Regional seminar: INOGATE PC convergence with EU Electricity and Gas Tariffs

European Tariff Methodologies: Common themes and practices

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Agenda

• Liberalisation of electricity and gas markets
• Pricing principles
• Revenue requirement
• Valuation of the regulatory asset base (RAB)
• Rate of return
• Tariff structures
Liberalisation of the energy market in the EU
Towards competitive market

1996
1st Electricity directive

1998
1st Gas directive

2003
2nd Electricity and Gas directives

2009
Implementation of the 3rd package

3rd package: Electricity and Gas directives, Regulations

2011

2015
Competitive pan-European market?
Pricing in a competitive market

Wholesale: Bilateral, PX

System use charges:
- Network use
- System operation
- Cross-border capacity use

Retail margin:
- Risk management services

= Final purchase price

regulated

+ +

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ERGEG advised the EU regulators already in 2007

- End-user price regulation should be abolished as it distorts the functioning of the market
- It asked all regulators to provide plans to remove any price regulation
- In some countries, although in theory the market is open, in practice there may still be only one supplier and a consequent lack of choice for consumers
Price regulation fails to activate consumers and suppliers

REGULATED PRICES FOR
HOUSEHOLD CONSUMERS AND
INDUSTRIAL CONSUMERS, IN GAS
AND/OR OF ELECTRICITY

REGULATED PRICES FOR
HOUSEHOLD CONSUMERS

NO REGULATED PRICES

European Commission, 2012
Pricing principles
The main principle of the price regulation

The regulator should set regulated tariffs for the regulated companies so that the regulated tariffs allow the companies to earn a revenue that covers the “justified costs” of their operation, that is the costs that are necessary and unavoidable to provide the regulated service at a predefined level of quality.
The main approaches to pricing

- Traditional cost plus
- Incentive pricing
  - price cap
  - revenue cap
  - hybrid cap
  - yardstick competition
  - benchmarking
  - etc.
## Approaches in some EU MS

<table>
<thead>
<tr>
<th>Country</th>
<th>Electricity</th>
<th>Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TSO</td>
<td>DSO</td>
</tr>
<tr>
<td>AT</td>
<td>RR</td>
<td>PC</td>
</tr>
<tr>
<td>CZ</td>
<td>RC</td>
<td>RC</td>
</tr>
<tr>
<td>EE</td>
<td>RC</td>
<td>RC</td>
</tr>
<tr>
<td>GB</td>
<td>RC</td>
<td>HC</td>
</tr>
<tr>
<td>IT</td>
<td>RC</td>
<td>RC</td>
</tr>
<tr>
<td>PL</td>
<td>RC</td>
<td>RC</td>
</tr>
<tr>
<td>SI</td>
<td>HC</td>
<td>HC</td>
</tr>
<tr>
<td>ES</td>
<td>RC</td>
<td>RC</td>
</tr>
</tbody>
</table>

RR – rate of return, PC – price cap, RC – revenue cap, HC – hybrid cap, CP – cost plus
## Different length of the regulatory period

<table>
<thead>
<tr>
<th>Length</th>
<th>Electricity TSO</th>
<th>Electricity DSO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>AT, ES</td>
<td>DK, SE</td>
</tr>
<tr>
<td>3 years</td>
<td>LT, NL, PT, SI</td>
<td>LT, NL, PT, SI</td>
</tr>
<tr>
<td>4 years</td>
<td>BE, FI, HU, IT</td>
<td>BE, FI, HU, IT</td>
</tr>
<tr>
<td>5 years</td>
<td>majority</td>
<td>majority</td>
</tr>
</tbody>
</table>

Majority of the regulators are applying 5 years regulatory period but there are some exceptions.
Pricing is a two step procedure

1. Regulator determines the revenue requirements for the regulated company

2. Regulator chooses a tariff structure which allows the company to obtain enough revenues to cover its cost and earn a reasonable return

   *alternatively*

Regulator revises a tariff structure proposed by the company
Calculation of the revenue requirement
Calculating the revenue requirement

- Revenue Requirement - total (annual) revenue which covers the operating expenses (including depreciation and taxes) of supplier(s) of a given service or product and ensures (them) a fair rate of return on assets utilized.
- Setting revenue requirement (RR) can substantially affect the profitability of the firm as well as the costs of ratepayers.
- Calculating RR is usually the first step of each well-known price regulation methodology (cost-plus regulation, incentive price regulation methods etc).
The main formula

Typical formula of revenue requirement (RR) is the following:

$$\text{RR} = \text{O} + \text{D} + \text{T} + r\times\text{B}$$

where

- RR = Revenue Requirement
- O = Operating Expenses
- D = Depreciation
- T = Taxes
- r = allowed rate of return
- B = rate base (or regulatory asset base – RAB)
Necessary costs

• Regulator will accept only reasonable and necessary costs in calculation of the Revenue Requirement
• How to know if certain costs are reasonable and necessary?
• Benchmarking if there are several similar companies (e.g. electricity distribution)
• International benchmarking may give some comparison, but due to different legal background it could also mislead
Historic data

