GAS DISTRIBUTION TARIFFS IN CROATIA

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Training on Gas and Electricity Distribution Tarifs – Energy Community Secretariat

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  - Natural gas system development

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  - Challenges in new gas distribution development

- **REGULATORY ACCOUNT MODEL**
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  - implementation in gas distribution tariff calculation
Natural gas supply in Croatia

Domestic Production Fields

Since 2012 increased level of import dependency (32% 2007 -> 61% 2018)

Source: HSUP

Source: Plinacro
Natural gas system of Croatia - the state of play

- significant transmission capacity and interconnections with neighboring countries
- significant number of relatively small DSOs with different level of development

CHALLENGES

- upgrading the system for domestic purposes and for transit use - connecting with new supply projects
- gasification of new uncovered areas in southern Croatia
Gas transmission system – possible future development

Plinacro 10YNDP 2018-2027

[Map showing gas transmission system routes]
Natural gas system of Croatia - the state of play

- significant transmission capacity and interconnections with neighboring countries
- significant number of relatively small DSOs with different level of development

**CHALLENGES**

- upgrading the system for domestic purposes and for transit use - connecting with new supply projects
- gasification of new uncovered areas in southern Croatia
New gas tariff methodology in Croatia - 2013

- Consistent methodological basis of gas infrastructure regulation
  - Economic regulation since 2001 had been solely based on the Rate-of-return method
  - Upgrade to incentive-based tariffing

- Review the position of investors in gas grids, storage, LNG terminal
  - Difficulties related to existing methodology – in particular to the one-year regulatory period
  - Particular position of GREENFIELD investors

- Taking into account trends in international (EU) regulation and experience gained by HERA, together with changes of legal framework and gasification of southern Croatia

- Main goals of the new regulation:
  - to increase efficiency and productivity as well as adequate financial capacity of regulated entities
  - to provide regulatory incentives for investing into new gas infrastructure and incremental capacity

- the applied incentives minimise the price spread and consequently enable new supplies -> make gas more affordable
## Overview of gas market activities in Croatia

<table>
<thead>
<tr>
<th>ENERGY ACTIVITY</th>
<th>OPERATOR</th>
<th>ENERGY SUBJECT</th>
<th>TARIFF METHODOLOGY</th>
<th>REGULATORY PERIOD</th>
<th>METHOD OF ECONOMIC REGULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNG SYSTEM OPERATION</td>
<td>LNGSO</td>
<td>LNG HRVATSKA Ltd.</td>
<td>Methodology for the determination of the tariff items for the Unloading and Send Out of LNG (OG No. 48/18)</td>
<td>-</td>
<td>REVENUE CAP</td>
</tr>
<tr>
<td>PUBLIC SERVICE OF GAS SUPPLY</td>
<td>SUPPLIER UNDER PUBLIC SERVICE OBLIGATION, LAST RESORT SUPPLIER</td>
<td>34</td>
<td>Methodology for the determination of the tariff items for the Public Service of Gas Supply and the Supply of Last Resort (OG No. 34/18)</td>
<td>-</td>
<td>COST-PLUS</td>
</tr>
<tr>
<td>GAS MARKET ORGANISATION</td>
<td>GAS MARKET OPERATOR</td>
<td>HROTE Ltd.</td>
<td>NO (operator’s fee determined on the basis of cost-plus principle)</td>
<td>-</td>
<td>COST-PLUS</td>
</tr>
</tbody>
</table>

### Market Activities

<table>
<thead>
<tr>
<th>ENERGY ACTIVITY</th>
<th>OPERATOR</th>
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</thead>
<tbody>
<tr>
<td>NATURAL GAS PRODUCTION</td>
<td>NATURAL GAS PRODUCER</td>
<td>INA d.d.</td>
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<tr>
<td>GAS TRADE</td>
<td>GAS TRADER</td>
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</tr>
<tr>
<td>GAS SUPPLY</td>
<td>GAS SUPPLIER</td>
<td>53</td>
<td></td>
<td>-</td>
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</tr>
</tbody>
</table>
Tariff methodology - key features

