assets in construction and disposal of assets are deducted from the RAB.

The formulae used to determine the RAB are the following:

$$RAB = \left(RAB_0 + RAB_1\right)/2 + WC$$

Where:

RAB_0 Regulatory asset base at the beginning of the regulatory period;

RAB_1 Regulatory asset base at the end of the regulatory period; and

WC Working capital allowance.

$$RAB_1 = RAB_0 + I - C - S$$

I Investments made during the regulatory period;

C Capital expenditure; and

S Fixed assets written off.

The regulator allows an estimate of the cost of investment (ex ante) to be included into the RAB and then at some point in the future (ex post) the actual cost will be used to replace the estimate.

The depreciation method applied to the RAB is the straight-line depreciation method. The asset lives of the individual assets are within the range 15-35 years.

The values of assets funded by capital contributions are not considered in the RAB. Usually, the working capital is determined as 5% of the turnover of the respective financial year. If necessary CA may perform a more detailed analysis of the working capital.

The asset valuation methodology used by the regulator is the historic cost and assets were not been subject to revaluation.

5.8. Georgia

The regulatory approach adopted in Georgia is the rate of return approach. There are no regulatory accounting guidelines that require specific treatment of capital cost. The assets in construction are not included in the RAB. The new /future investment in the RAB only take account of the investment once the expenditure has been incurred.

The depreciation method applied to the RAB consists of diminishing balance depreciation and accelerated depreciation. The asset lives of the individual assets vary and they depend on the type of assets. On average the asset lives is around 25-30 years. The asset life for financial accounting purposes is the approach used by the regulator to determine the asset life.

Treatment of assets funded by capital contributions are considered in the RAB on a case by case basis. (reasonable capital expenses are considered in the RAB). The regulator conducts a revision of the RAB between regulatory periods.

The asset valuation methodology used by the regulator is the replacement cost and assets have been revalued as part of the tariff regulation.

5.9. Hungary

In Hungary the regulatory approach used by the regulator is incentive regulation (a price cap mechanism); however, some items are regulated as rate of return regulation.

The HEO has prepared two regulatory accounting guidelines: one on cost justification for the determination of the starting prices and another on the regulatory mechanism. These guidelines are published on the HEO web site.

The RAB is determined by depreciated replacement value of the assets (residual values) registered on 31/12/2007 plus asset value activated in 2008 minus disposals in 2008. Assets in construction are not allowed to be included in the RAB and the approach used by the regulator when including new or future investment in the RAB is currently under revision.

The depreciation method applied to the RAB is the straight-line depreciation and the asset life of the individual assets is 35 years (this is determined in accordance to the “real asset life” approach). The value of assets funded by capital contributions are not considered in the RAB, whereas disposal of assets are deducted in the RAB.

The HEO uses the depreciated replacement value as the asset value for regulatory purposes. A revaluation process took place twice (in 2004 and 2008) in order to determine the depreciated replacement value.

5.10. Latvia

The regulatory approach followed by the regulator in Latvia is the rate of return approach.

The RAB is defined as “assets, intangible assets and inventories owned or rented by the service provider and attributed to the provision of the regulated service.” The assets in construction are not allowed in the RAB. The regulator only takes account of new / future investment in the RAB once the expenditure has been incurred.

The depreciation method applied to the RAB is according to the financial statements. The value of assets funded by capital contributions as well as the disposal of assets is not considered in the RAB. In addition, an allowance for working capital is not considered in the tariff calculation.

The asset value is established is line with the financial statements. An eventual asset revaluation process is a choice of the service provider.

5.11. Lithuania

The regulator in Lithuania applies an hybrid cap – 50/50 price/ revenue cap and the regulatory period lasts 3 years. At present there are no regulatory accounting guidelines with a specific treatment of capital cost.

The Law on Electricity setting price caps for the transmission, distribution and public supply services states that the value of assets used by the service provider for regulatory purposes shall be in line with the financial accounts. However, since June 2009 the RAB shall be valued and approved by the regulator and the principles on RAB are under approval. The RAB shall not include revaluation results, in other words the historical value shall be fixed and increased by actual investments minus depreciation.

The assets in construction are not allowed to be included in the RAB. The regulator intents to include new /future investment in the RAB only after the expenditure have been incurred.

The depreciation method applied to the RAB is the straight–line depreciation and the asset life (based on the asset life for tax purposes) of the individual assets is 11 years.

The value of assets funded by capital contributions are not considered in the RAB and the disposal of assets are deducted from the RAB. An eventual allowance for working capital is under discussion.

The asset valuation methodology used by the regulator is the historic cost since 2009.

