

Revenue Requirement

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Content of the presentation

- Calculating the revenue requirement
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- Practical considerations and messages

Main principles of tariff regulation

- **Prices should not endanger financial viability of regulated companies.** *All justified costs must be covered, including opportunity cost of capital assets.*
- **Price regulation should stimulate more efficient functioning.** *Productive and allocative efficiency are also aimed – incentive price regulation.*
- **Price regulation should be transparent and consistent.**
Simplicity of price structures can establish trust the regulation.
- **Frequent and unexpected interventions should be avoided.**
Regulators are always in an imperfectly informed position.

Calculating the revenue requirement

Revenue Requirement (RR) is revenue (profit) and cost at the same time (firms vs. consumers).

Calculating RR is usually the first step of each well-known price regulation methodology (**Rate of Return (RoR) methodology**, also known as cost-plus (or cost of service) regulation, Incentive Price Regulation methods etc).

The main idea is that revenues of the regulated companies have to cover their operating expenses, taxes and depreciation, and have to ensure a fair rate of return (profit) on assets utilized.

Calculating the revenue requirement

Typical formula of RR is the following:

$$\mathbf{RR = O + D + T + r * B}$$

where

RR = Revenue Requirement

O = Operating Expenses

D = Depreciation

T = Taxes

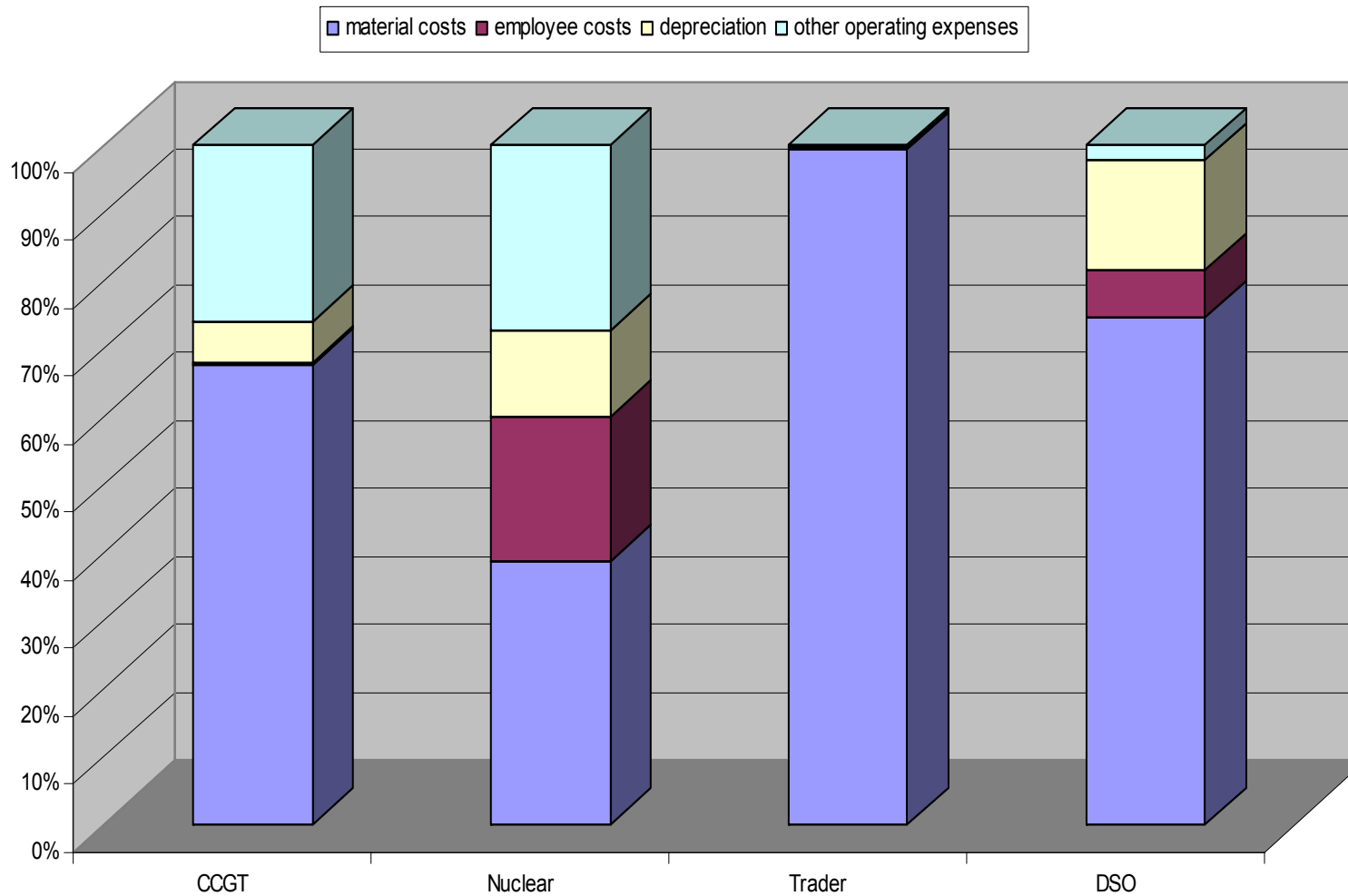
r = allowed rate of return

B = rate base (or regulatory asset base – RAB)

For calculating RR, all elements of the formula have to be collected by the regulator (detailed cost and asset reviews).