- Historic data is very useful for understanding the costs’ levels as also their development.
- But one should ask if company was managed and operated efficiently.
- When setting tariffs regulator needs to evaluate the future costs, therefore some forecasts should be calculated.
- The forecasts should evaluate the historic trends, current developments and make comparisons with such costs elements of similar companies.
Asymmetry of information

Regulator

Decisions to be made on the basis of best available information

Regulated company

Distort information in order to serve the profitability objective (shareholders interest)

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Normative values

- Some regulators are trying to give a scientific justification to almost all cost elements – theoretical values are calculated based on complicated formulas and assumptions
- Though it is rather popular, especially in the CIS countries, one should understand that theory may significantly differ from reality
- Therefore, theoretical normative values may be used as benchmarks only
- Price regulation is more art than science 😊
Regulatory asset base (RAB)

• RAB usually refers to the measure of the net value of a company’s regulated assets used in price regulation

• RAB drives two of the fundamental building blocks that make up the company’s revenue requirements:
  – the return on capital (i.e. the return on the RAB) and
  – the depreciation allowance

• RAB is a key determinant of prices that may be charged for regulated services in the future
RAB initial value

RAB is compilation and summation of the assets used in providing the regulated service

- generally only includes those assets funded with investor money
- regulators do not generally recognise intangible assets such as goodwill
- RAB should include the assets used for the provision of the regulated services only
- excludes customer contributed assets

- RAB is the investment base upon which the provider is permitted to earn a reasonable return
Fair value of RAB

- provision of certainty for investors
- provision of incentives for investors
- fairness - including:
  - sharing benefits between investors and customers
  - continuity of initial price level for social reasons
- provision of correct price signals for consumption, investment etc.
- interpretation of the regulatory ‘contract’ - in what state are assets expected to be kept?
RAB calculation

Opening value + Prudent capital expenditures - Asset disposals or retirements - Regul. accumulated depreciation = Net asset balance
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 the capital contributions should be excluded from the RAB

• 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
Working capital

• 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 – working capital

• 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
Construction work in progress (CWIP)

- Most of the regulators think 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.

- Some regulators include construction work in progress in the RAB when construction is to be completed within a relatively short period of time, e.g. in one year.

- There is also the question of prudent investment when considering whether the full cost of new investment should be added to the RAB.
New investments

• Different type of investments
  – extension investments: all investments needed for meeting the change of load and generation patterns in the future
  – replacement investments: all investments related to replacement of aged (technically or economically) equipment
  – exceptional investments: investment resulting from e.g. new legal obligations.

• Some investments could be both for network extension and for replacement reasons (e.g. replacement of an old transformer with a new one but more powerful)
Used and useful concept

- Regulator needs to consider whether the company’s assets are sufficient to carry the regulated activity
- On the other hand, if a regulated company has excessive number of assets the regulator may decide not to include these assets into the RAB
- Although the assets are being “used” the question is whether they are actually “useful”
Asset valuation
Asset valuation options

Asset valuation

- Book valuation
  - Historic cost
  - Current cost
  - Indexed historic value
  - Modern equivalent asset

- Market valuation
  - Current

- Economic valuation
  - Re-valued initial
  - Net present value
Historic cost

• The historic cost methodology values assets at their original purchase price

• It has several advantages:
  – 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
Indexation

• This is the procedure for adjusting the value of the asset base for the effect of inflation

• Indexation should measure movements in the current replacement cost of the assets

• Consumer price index or industrial price index?
Replacement cost

• 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 them today

• Replacement costs reflect the price that a firm with a certain service requirement would pay for existing assets in preference to replicating the assets
Fair market value

- Sum of the prices that would be obtained from selling each of the assets in a competitive market
- What a third party would pay in an arm’s length transaction
- Difficult if no active market, especially for large, specialised items
- Romanian example
Valuation of assets in the CEE countries

- In many CEE countries assets of the energy companies were not properly valued, historic cost was very low
- Indexations were not sufficient and many countries introduced the replacement cost principle for re-evaluation
- E.g. in Romania asset value of the distribution companies after the re-evaluation increased from 3 to 7 times
- But it was impossible to put it into the revenue requirement
Bad example: Lithuania

- One of the two distribution companies (0.7 million customers) was privatised in 2003 by the local biggest retailer
- Competitive process, good price, but…
- Law on Electricity was amended after the privatisation, in 2004
- Assets were re-valued in 2004, increasing their value by factor 3
- Consequently tariffs were raised
- Result: consumers complaining that the private investor caused such an increase of tariffs
Lessons from the CEE countries

Privatisation of the distribution utilities in Bulgaria, Romania and Macedonia has shown that

– necessary to increase the asset value before the privatisation as it was usually kept too low
– could be too painful to switch to the replacement value of assets
– therefore it is important to agree on the re-valuation of assets before the privatisation and on their further regulatory treatment
– Romania agreed on the market value
Example: RAB calculation in some CEE countries