- TSO/SSO/DSO/LNGSO methodologies – separate subordinate legislation -> the same AR method
- based on the **building blocks approach** -> **revenue cap** method
  - OPEX - **incentive regulation** scheme
  - CAPEX – **rate of return** scheme
- OPEX incentive regulation - conducted by the **efficiency factor** and the **profit sharing mechanism**
- CAPEX remuneration scheme - **ex-ante RAB approval** based on investment plan with **ex-post adjustment** based on realised values (up to the economically efficient level)
- duration of reg. period – 1\(^{st}\) period 3 years (2014-16), 2\(^{nd}\) and subsequent periods 5 years (2017-21)
- allowed revenues and tariffs amounts set for all the years of the regulatory period before beginning of the regulatory period (in year T-1) => **allowed revenue smoothing** throughout the reg. period
- revision of allowed revenues carried out in the last year of the regulatory period
  - mechanism for **switching the difference (reconciliation)** between allowed and incurred revenues (under- or over-recovery) to the years of the next regulatory period with its future values (indexed by WACC)
- **extraordinary revision** of allowed revenues due to unexpected changes in the market - at the request of the operator or according to HERA decision => possible to revise all elements used in the projection of allowed revenues, except the efficiency factor
Allowed revenues - structure

- AR determined on the basis of the eligible costs and an appropriate return on regulated assets
- revenues from non-standard services and other generated revenues are deducted items

\[ DP_t^P = OPEX_t^P + A_t^P + PRO_t^P + PV\delta_t - \left( P_{NUt}^P + P_{OSTt}^P \right) \]
Operating expanditure (1)

- all **justifiable** operational costs related to energy activity, consisting of reasonable amount of material costs, cost of service, personnel costs and other operating expenses (unjustifiable operational costs defined)

- OPEX projection for the years the reg. period based on the determined value of the base OPEX for the year T-2 (the last year of available fin. reports at the time of determining the tariff) and the estimated amount of the CPI and the determined amount of the X factor

\[ OPEX^{p}_{T+i-1} = OPEX^{p}_{T+i-2} \times \left(1 + CPI^{p}_{T+i-1} \times X\right); \quad i=2,3,4,5 \]

- setting the base OPEX:

\[ OPEX^{DOZ}_{T-2} = \min \left[ OPEX_{T-2}, \ OPEX_{T-2} - 0.5 \times (OPEX_{T-2} - OPEX^{TSO}_{T-2}) \right] \]

wherein the following items are:
- \( OPEX^{DOZ}_{T-2} \) - the allowed base OPEX in the year T-2
- \( OPEX_{T-2} \) - previously projected OPEX for the year T-2
- \( OPEX^{TSO}_{T-2} \) - realised amount of OPEX in the year T-2
Operating expenditure

- **efficiency factor X:**
  - reflects the expected increase in efficiency => establishing appropriate incentives for ex-ante efficiency increase => with limited revenue / tariffs growth operator will strive to maintain the level of profits by increasing operational savings
  - application of some of the recognized benchmark method for determining the efficiency of each DSO relative to sector postponed for 2\textsuperscript{nd} reg. period - with planned application starting from 3\textsuperscript{rd} reg. period
  - simplified uni-dimensional benchmark method used in 2013 (DSO) -> comprehensive analysis to determine the base OPEX for 1\textsuperscript{st} reg. period

- **profit sharing mechanism:**
  - sharing 50% of achieved savings with customers (lower OPEX)
  - no OPEX increase in case of inefficiency
  - applied for setting base OPEX for 2\textsuperscript{nd} reg. period
OPEX projection / profit-sharing

\[ \text{OPEX}_{T} = \text{OPEX}_{T-2}^\text{DOZ} \times (1+CPI_{T-1}^P - X_{T-1}) \times (1+CPI_{T}^P - X) \]
OPEX projection / profit-sharing

\[ \text{OPEX}^P_T = \text{OPEX}^{DOZ}_{T-2} \times (1 + \text{CPI}^P_{T-1} - X_{T-1}) \times (1 + \text{CPI}^P_T - X) \]