Calculating the revenue requirement

Example: Structure of expenses (2006)



Calculating the revenue requirement

Operating expenses (O) are related to operating and maintaining the utility plant and providing the utility services.

Main items are:

- *Fuel (generation)*
- *Purchased power (wholesale and retail supply)*
- *Maintenance (generation, transmission-distribution)*
- *Employee costs (staff expenses).*
- *Services*

Calculating the revenue requirement

Operating expenses (O) are related to operating and maintaining the utility plant and providing the utility services.

- **O&M (Operations and Maintenance)** costs can be **directly** assigned to particular operating functions.
- **A&G (Administrative and General)** costs have to be distributed among operating activities – **indirect** costs (similarly to allocation of shared and/or outsourced services).

Calculating the revenue requirement

Special operating expenses are:

- Network losses

- *Technical* – losses associated with the transmission of electricity.

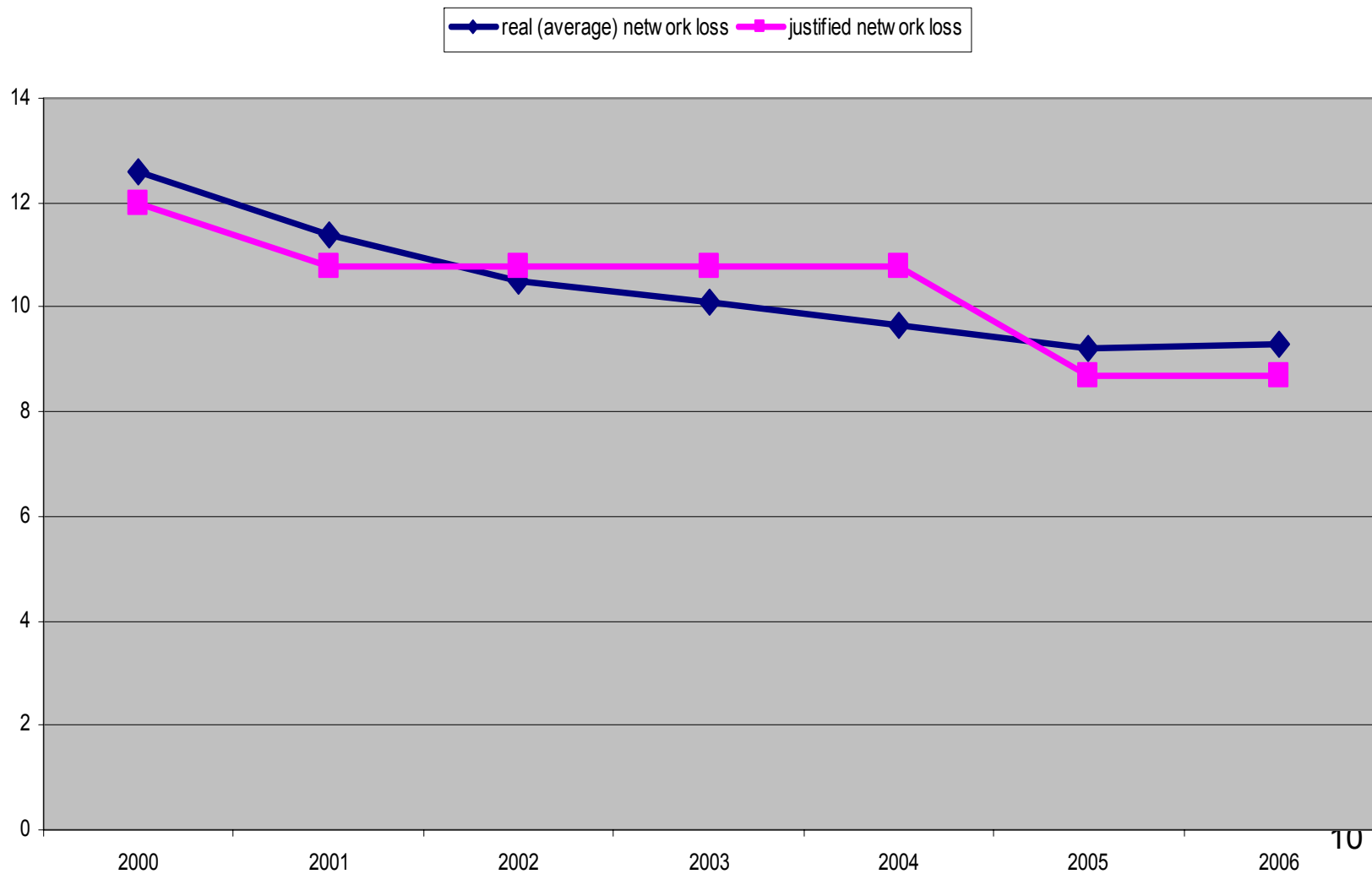
- *Non-technical* (commercial) – losses due stealing energy and losses due to accidents.