In the regulatory period 2005-2007 the RAB was revalued by the replacement cost method, but only depreciation costs were calculated on the basis of this value.

5.12. Macedonia

In Macedonia an incentive regulation approach (a revenue cap regulation) is used. There are Rulebooks on the method and conditions for regulating prices of the regulated activities defined by the Energy Regulatory Commission of the Republic of Macedonia. This includes, for example, excel tables for buildings, equipment, machinery, office equipment, written-off and withdrawn assets.

Based on such Rulebooks the computation of the RAB shall exclude capital contributions such as grants, connection charges and imprudent investment. The assets in construction (new prudent investments) are allowed to be included in the RAB.

The regulator allows an estimate of the cost of investment (ex ante) to be included into the RAB and then at some point in the future (ex post) the actual cost will be used to replace the estimate. ERC recognizes the cost of new construction according to the investment plan and the rate of realized investment in the previous period.

The straight-line depreciation method is applied with minimum annual depreciation rates. The asset lives of the individual assets included in the RAB are determined through the asset life for tax purposes and are shown in table below.

Assets	Asset life (in years)
Buildings	40
Equipment	20
Transports, machinery	10
Office equipment	5
Office furniture	5
IT equipment	4

The value of assets funded by capital contributions is not included in the calculation of the RAB and disposal of assets is deducted from the RAB.

An allowance for working capital is allowed to be included in the RAB for the retail supply activity. This is determined by the difference between the turnover of receivables and the turnover of liabilities.

At the end of the regulatory period the ERC checks the data for the RAB and if necessary makes corrections for the new regulatory period.

The ERC uses the historic cost valuation methodology for asset valuation calculated on the basis of the net book value of the assets and the assets have not been revalued as part of the tariff regulation.

5.13. Mongolia

The regulatory approach in place in Mongolia consists of rate of return /cost plus regulation. There are no regulatory accounting guidelines with a specific treatment of capital cost.

The rate base is given by the sum of net fixed assets and net working capital. The net fixed assets are the initial cost of fixed assets (used in licensed activities) net of accumulated depreciation. The net working capital is estimated by deducting short-term payables from current assets (related to licensed activities).

The assets in construction are not included in the RAB and new/future investment is included in the RAB once the expenditure has been incurred (i.e. ex-post).

The depreciation method applied to the RAB is the straight-line depreciation and the asset lives of the individual assets depend on the type of assets ranging from 5 to 60 years. The regulator uses the asset life for financial accounting purposes method in order to determine the asset life. Disposal of assets is deducted from the RAB.

The asset valuation methodology used by the regulator consists of historic cost and assets are revalued every three 3 years.

5.14. Montenegro

In Montenegro the regulator adopts revenue cap regulation. There are no regulatory accounting guidelines with a specific treatment of capital cost.

The actual RAB is given by the value of the regulatory assets on 31 December of the preceding year (according to the balance sheet), subtracted by estimated annual values of depreciation, contributions, and asset disposals and added by estimated annual values of new assets. In addition, the assets in construction are allowed to be included in the RAB.

With regards to the treatment of new/ future investment the regulator allows an estimate of the cost of investment (ex ante) to be included into the RAB and then ex post the actual cost will be used to replace the estimate.

The straight-line depreciation method is applied and the asset lives (in years) of the individual assets are as follows:, buildings: 80 years; substations: 50 years; overhead lines: 33 years; turbines: 45 years; tools with engine: 7 years; tools without engine: 8 years etc. The asset life is determined based on the approach “asset life for financial accounting purposes”.

The value of assets funded by capital contributions are deducted from the purchase cost and the disposal of assets are deducted from the RAB. The working capital is also included in the RAB.

There has been only one regulatory period and no significant discrepancies between projected and realized RAB were registered. There are no specific compensation mechanisms for such purpose.

The asset valuation methodology used by the regulator consists of historic cost and assets are subject to revaluation based on the discounted cash flow method. The revaluation process occurs every three to five years and shall be in compliance with IAS 16.

5.15. Romania

Incentive regulation (price cap) for distribution system operators is currently adopted in Romania. There does not exist any regulatory accounting guidelines. RAB is defined as:

RAB = net value of the assets, recognized by regulatory authority, used for distribution service

Assets in construction are not allowed in the RAB. For including new / future investment, the regulator allows an estimate of the cost of investment (ex ante) to be included into the RAB and ex post, at the end of the regulatory period, a correction is made for the value of investments and its depreciation, between the forecast and actual value. Straight-line depreciation is used. The assets lives differ depending on whether they are new assets (starting with 2005, January 1st, if they were state own companies, or after the date of privatisation) the asset live is set according with the primary law provisions.