- **T-2** (2012)
- **T-1** (2013)
- **T** (2014)
- **T+1** (2015)
- **T+2** (2016)

1. regulatory period
OPEX projection / profit-sharing

$$\text{OPEX}_{T} = \text{OPEX}_{T-2} \times (1 + CPI_{T-1} - X_{T-1}) \times (1 + CPI_{T} - X)$$
OPEX projection / profit-sharing

\[ OPEX_{T}^{p} = OPEX_{T-2}^{DOZ} \times (1+CPI_{T-1}^{p} - X_{T-1}) \times (1+CPI_{T}^{p} - X) \]
OPEX projection / profit-sharing

\[
OPEX_T^p = OPEX_{T-2}^D \times (1 + CPI_{T-1}^p - X_{T-1}) \times (1 + CPI_T^p - X)
\]
OPEX projection / profit-sharing

OPEX\(^T\) = OPEX^{DOZ}_{T-2} \times (1+CPI^P_{T-1} - X_{T-1}) \times (1+CPI^P_T - X)

Graph showing:
- OPEX projection from 2012 to 2017
- CPI bars for each year
- 1. regulatory period from 2012 to 2013
OPEX projection / profit-sharing

\[ \text{OPEX}_{T-1} = \text{OPEX}_{T-2} \times (1 + \text{CPI}_{T-1} - \text{X}_{T-1}) \times (1 + \text{CPI}_{T} - \text{X}) \]

- 2012.
- 2013.
- 2014.
- 2015.
- 2016.

1. regulatory period
OPEX projection / profit-sharing

\[ \text{OPEX}_T = \text{OPEX}_{T-2} \times (1+\text{CPI}_{T-1} - X_{T-1}) \times (1+\text{CPI}_T - X) \]
OPEX projection / profit-sharing

\[
\text{OPEX}^{\text{DIZ}}_{T-2} = \min \left( \text{OPEX}_{T-2}, \text{OPEX}_{T-2} - 0.5 \times (\text{OPEX}_{T-2} - \text{OPEX}^{\text{DDS}}_{T-2}) \right)
\]
OPEX projection / profit-sharing

\[
OPEX_{T-2}^{DOZ} = \min \{OPEX_{T-2}, \; OPEX_{T-2} - 0.5 \times (OPEX_{T-2} - OPEX_{ODS_{T-2}})\}
\]
OPEX projection / profit-sharing

\[ \text{OPEX}^{\text{D0Z}}_{T-2} = \min \left( \text{OPEX}_{T-2}, \text{OPEX}_{T-2} - 0.5 \times (\text{OPEX}_{T-2} - \text{OPEX}^{\text{ODS}}_{T-2}) \right) \]
OPEX projection / profit-sharing

\[
OPEX^{DOZ}_{T-2} = \min \left[ OPEX_{T-2}, OPEX_{T-2} - 0.5 \times (OPEX_{T-2} - OPEX^{ODS}_{T-2}) \right]
\]


1. regulatory period
OPEX projection / profit-sharing

\[
\text{OPEX}^{\text{DOZ}}_{T-2} = \min \left[ \text{OPEX}_{T-2}, \text{OPEX}_{T-2} - 0.5 \times (\text{OPEX}_{T-2} - \text{OPEX}^{\text{ODS}}_{T-2}) \right]
\]
OPEX projection / profit-sharing

\[ \text{OPEX}^p_{T+i} = \text{OPEX}^p_{T+i-2} \times (1 + \text{CPI}^p_{T+i-1} - X); \ i=2...n \]