<table>
<thead>
<tr>
<th>Country</th>
<th>CWIP included</th>
<th>CC included</th>
<th>Assets value</th>
<th>Revaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>no</td>
<td>yes</td>
<td>historic</td>
<td>yes</td>
</tr>
<tr>
<td>Croatia</td>
<td>yes</td>
<td>no</td>
<td>historic</td>
<td>no</td>
</tr>
<tr>
<td>Estonia</td>
<td>no</td>
<td>no</td>
<td>historic</td>
<td>yes</td>
</tr>
<tr>
<td>Hungary</td>
<td>no</td>
<td>no</td>
<td>replacement</td>
<td>yes</td>
</tr>
<tr>
<td>Lithuania</td>
<td>no</td>
<td>no</td>
<td>replacement</td>
<td>yes</td>
</tr>
<tr>
<td>Serbia</td>
<td>yes</td>
<td>no</td>
<td>historic</td>
<td>yes</td>
</tr>
<tr>
<td>Slovakia</td>
<td>yes</td>
<td>no</td>
<td>replacement</td>
<td>yes</td>
</tr>
</tbody>
</table>
Rate of return
Rate of return

- Rate of return \((r)\) is the expected yield from the company (industry), taking into account the costs of financing the business (cost of capital).
- The cost of capital is usually measured as the Weighted Average Cost of Capital (WACC).
- The \(r\) sets the return that can be earned on:
  - existing assets and
  - net investment
- This is a mixture of debt and equity.
Rate of return

Equity

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

Debt

Debt providers require a fixed interest rate on their investments

Returns of other possible investments with similar risks (opportunity cost)

Interest expenses
Capital gearing ratio

It is a financial ratio that compares some form of owner's equity (or capital) to borrowed funds

• Gearing is a measure of financial leverage, demonstrating the degree to which a firm's activities are funded by owner's funds versus creditor's fund

• The share of borrowed funds may differ from 30% in the Czech Republic to 70% in Austria (by assumptions of national regulators)
Weighted average cost of capital

\[ WACC = r_e \frac{E}{E + D} + r_d(1 + t) \frac{D}{E + D} \]

where

- \( r_e \) = required rate of return on equity
- \( r_d \) = rate of return on debt
- \( E \) = equity
- \( D \) = debt
- \( t \) = corporate tax rate
Different tax rates in the EU countries

2009

Slovenia  Ireland  Lithuania  Germany  Poland  Hungary  Austria  UK  France  Italy

%
WACC of some European TSOs

%
Tariff structures
Average electricity prices, May 2013

industrial

residential

ct/kWh

Source: www.energy.eu
Structure of electricity transmission tariffs

Source: ENTSO-E 2013
The tariff structure

The optimal degree of complexity of the tariff depends on:

– response possibility of customers concerned - e.g. major industrial customers could respond much more than residential ones
– metering and implementation costs associated with the tariff structure envisioned

=> large industrial consumers require complex tariff structure, residential consumers - simple
## Possible gas tariffs

<table>
<thead>
<tr>
<th>Tariff type</th>
<th>Energy component</th>
<th>Capacity component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Two component</td>
<td>€/m³</td>
</tr>
<tr>
<td>Distribution</td>
<td>Two component</td>
<td>€/m³</td>
</tr>
<tr>
<td>Storage</td>
<td>Four component</td>
<td>Injection fee €/m³, Withdrawal fee €/m³</td>
</tr>
<tr>
<td>Retail</td>
<td>Two component</td>
<td>€/MJ or €/kWh</td>
</tr>
<tr>
<td>Charge</td>
<td>G11</td>
<td>G12</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Quality charge, zł/MWh</td>
<td></td>
<td>9.8</td>
</tr>
<tr>
<td>Transition fee, zł/month for consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 500 kWh/year</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>501-1200 kWh/year</td>
<td>1.54</td>
<td></td>
</tr>
<tr>
<td>&gt;1200 kWh/year</td>
<td>4.86</td>
<td></td>
</tr>
<tr>
<td>Day and night tariff, zł/kWh</td>
<td>0.1661</td>
<td></td>
</tr>
<tr>
<td>Day tariff, zł/kWh</td>
<td>0.1778</td>
<td></td>
</tr>
<tr>
<td>Night tariff, zł/kWh</td>
<td>0.0789</td>
<td></td>
</tr>
<tr>
<td>Network fee, zł/month, 1 phase</td>
<td>1.22</td>
<td>4.2</td>
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<tr>
<td>Network fee, zł/month, 3 phase</td>
<td>2.68</td>
<td>6.15</td>
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<tr>
<td>Customer charge, semi-annual settlement, zł/month</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>Customer charge, monthly settlement, zł/month</td>
<td>4.99</td>
<td></td>
</tr>
</tbody>
</table>
Thank you

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