Existing asset value at privatisation or as the asset were recorded in the accounting book at 2003 (inflated to 1 January 2005 but no more than 200 %) known as “initial RAB” was set a 25 years depreciation period.

A combination of Other and with asset life for tax purposes is used by the regulator to determine the asset life. Capital contributions are not considered in the RAB. Asset disposals are deducted from RAB (with the exception of the disposal of assets from initial RAB). The allowance for working capital is computed by:

A value allowed for the working capital for covering the short term financial liabilities of the distribution operator. Working capital is a separate cost not included in RAB.

NFRR = 1/8 *CO&M *RRR/100

Where,

NFRR –working capital

CO&M – Operating and maintenance costs

RRR – regulated rate of return

When a new regulatory period starts, the RAB value for each year of the regulatory period is forecasted based on investment plan submitted to ANRE for approval and the reevaluated value of commissioned assets. The indexed historic cost is the adopted asset valuation methodology. Asset revaluation of the assets is recognized only at the end of the regulatory period and, no more then regulated index of inflation.

5.16. Russia

The regulatory approach currently in place is rate of return regulation. Regulatory accounting is applied according to the Rules of determination of asset valuation and the size of invested capital and conducting of their account. The definition of the RAB applied is *Invested capital is the capital that was used for forming the assets necessary for the regulated activity, the size of which is determined for the beginning of each long-term regulatory period.*

Assets in construction are considered in the RAB.

The approach used by the regulator when including new/future investment to the RAB is to allow an estimate of the cost of investment (ex-ante) to be included and then ex-post the actual cost will be used to replace the estimate.

Straight line depreciation is applied to assets. The assets lives in the RAB is 35 years. In determining the asset life the approach used is the average period of the service life of the equipment.

Disposals are deducted from the RAB.

According to the Methodology the size of net working capital is determined by the regulator for the regulatory period. The size of net working capital cannot be less than 4 % and more than 8 % of a necessary total gain of the regulatory organisation established on the last fiscal year.

The treatment of RAB between regulatory periods is done by taking the closing RAB of the respective regulatory period. For the roll forward of the RAB for the following regulatory period the regulator considers the planned/future investments (Capex) and adds this to the closing RAB.

Asset valuation approach is the replacement cost of the respective asset. However the regulator does not formally estimate the asset value of the regulated company, this should be done by an independent auditor. Nevertheless the regulator has the authority to adjust the asset value where it sees necessary.

Assets have been revalued as part of the tariff regulation. This should be done by an independent auditor.

5.17. Serbia

The regulatory approach currently adopted in Serbia is cost plus regulation. In regards to regulatory accounting guidelines no such methodology is in place.

The definition of RAB as provided in the tariff methodology is as follows:

Regulated assets represent the net value of non-material investments (except goodwill), real estates, facilities and the equipment which is used for carrying out the energy activity, excluding:

- net value of the assets acquired without capital contributions, such as grants, participation of third parties in the construction of assets, assets acquired from constructing/building connections etc.
- net value of non-material investments, real estate, facilities and equipment in construction work in progress and down payments for the procurement of those assets, that are not activated in the regulated period, and which are not justified and/or efficient.

The value of the regulated assets is calculated as the arithmetic mean of the opening and closing values of the regulated assets in the regulatory period according to the following formula:

RSt = (pRSt + kRSt) / 2,

where:

RSt – regulated assets in period t (in dinars),
pRSt – opening value of regulated assets in period t (in dinars),
kRSt – closing value of regulated assets in period t (in dinars),

Opening value of regulated assets is calculated according to the following formula:

pRSt = pNVSt – pSBNt – pNSUPt, where:

pNVSt – net value of non-material investments (except goodwill), real estate, facilities and equipment at the beginning of the regulatory period (in dinars),
pSBNt – net value of the assets obtained without capital contribution at the beginning of the regulatory period (in dinars),
pNSUPt – net value of non-material investments (except goodwill), real estate, facilities and equipment in construction work in progress and down payments for the procurement of those assets at the beginning of the regulatory period, that will not be activated in the regulatory period, or that are not justified and efficient (in dinars).