1. regulatory period

- 2012
- 2013
- 2014
- 2015
- 2016
OPEX projection / profit-sharing

\[ \text{OPEX}^{p}_{T+i} = \text{OPEX}^{p}_{T+i-2} \times (1+\text{CPI}^{p}_{T+i-1} - X); \; i=2...n \]
OPEX projection / profit-sharing

\[ \text{OPEX}^p_{T+i} = \text{OPEX}^p_{T+i-2} \times (1 + \text{CPI}^p_{T+i-1} - X); \ i=2...n \]
Capital expenditure

- **RAB**:
  - regulated assets - tangible and intangible assets
  - based on net book value
  - only assets in service considered, assets in preparation/construction not included
  - non-repayable funds and subsidies deducted from RAB
  - projected for all years of the regulatory period in T-1 year

- **new investments**:
  - added to projection of RAB -> based on approved network development plan (approved before reg. period)
  - investments should be technically justified and economically efficient - > HERA performs evaluation of submitted investments by benchmark, other projects and by analyzing feasibility study / CBA
  - *ex-ante* approval of investment plan with *ex-post* review of justifiability and efficiency (part of AR revision)

- **depreciation - maximum allowable depreciation rates**:
  - 2,86 % max (35 years minimum asset life) for pipelines, MRS, buildings (TSO, SSO, DSO) / 40 years for LNGSO
  - 5 % max (20 years minimum asset life) -> for plants and equipment (SSO and LNGSO)
  - possibility of applying progressive method of depreciation calculation (in regulatory account option)
WACC - nominal pre-tax

- D/E ratio fixed to 50/50% - target shares in the capital structure
- rate of return on equity \( (r_e) \) determined by applying the capital asset pricing model (CAPM)
- risk free rate \( (r_f) \) determined based on the average value of nominal interest rate of the latest three ten-year domestic or international bonds issued by the Cro Gov
- variability coefficient \( (\beta) \) reflects the degree of risk of investing in the energy business of gas distribution in relation to the risk of investing in the market, can be determined on the basis of a comparative analysis of the variability coefficients of return on the shares of the similar operators applied in the regulatory mechanisms of European countries
- market risk premium \( (r_m - r_f) \) reflects the expected rate of return on the diversified market portfolio in Croatia, determined based on benchmark analysis and available international databases
- rate of return on debt \( (r_d) \) equals the weighted average interest rate on investment loans used by the operator to finance regulated assets, whereby the interest rate on investment loans are taken into account up to the maximum reference interest rate -> the average interest rate of credit institutions on long-term loans in Croatian kuna with a foreign currency clause granted to non-financial companies in Croatia in the last 12 months

\[
WACC = \frac{r_e}{1-P} \times \frac{E}{E+D} + r_d \times \frac{D}{E+D}
\]

\[
r_e = r_f + \beta \times (r_m - r_f)
\]
Allowed revenue allocation - Tariff items

- **Ts1** (kn/kWh) - tariff item for the distributed gas quantity
- **Ts2** (kn) - fixed monthly fee for covering the corresponding part of fixed expenses of gas distribution related to a metering point:
  - maintenance, replacement and calibration of gas meters,
  - measurement, transfer and processing of measurement data
  - other related costs
Gas distribution tariff methodology – tariff models

