

## **Distribution tariff methodologies for electricity and gas in the Energy Community**

April 2019



## Content

<b>INTRODUCTION .....</b>	<b>4</b>
The Energy Community .....	4
Background and scope .....	4
Methodology .....	5
<b>FINDINGS - ELECTRICITY .....</b>	<b>6</b>
Type of regulation .....	6
Allowed revenue and accounting guidelines .....	7
Operating and maintenance costs .....	8
Return on assets .....	9
Depreciation .....	19
Losses .....	20
Deducted revenues .....	26
Quantities .....	26
Correction .....	28
Tariff design .....	28
<b>FINDINGS GAS .....</b>	<b>33</b>
Type of regulation .....	33
Allowed revenue and accounting guidelines .....	34
Operating and maintenance costs .....	35
Return on assets .....	36
Depreciation .....	41
Losses .....	43
Deducted revenues .....	45
Quantities .....	46
Correction .....	47
Tariff design .....	47
<b>SUMMARY OF RESULTS .....</b>	<b>50</b>
Network regulation .....	50
Tariff design .....	52



## List of Tables

Table 1	<i>Role of regulators in evaluating electricity distribution assets</i>	10
Table 2	<i>Treatment of RAB during the regulatory period - electricity distribution</i>	15
Table 3	<i>WACC and its components for electricity distribution (all in %)</i>	17
Table 4	<i>Shares of allowed return in the allowed revenues for distribution</i>	18
Table 5	<i>Depreciation of electricity distribution assets</i>	19
Table 6	<i>Recognition of losses in the allowed revenue (AR) for electricity transmission and distribution</i>	21
Table 7	<i>Allowed levels of losses for calculation of distribution tariffs (in 2018)</i>	25
Table 8	<i>Sources of quantities used for electricity distribution tariff calculation</i>	27
Table 9	<i>Distribution tariff elements and percentages of allowed revenue recovered through them</i>	29
Table 10	<i>Classification of system users for the purpose of distribution tariff determination</i>	30
Table 11	<i>Role of regulators in evaluating gas distribution assets</i>	36
Table 12	<i>Treatment of RAB during the regulatory period- gas distribution</i>	38
Table 13	<i>WACC and its components for gas distribution (all in %)</i>	40
Table 14	<i>Shares of the allowed return in the allowed revenues for distribution</i>	40
Table 15	<i>Depreciation of gas distribution assets</i>	42
Table 16	<i>Recognition of losses in the allowed revenue for gas distribution</i>	44
Table 17	<i>Allowed levels of losses for calculation of distribution tariffs (in 2018)</i>	45
Table 18	<i>Sources of quantities used for gas distribution tariff calculation</i>	46
Table 19	<i>Distribution tariff elements and percentages of allowed revenue recovered through them</i>	47
Table 10	<i>Classification of system users for the purpose of distribution tariff determination</i>	48

## List of Figures

Figure 1	<i>Type of implemented regulation in electricity distribution</i>	7
Figure 2	<i>Are assets under construction included in RAB?</i>	11
Figure 3	<i>Recognition of depreciation of capital contributions in electricity distribution</i>	13
Figure 4	<i>Treatment of intangible assets in RAB for electricity distribution</i>	14
Figure 5	<i>Treatment of working capital in RAB for electricity distribution</i>	14
Figure 6	<i>Application of time-of-use distribution tariffs</i>	32
Figure 7	<i>Type of implemented regulation in gas distribution</i>	34
Figure 8	<i>Treatment of working capital in RAB for gas distribution</i>	38



# INTRODUCTION

## The Energy Community

The **Energy Community**<sup>1</sup> comprises Albania, Bosnia and Herzegovina, Georgia, Kosovo\*<sup>2</sup>, Moldova, Montenegro, North Macedonia, Serbia and Ukraine. Armenia, Turkey and Norway are Observer Countries.

The **Energy Community Regulatory Board** (ECRB) operates based on Article 58 of the Energy Community Treaty. As an institution of the Energy Community the ECRB advises the Energy Community Ministerial Council and Permanent High Level Group on details of statutory, technical and regulatory rules and should make recommendations in the case of cross-border disputes between regulators.