The closing value of the regulated assets is calculated according to the following formula:

kRSt = pRSt – ARSt + ΔSUPt – NOPSt – ΔSBNt – ΔNSUPt, where:

ARSt – depreciation costs of regulated assets without depreciation costs of the assets acquired without capital contributions in period t calculated in a way that is consistent with this Methodology (in dinars),
ΔSUPt – change of value of non-material investments (except goodwill), real estate, facilities and equipment in construction work in progress and down payments for the procurement of those assets in period t, increased by net value of non-material investments (except goodwill), real estate, facilities and equipment in construction work in progress and down payments for the procurement of those assets at the beginning of the regulatory period that will be activated in period t (in dinars),
NOPSt – net value of assets that are disposed of in period t (in dinars),
ΔSBNt – change of value of assets acquired without capital contribution in period t (in dinars),
ΔNSUPt – change of value of non-material investments (except goodwill), real estate, facilities and equipment in construction work in progress and down payments for the procurement of those assets that will not be activated in period t, or that are not justified and/or efficient (in dinars).

Assets in construction are included / allowed in the RAB, but only assets in construction which will be activated in the regulatory period.

The approach used by the regulator when including new / future investment in the RAB is to allow an estimate of the cost of investment (ex ante) to be included into the RAB and then at some point in the future (ex post) the actual cost will be used to replace the estimate. Straight line depreciation is used. The following asset lives:

Gas transportation pipeline network: 40 years
Polyethylene gas distribution pipeline network: 40 – 50 years
Electricity transmission: buildings and transmission system 40 – 50 years, equipment 25 years
Electricity distribution: buildings 80 years, distribution system 40 – 50 years, equipment 20 - 36 years

In determining asset life it is used for financial accounting purposes. Capital contributions and disposals are deducted from the purchase cost. No allowance for working capital is allowed.

The treatment of RAB between regulatory periods is done by the following:

RAB is used for the calculation of the rate of return on assets employed that the energy entity is allowed to obtain in the regulatory period. The duration of the regulatory period is set at one year. Estimated value of RAB from t-2 regulatory period will be replaced with actual value of RAB for t-2 regulatory period in a t (2 years later) regulatory period in a process of calculation and application of correction element. Asset valuation is done by historic cost

The assets has been revalued as part of the tariff regulation. The assets are revalued whenever the book net value is significantly different from the fair market value (usually several years) by the application of these different methods:

Revenue approach - which stems from the position of energy companies at their current and expected markets and their subsequent cash-flow position
Cost approach - which is determined by the shape of the energy company Capital Assets being revalued in the context of the market (for those items which value can be compared on secondary market) and application of replacement method (for specific items without any turnover on secondary market).

In the Republic of Serbia, IAS which are the part of the Low on Accounting and Auditing have been applied since 2004.

5.18. Slovakia

For gas regulation the approach changes from the 2nd regulatory period (2007-2008) from revenue cap regulation to price cap regulation for the 3rd regulatory period (2009-2011). There are currently no regulatory accounting guidelines in place. The definition of the RAB in the Decree of the Office stipulating the methodology of calculation of a price for the 2nd regulatory period:

The data from previous regulatory period:

The reasonable profit = WACC x RAB.

The extent of reasonable profit shall include the rate of return on operating assets (set by the Office in percent) and the value of operating assets used to ensure the regulated activity (set by the Office in the first year of the 2nd regulatory period).

Operating assets used in the regulated activity include long-term assets and intangible assets, working capital, investment in renewal and development of operating assets needed to achieve and sustain the given extent of services and standards of the quality of services.

Assets in construction are included in the RAB within the investment. The approach used by the regulator when including new / future investment in the RAB is to allow an estimate of the cost of investment (ex ante) to be included into the RAB and then at some point in the future (ex post) the actual cost will be used to replace the estimate. Depreciation of regulated assets was set on the basis of technical life of the gas industry equipment using straight line depreciation. The classification of the technical life of the operating assets used in gas distribution is as follows:

Gas pipelines and gas fixtures: steel (25 years), plastic (40 years)
Gasometers and meters (10 years)
Property: regulation stations, fencing, roads and communication (50 years)
Plant and equipment (17 years)

The extent of the technical life of the operating assets used in electricity distribution [for example: Property, roads and communication (from 30 to 80 years), transformers (20 years), other equipment (from 5 to 20 years)]

The approach used by the regulator to determine the asset life is the technical life of assets for the regulatory purposes. The Office doesn't determine the asset life for financial accounting or tax purposes. Determination of asset life is for the purpose of price regulation only.