<table>
<thead>
<tr>
<th>Tariff model</th>
<th>BMP (billing metering point) yearly consumption - Q (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM1</td>
<td>$Q \leq 5.000 \text{ kWh}$</td>
</tr>
<tr>
<td>TM2</td>
<td>$5.000 &lt; Q \leq 25.000$</td>
</tr>
<tr>
<td>TM3</td>
<td>$25.000 &lt; Q \leq 50.000$</td>
</tr>
<tr>
<td>TM4</td>
<td>$50.000 &lt; Q \leq 100.000$</td>
</tr>
<tr>
<td>TM5</td>
<td>$100.000 &lt; Q \leq 1.000.000$</td>
</tr>
<tr>
<td>TM6</td>
<td>$1.000.000 &lt; Q \leq 2.500.000$</td>
</tr>
<tr>
<td>TM7</td>
<td>$2.500.000 &lt; Q \leq 5.000.000$</td>
</tr>
<tr>
<td>TM8</td>
<td>$5.000.000 &lt; Q \leq 10.000.000$</td>
</tr>
<tr>
<td>TM9</td>
<td>$10.000.000 &lt; Q \leq 25.000.000$</td>
</tr>
<tr>
<td>TM10</td>
<td>$25.000.000 &lt; Q \leq 50.000.000$</td>
</tr>
<tr>
<td>TM11</td>
<td>$50.000.000 &lt; Q \leq 100.000.000$</td>
</tr>
<tr>
<td>TM12</td>
<td>$Q \geq 100.000.000$</td>
</tr>
</tbody>
</table>
## Gas distribution tariff methodology – tariff allocation

<table>
<thead>
<tr>
<th>Tariff model</th>
<th>Coefficient of consumption - $k_{p,TMi}$</th>
<th>Coefficient of billing metering point - $k_{OMM,TMi}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM1</td>
<td>1,00 – 1,30</td>
<td>1,0</td>
</tr>
<tr>
<td>TM2</td>
<td>1,00</td>
<td>1,0</td>
</tr>
<tr>
<td>TM3</td>
<td>0,80 – 1,00</td>
<td>2,0</td>
</tr>
<tr>
<td>TM4</td>
<td>0,75 – 0,95</td>
<td>3,0</td>
</tr>
<tr>
<td>TM5</td>
<td>0,70 – 0,90</td>
<td>4,0</td>
</tr>
<tr>
<td>TM6</td>
<td>0,65 – 0,85</td>
<td>6,0</td>
</tr>
<tr>
<td>TM7</td>
<td>0,60 – 0,80</td>
<td>10,0</td>
</tr>
<tr>
<td>TM8</td>
<td>0,55 – 0,75</td>
<td>15,0</td>
</tr>
<tr>
<td>TM9</td>
<td>0,40 – 0,70</td>
<td>20,0</td>
</tr>
<tr>
<td>TM10</td>
<td>0,30 – 0,60</td>
<td>30,0</td>
</tr>
<tr>
<td>TM11</td>
<td>0,20 – 0,50</td>
<td>40,0</td>
</tr>
<tr>
<td>TM12</td>
<td>0,10 – 0,40</td>
<td>50,0</td>
</tr>
</tbody>
</table>
Challenges in natural gas distribution sector

- Gasification and development of distribution grids in new concession areas in coastal parts of Croatia (Istria and Dalmatia)
- Represent significant greenfield investments in gas distribution grids:
  - steep growth of the regulated asset base
  - initially low gas volumes (small number of customers)
  → results in uncompetitively HIGH TARIFFS
- Imperative to prolong the regulatory period - redesigning the basic tariff methodology
- Providing a special option for sustainable grid investments

<table>
<thead>
<tr>
<th>GAS SYSTEM:</th>
<th>existing 75 bar transport system</th>
<th>existing 20 bar transport system</th>
<th>underground gas storage facility</th>
<th>transport system entry point</th>
<th>distribution system entry point</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOR CODE:</td>
<td>red</td>
<td>green</td>
<td>gray</td>
<td>orange</td>
<td></td>
</tr>
<tr>
<td>ICONS:</td>
<td>network nodes</td>
<td>pipeline</td>
<td>storage tanks</td>
<td>connectivity</td>
<td></td>
</tr>
<tr>
<td>LEGEND:</td>
<td>carries out gas distribution</td>
<td>no connection</td>
<td>no connection</td>
<td>no connection</td>
<td></td>
</tr>
<tr>
<td>NO:</td>
<td>carries out gas distribution</td>
<td>no connection</td>
<td>no connection</td>
<td>no connection</td>
<td></td>
</tr>
</tbody>
</table>