- Uncollectible accounts (non-payment of insolvent customers) can also be take into account within operational expenses (but this way non-payers never will be disconnected).

Calculating the revenue requirement

Example: Distribution network losses in Hungary (%)

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Calculating the revenue requirement

Depreciation (D, or amortization) is a non-cash expense recorded in financial statement that reduces the value of a tangible (intangible) asset as a result of wear and obsolescence.

- Investment costs related to fixed assets are not deductible from the revenues. It is allocated through depreciation over useful life of the asset.
- Yearly value of depreciation depends on company's depreciation policy. Straight line (linear) or accelerated depreciation is also possible, and remaining value can be taken into consideration.

Calculating the revenue requirement

Possible grouping of depreciation methods

- Linear – Non-linear
- Normal – Extraordinary
- Time proportionate – Performance-related.

Service life: the period of time between the installation of the unit and its retirement for accounting purposes.

Net salvage: Remaining value minus costs incurred in retiring.

Service value: original cost minus estimated net salvage.

Calculating the revenue requirement

Example: Useful lifetimes for calculating depreciation

Asset group	Useful lifetime of a new asset (years)
HVL lines (120 kV)	35
MVL lines (10-35 kV)	30
LVL lines	25
Transformers	25-30
Buildings	50
Vehicles	8

Calculating the revenue requirement

Taxes (T) can be income or non-income based taxes (eg. Value Added Tax).

In case of calculation corporation tax expense you have to bring it into harmony with applied rate of return!

Calculating the revenue requirement

Rate of Return (r) is the expected yield from the company (industry), taking into account the costs of financing the business (cost of capital).

Cost of borrowed capital (debt): interest expense.

Cost of equity: returns of other possible investments with similar risks (opportunity cost).

Debt providers require a fix interest rate on their investments.

Equity holders are „residual claimants” on the revenues – the rest after all payment obligations are allocated to them.

Calculating the revenue requirement

The cost of capital is usually measured as the **Weighted Average Cost of Capital**. It is proportion of equity times the cost of equity, plus proportion of debt times the after-tax cost of debt.

$$WACC = re^*(E/(E+D))+rd^*(1-tc)^*(D/(E+D))$$

Where

re = required rate of return on equity

rd = rate of return on borrowings

E = equity

D = debt

tc = corporate tax rate

Calculating the revenue requirement

Example: Hungarian WACC (Year 2005,
Distribution network tariffs)

$$WACC = re^*(E/(E+D))+rd^*(1-tc)^*(D/(E+D))$$

$$\begin{aligned} \text{Before tax WACC} &= (8,3 \% * 0,5) + (5,8 \% * 0,5) \\ &= 7,1 \% \end{aligned}$$

Calculating the revenue requirement

The cost of equity (r_e) is usually tried to be determined with the **Capital Asset Pricing Model (CAPM)**.

$$r_e = r_f + \beta_e * (r_m - r_f)$$

Where

r_e = required rate of return on equity

r_f = risk free rate of return (eg. treasury bill)

β_e = Beta, the relative volatility of the specific stock to the market

r_m = market risk

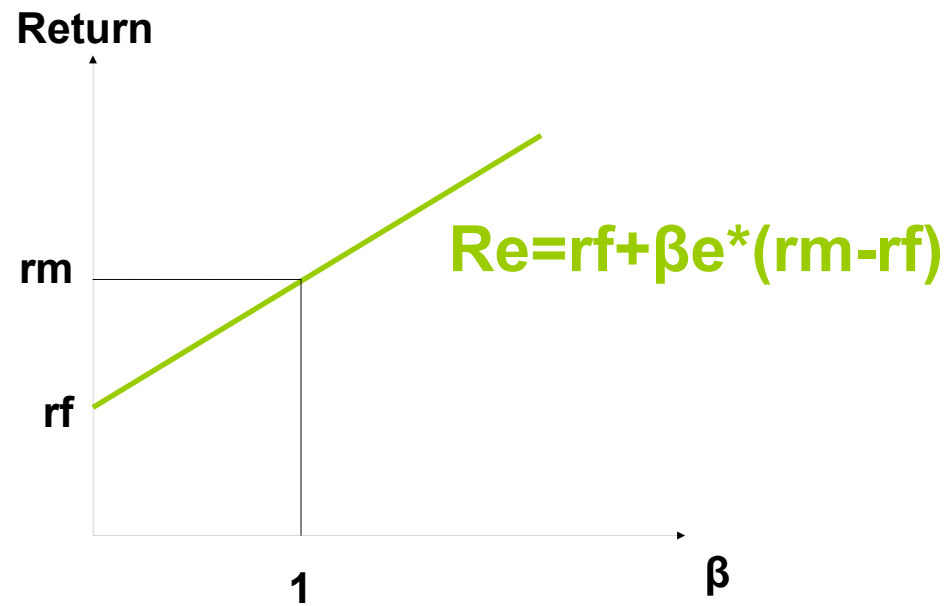
Hungarian example (2005, Distribution network tariffs)