However for calculating the average price for access to the distribution network and for distribution, the local distribution companies (the number of customers of the individual local distribution companies does not exceed 100 000) shall apply depreciations up to the level of the amount stipulated by law on tax income. Capital contributions are not considered in the RAB. For the disposal of assets treated in the RAB, the RAB is a fixed amount and includes the depreciation value of operating assets and the value of planned investment. In regards to working capital the RAB at the beginning of the 2nd regulatory period was set as a fixed amount including working capital. For the treatment of RAB between regulatory periods the RAB at the beginning of the 2nd regulatory period was re-valued. In the 3rd regulatory period RAB is included in the methodology of calculation of tariffs of the same amount. For asset valuation replacement cost is used. An independent appraiser, re-valued in 2006 property, plant and equipment held for use in gas transmission and distribution (the method is similarly in electricity sector). Their revaluation was based on the observed asset conditions and asset replacement cost by reference to market evidence of recent transactions for similar properties and replacement cost estimation methodologies.

5.19. Turkey

Incentive regulation is currently adopted in Turkey. The definition of RAB is as follows:

There are two components of RAB:

1. Non-Amortized Stranded Liabilities: The capital expenditures that have been realized before the start of the first implementation period and that will be included in the calculation of cost of capital and amortization amounts,

2. Non-Amortized Total Capital Expenditures: The non-amortized portion of the capital expenditures incurred until any date from the start of the first implementation period

Assets in construction are not allowed or considered in the RAB. For including new / future investments in the RAB the regulator estimates the cost of investment (ex ante) to be included. After the end of the implementation period (ex post) an Investment Correction Component is used for adjusting the distribution and transmission system revenue caps to reflect the unrealized investments. This in done only if the investments included in the investment plan for the previous implementation period are not fully realized. Assets are depreciated straight line. 30 years is the asset lifetime for the assets. The approach used to determine the asset life is asset life for financial accounting purposes. Capital contributions are not considered in the RAB and disposals are deducted. Furthermore now allowance us given for working capital. Treatment of RAB between regulatory periods is done by taking the non-amortized portion of the Capital Expenditures and Stranded Liabilities which are then added to revenue cap of the implementation period. The historic cost asset valuation methodology is used and assets have not been re-valued in Turkey.

5.20. UNMIK

Currently a cost-plus regulation approach is applied; however, the Tariff Methodology foresees the application of an incentive-based regulation.

In United Nations Mission in Kosovo (UNMIK), there are regulatory accounting guidelines requiring that the assets financed by grants for example are separated from commercially financed assets. These shall be subtracted from the RAB.

The RAB is defined as the sum of capital invested by the TSO on which it is allowed to earn a return. It is given by the sum of the opening RAB and capital expenditures and deducting the depreciation of assets. However, some special arrangements apply to the determination of the RAB where post-2005 assets are funded by subsidies or grants.

The assets in construction are also included in the RAB. With regards to new or future investment the regulator allows to include an estimate of the cost of the investment (ex-ante). At the end of the regulatory period, ERO applies a reconciliation to account for differences between the amount of investments included in the RAB (ex-ante) and the actual investments.

Straight-line depreciation is the depreciation method applied to the RAB and the assets lives depend on the individual asset. For depreciation purposes it is used a weighted average asset life of 30 and 35 years for distribution and transmission network, respectively. In general, the approach used by the regulator to determine the asset life is the asset life for financial accounting purposes although exceptions exist.

ERO only allows return on post-2006 commercially financed assets and allows depreciation costs for all post-2006 financed assets. This is due to the fact that most of the pre-war assets are old and depreciated.

5.21. Ukraine

Cost plus regulation is currently in place. The Tariff methodology for power transmission companies does not entirely fit into the classical definition of categories such as rate of return or incentive regulation but is instead based on reported or projected costs including a profit component. The profit component does not use the concept of regulatory asset base (RAB) and allowed rate of return on this RAB.

It should be noted that 5 power transmission companies apply the principles of rate of return regulation with some additional incentive elements. The RAB of the existing assets was established in connection with the privatisation price paid by the strategic investor. New investments undertaken by the companies after privatisation also attract rate of return.

In the period 2001 – 2007 the rate of return was set at 17 % (nominal return, after tax). For the subsequent five years, i.e. starting from 2008, the rate of return on RAB will be evaluated by the NERC, but cannot be lower than 11%.

In terms of the approach when including new / future investment, it is taken account, once the expenditure has been incurred (ex post). Straight line depreciation is used for assets and also the tax method. To determine the asset life the approach used is asset life for tax purposes. Regarding the treatment of capital contributions the answer given was other, however no further information was given.

No allowance for working capital is considered. The asset valuation methodology used is the indexed historic cost approach and the assets have not been revalued for regulatory purposes.