General information - 2018

- Total pipeline length: 19,448 km
- Average gas losses: 2.1% per year
- Number of distribution stations: 1,260
- Total number of users:
  - Households: 671,715
  - Commercial customers ≤ 10 GWh: 621,748
  - Commercial customers > 10 ≤ 59 GWh: 45
  - Commercial customers > 50 GWh: 2
- Total gas distributed: 11,071 GWh
  - Households: 5,966 GWh
  - Commercial customers ≤ 10 GWh: 8,752 GWh
  - Commercial customers > 10 ≤ 59 GWh: 1,911 GWh
  - Commercial customers > 50 GWh: 292 GWh
- Losses: 171 GWh
Regulatory account – the new method

- **optional model** of incentive regulation of infrastructure activities in HR gas sector -> approved by HERA

- application of the regulatory account resulting in objective and methodologically consistent tariffs -> **longer regulatory period** (min. 10 years)

- introduced option of regulatory account → **supporting investments** in new infrastructure

- **prerequisites** for regulatory account set up:
  - **significant investments** in the next regulatory period,
  - expected gas system usage in next reg. period much lower than in subsequent periods,
  - **resulting tariffs without reg. account not competitive** (to competing fuels in case of distribution, or to neighbouring countries’ storage systems or LNG terminals) -> in case of significant investments, without an option of “regulatory account”, complete investment, when put in service, would go into regulatory base, which would result in uncompetitively high tariffs during the initial years, when high investments are being followed with low gas consumption
Regulatory account – principle

- NPVs of allowed revenues remain the same for options with or without RA – but are realized with different dynamics -> operator recoups AR of first years in the later project years, i.e. return on invested capital enabled in longer term
Regulatory account – principle (2)
Regulatory account – tariff dynamics (example)
Approved gas DSO average tariffs - 2016/2017

- OSNOVNA TARIFNA STAVKA - VAŽEĆA 2016
- OSNOVNA TARIFNA STAVKA - ODLUKA 2017
- PROSJEK VAŽEĆA 2016
- PROSJEK ODLUKA 2017

Gustoća potrošnje (1000 m3 po km mreže)
Approved gas DSO average tariffs for 2\textsuperscript{nd} reg. period 2017-2021

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Tariff</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>0.0000</td>
</tr>
<tr>
<td>2018</td>
<td>0.0200</td>
</tr>
<tr>
<td>2019</td>
<td>0.0400</td>
</tr>
<tr>
<td>2020</td>
<td>0.0600</td>
</tr>
<tr>
<td>2021</td>
<td>0.1000</td>
</tr>
</tbody>
</table>

AVERAGE TARIFF DECREASE
2021 / 2016 -6.0%
Regulatory account revision

- RA projection to be corrected at the end of each regulatory period
- approved only reasonable changes of actual and planned operational and capital costs, capacity usage rate, in relation to initial assumptions
- regulatory account is not a guarantee of return on investment → input parameters are planned and therefore a subject to change
- regulatory account is an instrument of establishing competitive tariffs in the initial period of infrastructure operation and of compensation of temporarily "lost" part of the allowable revenue
- the mechanism enables sustainability of investment in the new gas infrastructure and prevents discrimination of consumers connected during first few years in relation to those connected later -→ tariffs (revenues) are “normalized” throughout the whole period for which the regulatory account is maintained
to conclude -&gt; regulatory investment incentives –&gt; menu of elements

- **Coverage of OPEX and CAPEX** with incentive regulation
  - building blocks approach
  - total expenditure – TOTEX approach

- **Depreciation policy**
  - linear (straightforward) method, progressive method, degressive method and calculation method by effect (functional method)
  - regulatory recognized useful life of certain groups of regulated assets → may deviate from recognized tax rates from a tax standpoint → typically ranging from 30 to 50 years

- **Direct investment incentive mechanisms**
  - additions to WACC – uplifters
  - Early reimbursement of project development costs
  - extension of the regulatory period and NPV approach
  - approval of the investment budget
Thank you for your attention!

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