After tax $r_e = 5,3 + 0,4 * 4,3 = 7 \%$

Before tax $r_e = 7 / (1 - 0,16) = 8,3 \%$

Calculating the revenue requirement

Capital Asset Pricing Model (CAPM)



Calculating the revenue requirement

Regulatory Asset Base (Rate Base, B)

represents the value of investments on which utility can earn a reasonable rate of return.

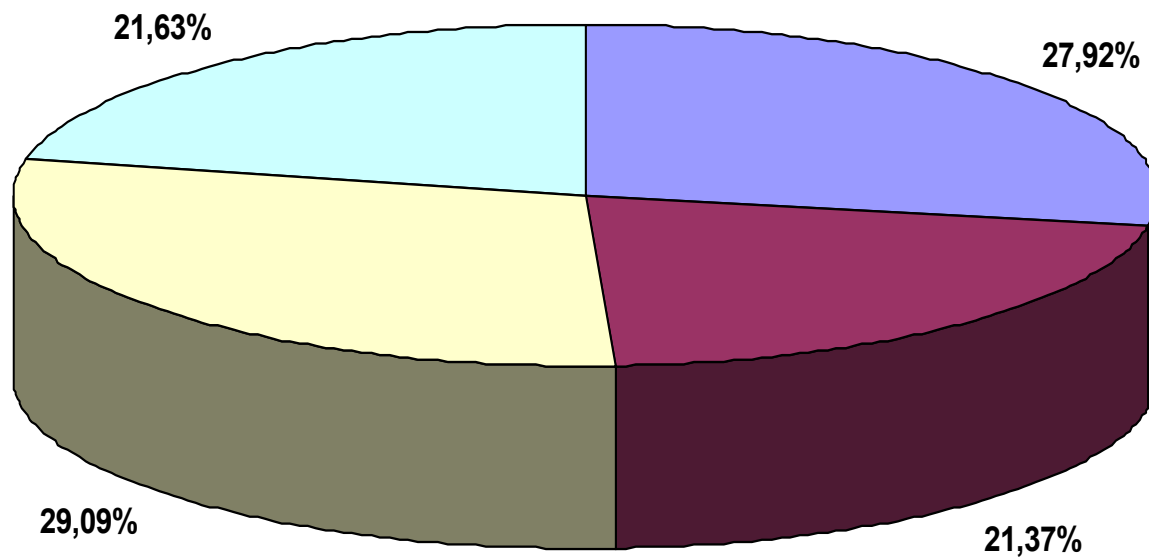
The principal method for asset valuation is: original cost minus accumulated yearly depreciation.

Starting point is the *gross value* of fixed assets related to the regulated activity. Deducting *accumulated depreciation* of the assets we receive the *net book value* of the fixed assets.

Working capital (current assets – current liabilities) can also be part of Rate Base.

Calculating the revenue requirement

Example: Distribution Revenue Requirement (Hungary, 2007, %)



■ Depreciation ■ Cost of capital ■ Operating expenses ■ Justified network loss

Practical considerations and messages (1)

- During RR calculation in addition to analyze past values of operating expenses, adjustments for foreseeable future changes need to be considered.
- Accounting, taxation and regulatory depreciation requirements usually deviate from each other.
- Assets, which were not financed by the company itself (but from subsidies or consumer contribution) cannot be parts of the regulatory asset base.
- You do not have to use real capital structure when calculating WACC. „Virtual” share of debt and equity is also possible (although disputable).

Practical considerations and messages (2)

- In case of old assets net book value is much lower than depreciated replacement value (mainly where inflation rate is quite high).
- A mid-year average or 12 month average Balance Sheet might be used as a representative Balance Sheet for tariff setting purposes.
- Construction work in progress (unfinished investments) can also be a part of the rate base, but usually regulators are not for financing through tariffs before operation.

Thank you for your attention!

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