6. REGULATORY ACCOUNTING ASPECTS / CHART OF ACCOUNTS

In liberalised jurisdictions, it is usual that the regulated companies are required, to maintain separate accounts for each regulated activity. These accounts are often known as separated or regulatory accounts and provide the regulator and other interested stakeholders with financial information about that licensed activity on a regular basis. Regulatory accounts are usually more detailed than statutory accounts and it is normal for regulators to produce Regulatory Accounting Guidelines (RAGs), which specify the format in which the financial information should be submitted and the accounting policies to be applied in producing the accounts.

The scope of the accounts (the type of data and the level of detail required) should reflect the purpose for which the regulator requires the information. The core applications of regulatory accounts can include:

- Monitoring performance against the assumptions underlying price controls;
- Informing price control reviews;
- Monitoring the financial health of licensees;
- Assisting in the detection of unfair cross-subsidy and/or discrimination between activities, market sectors or customer groups;
- Comparing the performance of licensees undertaking the same regulated activity; and
- Improving transparency in the regulatory processes.

Electricity regulators need to collect a range of economic and technical data in order to carry out their duties. The data collected can include:

- Cost and technical data on a historic basis.
- Demand data
- Business plans, both historical and future
- Investment plans
- Regulatory accounts
- Data for quality regulation
- International benchmarks
- Macroeconomic information from competent institutions

6.1. RAB Templates

In conjunction with regulatory accounting guidelines, the range of information collected serves different purposes in the overall regulatory framework. In regards to the regulated asset base, regulators may also require data of the regulated companies' assets. This could include for example:

- Type of Asset
- Purchase Cost of Asset

- Replacement Cost of asset
- Remaining Useful life of asset
- Depreciation
- Disposals

This information can support the regulator in establishing the RAB for price control purposes, especially in setting the allowed revenues of a regulated company.

In a separate excel document we provide an example of templates on how regulators can collect this information.

7. CONCLUSIONS AND RECOMMENDATIONS

The Regulatory Asset base is one of the most important factors that regulators and companies have to determine since allowable profits and depreciation depend on the RAB. This in turn affects the revenue requirements of a regulated company and the prices it can charge to its customers.

This report discusses the key aspects and components of the RAB and reviews the way that regulators in the ERRA countries have determined the RAB. It also explains the key factors to set a reasonable level of RAB and the differences between the previous and new value of RAB after taking into consideration the treatment of capital contributions, construction work in progress and working capital.

Although there is no uniform methodology for determining RAB in the ERRA countries some common aspects might be identified.

Based on the answers received from the questionnaires it can be seen that in most regulatory jurisdictions:

- The regulatory approach currently in place is rate of return or cost plus regulation;
- Regulatory accounting guidelines are not applied;
- Assets in construction are not included in the RAB;
- Regulators allow an estimate of the cost of investment (ex ante) to be included into the RAB and then in the future (ex post) the actual cost will be used to replace the estimated;
- The depreciation method applied to the RAB is the straight-line depreciation;
- The asset life for financial accounting purposes is the approach used;
- Capital contributions are deducted from purchase cost;
- Disposal of assets are deducted from the RAB;
- An allowance for working capital is allowed to be included in the RAB;
- The asset valuation methodology used by the regulator consists of the historic cost; and
- The assets are usually re-valued as part of the tariff regulation process.

Please refer to Appendix III for a summary table of the received answers

Overall the approach taken by the ERRA members based on the answers from the questionnaire indicate that the treatment of the key components (i.e. capital contributions, depreciation, disposals) is similar to international best practice. In regards to asset life as mentioned the common approach is the

On the basis of international experience the following principles should be followed in the course of the assets' roll forward process and the adjustment of the asset opening value to arrive at the asset closing value for each year of the regulatory period:

- Any prudent capital expenditure /capital additions (net of capital contributions) should be added;
- The assets included in the RAB should be the assets used for the provision of the regulated services. The regulated company should ensure that costs are not transferred from any unregulated services to regulated service or between regulated services
- The opening value plus a certain percentage of prudent capital expenditure / capital additions minus a certain percentage of disposals;
- Disposals and depreciation shall be deducted to obtain the closing value of the RAB for the given year (which becomes the opening value for the subsequent year);
- Depreciation may be calculated as straight-line depreciation using a pre-determined life per asset group for regulatory purposes. All assets should be depreciated with the exception of land and construction work-in-progress;
- In the case of existing assets, depreciation is calculated on the un-depreciated value of assets minus any disposals; and
- For new assets (prudent expenditure during the regulatory period), depreciation is calculated on the accumulated un-depreciated value of new assets at the start of the year, plus a percentage of additions in that year.
- For setting the RAB between regulatory periods, the regulator should provide clear guidelines on its methodology and procedure. Re-setting pre-agreed levels should be avoided as this will undermine the regulatory regime.

The regulators usually endorse a particular asset valuation methodology. The asset valuation issue must be considered with regard to the functional adequacy of regulated assets, market assets value and overall profitability of the regulated business and sustainable cash flows of the business as well as equity considerations.

In regards to the treatment of asset life of individual assets somewhat differ, some regulators specify the regulatory asset life time of assets which may or may not differ to the asset life use for financial accounting purposes.

The treatment of working capital can also be linked to the cash management of a company. It would be in the company's interest to send out invoices promptly and have some kind of collection policy. Working capital is important as this can affect the cash flow of the company. In terms of how working capital is considered in the overall methodology to establish the revenue requirements different approaches/views are taken by regulators as discussed and there is not common methodology among regulators even in the more experienced regulatory jurisdictions.

To summarise the key message is that the approaches and treatment of the components of the RAB should be set out clearly by the regulators so the regulated companies can understand and easily apply the concepts. Furthermore the methodology for determining the RAB should be consistent and transparent and not constantly changed. This will enable a more

robust regulatory regime. The concepts should be thoroughly thought through and guidance and discussion sought on key issues.

8. REFERENCES

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APPENDIX I QUESTIONNAIRE ON DETERMINATION OF THE RAB

This questionnaire is designed to provide information from ERRA countries on the determination of the Regulatory Asset Base (RAB). We appreciate if you can complete your answers and send this back to the ERRA secretariat as soon as possible.

Establishing the Regulatory Asset Base

1. What regulatory approach is currently in place?
    a. Rate of Return / Cost plus Regulation
    b. Incentive Regulation: e.g. price cap, revenue cap regulation
2. Do you apply any regulatory accounting guidelines which require specific treatment of capital cost? If so please specify.
3. Please provide the definition of the RAB used e.g. copy of the paragraph of the corresponding tariff methodology where applicable?
4. Are assets in construction included / allowed in the RAB?
5. What is the approach used by the regulator when including new / future investment in the RAB?
    a. Allow an estimate of the cost of investment (ex ante) to be included into the RAB and then at some point in the future (ex post) the actual cost will be used to replace the estimate
    b. Only take account of the investment, once the expenditure has been incurred (ex post)
    c. Other. (Please specify).
6. What is the depreciation method applied to the RAB? Please specify in case a different methodology is applied to different assets (for example, initial assets vs. assets acquired during the regulatory period, etc.)?
    a. Straight-line depreciation

b. Accelerated depreciation

c. Diminishing balance depreciation

d. Other. (Please specify).

7. What is the asset lives (in years) of the individual assets included within the RAB?

8. What is the approach used by the regulator to determine the asset life?

a. Asset Life for financial accounting purposes

b. Asset Life for tax purposes

c. Other

9. How are the value of assets funded by capital contributions treated by the regulator?

a. Deducted from purchase cost

b. Not considered in RAB

c. Other

10. How is the disposal of assets treated in the RAB?

a. Deducted

b. Other

11. Is there any allowance for working capital? If yes, which is the approach used by the regulator and how is working capital computed?

12. How is the RAB treated between regulatory periods?

Asset Valuation

13. Which is the asset valuation methodology used by the regulator? Please specify in case a different methodology is applied to different assets (for example, existing assets vs. new assets, etc.)?

a. Historic cost

b. Indexed historic cost

c. Replacement cost

d. Deprival value

e. Other. (Please specify).

14. Have assets been revalued as part of the tariff regulation in your country? If so, what approach has been used and how often are they revalued?

APPENDIX II RAB FORMULAE

NET APPROACH

The regulatory asset base is calculated according to the following formula:

$$CRAB_t = ORAB_t + Invest_t - D_t - AD_t - \Delta CAPC_t + \Delta WC_t$$

Where:

$ORAB_t$ opening value of regulatory assets for year t of the regulatory period;

$Invest_t$ investment (capital expenditures) for year t of the regulatory period;

D_t depreciation for year t of regulatory period;

AD_t assets disposal for year t of regulatory period;

$\Delta CAPC_t$ annual change over year t in the value of assets funded by capital contributions;

ΔWC_t annual change over year t in working capital; and

$CRAB_t$ closing value of regulatory assets for year t of regulatory period.

GROSS APPROACH

According to the gross approach the closing value of the RAB for year t of regulatory period might be expressed by the following formula:

$$CRAB_t = CFA_t - CCAPC_t - CWC_t$$

Where:

$$CFA_t = OFA_t + Invest_t - D_t - AD_t$$

$CRAB_t$ closing value of regulatory assets for year t of regulatory period;

CFA_t closing value of fixed assets for year t of regulatory period;

$CCAPC_t$ closing value of capital contribution;

CWC_t closing value of working capital;

OFA_t opening value of fixed assets for year t of regulatory period.

MID-YEAR RAB

When calculating the revenue requirements, it is common practice to use a mid-year RAB, i.e. the simple average of the expected opening and closing values of the RAB for that year. The formula for the mid-point RAB for a given year would then be equal to:

$$RAB_t = (ORAB_t + CRAB_t)/2$$

Where:

RAB_t the RAB used in the calculation of the regulated revenue in year t;

$ORAB_t$ opening RAB for year t; and

$CRAB_t$ closing RAB for year t.

APPENDIX III SUMMARY OF QUESTIONNAIRE RESPONSES

	Regulatory approach	Apply RAGs	Assets in Const. Included RAB	New /future Invest.	Depreciation	Asset life	Capital Contributions Deducted RAB	Disposal assets Deducted RAB	WCA	Asset valuation	Revaluation
Azerbaijan	RoR		Yes	Ex-ante + Ex-post		Other	Yes	Other		Other:	No
Albania	Generation: RoR; Transm & distr: price cap	No	No	Ex-ante + Ex-post	Straight-line	Tax lives on assets	Yes	Yes	Yes	Historic cost	Yes
Armenia	RoR	No		Ex-post	Straight-line	Efficient & Useful asset life	Yes	Yes	Yes	Historic cost	Yes
BiH	RoR	No	No	Ex-post	Straight-line	Asset life for financial accounting purposes	Other	Yes	No	Historic cost	No
Bulgaria	RoR and Revenue cap		No	Ex-ante + Ex-post	Straight-line	Useful life of assets	Yes	Yes	Yes	Historic cost	Yes
Croatia	RoR	No	Yes	Ex-ante + Ex-post	Straight-line	Asset life for financial accounting purposes	No	Yes	No	Historic cost	No
Estonia	RoR and incentive regulation	Yes	No	Ex-ante + Ex-post	Straight-line	Other	No	Yes	Yes	Historic cost	No
Georgia	RoR	No	No	Ex-post	Diminishing balance depreciation	Asset life for financial accounting purposes	Other			Replacement cost	Yes
Hungary	Mainly RoR but some items incentive regulation	Yes	No	Under revision	Straight-line	Other: Real asset life	No	Yes		Depreciated Replacement Value	Yes
Kosovo	RoR	Yes	Yes	Ex-ante + Ex-post	Straight-line	Asset life for financial accounting purposes					
Latvia	RoR		No	Ex-post	Financial statements	Asset life for financial accounting purposes	No	No	No	Other: according to financial statements except for reduction of revaluation reserve	No

	Regulatory approach	Apply RAGs	Assets in Const. Included RAB	New /future Invest.	Depreciation	Asset life	Capital Contributions Deducted RAB	Disposal assets Deducted RAB	WCA	Asset valuation	Revaluation
Lithuania	Hybrid cap	No	No	Ex-post	Straight-line	Asset life for tax purposes	No	Yes	Under discussion	Historic cost	Yes
Macedonia	Revenue cap	Yes	Yes	Ex-ante + Ex-post	Straight-line	Asset life for tax purposes	No	Yes	Yes	Historic cost	No
Mongolia	RoR	No	No	Ex-post	Straight-line	Asset life for financial accounting purposes	Other	Yes	Yes	Historic cost	Yes
Montenegro	Revenue cap	No	Yes	Ex-ante + Ex-post	Straight-line	Asset life for financial accounting purposes	Yes	Yes	Yes	Historic cost	Yes
Romania	Price Cap	No	No	Ex-ante + Ex-post	Straight-line	Combination of Other with asset life for tax purposes	Yes	Yes	Yes	Indexed historic cost	Yes
Russia	RoR	yes	Yes	Ex-ante + Ex-post	Straight-line	Other (average period of the service life of the equipment)		Yes	Yes	Replacement cost	Yes
Serbia	RoR	No	Yes	Ex-ante + Ex-post	Straight-line	Asset life for financial accounting purposes	Yes	Yes	No	Historic cost	Yes
Slovakia	(2009-2011) - Price cap regulation	No	Yes	Ex-ante + Ex-post	Straight-line	Technical Life of assets for the regulatory purposes	No		No	Replacement cost	Yes
Turkey	Incentive Regulation		No	Ex-ante + Ex-post	Straight-line	Asset life for financial accounting purposes	Yes	Yes	No	Historic cost	No
Ukraine	RoR			Ex-post	Straight-line	Asset life for tax purposes	other		No	Indexed historic cost	No