## Background and scope

The Energy Community *acquis communautaire* (hereinafter 'acquis') on electricity and gas<sup>3</sup> requires regulatory authorities to ensure that distribution tariffs are transparent, non-discriminatory, cost-reflective<sup>4</sup> and allow for necessary investments in networks.<sup>5</sup> The Third Energy Package additionally requires regulated tariffs or the methodologies for their calculation to ensure that *transmission and distribution network operators are granted appropriate incentives, over both the short and long term, to increase efficiencies, foster market integration and security of supply and support the related research activities.*<sup>6</sup>

Changing technological and legislative environment in the electricity and gas sector has been affecting the distribution business for years. Distribution system operators have been given new tasks, such as investing in network so to enable renewable generation feed-in or facilitating retail markets. All these changes have effect on and/or require changes of distribution tariffs. The Energy Community Secretariat (hereinafter 'the Secretariat') addressed these issues in its Policy

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<sup>1</sup> [www.energy-community.org](http://www.energy-community.org).

<sup>2</sup> Throughout this document the symbol \* refers to the following statement: This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Advisory Opinion on the Kosovo\* declaration of independence.

<sup>3</sup> Electricity Directive 2009/72/EC ([https://www.energy-community.org/dam/jcr:1af4857c-9985-4c2a-baff-95c5bf1ee38b/Directive\\_2009\\_72\\_EL.pdf](https://www.energy-community.org/dam/jcr:1af4857c-9985-4c2a-baff-95c5bf1ee38b/Directive_2009_72_EL.pdf)), and Gas Directive 2009/72/EC ([https://www.energy-community.org/dam/jcr:004b3ca7-fa52-4633-875e-8ac1b2cea021/Directive\\_2009\\_73\\_GAS.pdf](https://www.energy-community.org/dam/jcr:004b3ca7-fa52-4633-875e-8ac1b2cea021/Directive_2009_73_GAS.pdf)) incorporated into the the acquis by Decision 2011/02/MC-EnC of the Energy Community Ministerial Council.

<sup>4</sup> Recitals 32 and 36 of Electricity Directive and Recital 32 of Gas Directive.

<sup>5</sup> Art. 37(6) of Electricity Directive and Article 40(6) of Gas Directive.

<sup>6</sup> Art. 37(8) of Electricity Directive and Article 40(8) of Gas Directive.



Guidelines on distribution network tariffs.<sup>7</sup> For the electricity sector, the Council of European Energy regulators (CEER) issued guidelines of good practice for distribution tariffs.<sup>8</sup>

The present report analyzes the distribution tariff methodologies applied in the Energy Community including the composition of allowed revenues and tariff design/structures, with a view to identify good practices and provide recommendations, where needed. The report covers **Albania, Bosnia and Herzegovina, Georgia, Greece, Kosovo\***, **Moldova, Montenegro, North Macedonia, Serbia and Ukraine**. Where results for Bosnia and Herzegovina differ for the Federation of Bosnia and Herzegovina (FBiH), Republika Srpska (RS) and Brčko District, they are displayed separately in this survey.

## Methodology

Data and analyses provided in the present report are exclusively based on information provided by the regulatory authorities of the analyzed markets. The information in the report reflects the distribution tariff methodology and tariffs applied in **March 2019**.

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<sup>7</sup> [https://www.energy-community.org/dam/jcr:a6882c6d-923f-4d6a-83d3-395773804984/PG\\_02\\_2018\\_ECS\\_tariffs\\_DS.pdf](https://www.energy-community.org/dam/jcr:a6882c6d-923f-4d6a-83d3-395773804984/PG_02_2018_ECS_tariffs_DS.pdf).

<sup>8</sup> <https://www.ceer.eu/documents/104400/-/1bdc6307-7f9a-c6de-6950-f19873959413>.

# FINDINGS - ELECTRICITY

## Type of regulation

Electricity distribution tariffs are determined by different types of price control mechanisms:

- *Cost plus (or rate-of-return) regulation*, where tariffs are set in a way to cover the system operator's justified costs and include a rate of return i.e. a return on the capital invested;
- *Revenue or price cap regulation*, where revenues/prices are set in advance for a fixed period of several years ("regulatory period") allowing system operators to keep cost savings they are able to acquire during this period due to, e.g. increase of efficiency in system operation. Typically, yearly tariffs resulting from cap regulation only vary based on the level of inflation corrected by a predetermined percentage rate of efficiency growth<sup>9</sup>;
- *Other mechanisms*, such as yardstick regulation or performance based regulation; these models are, however, less widely spread compared to the previously mentioned mechanisms.

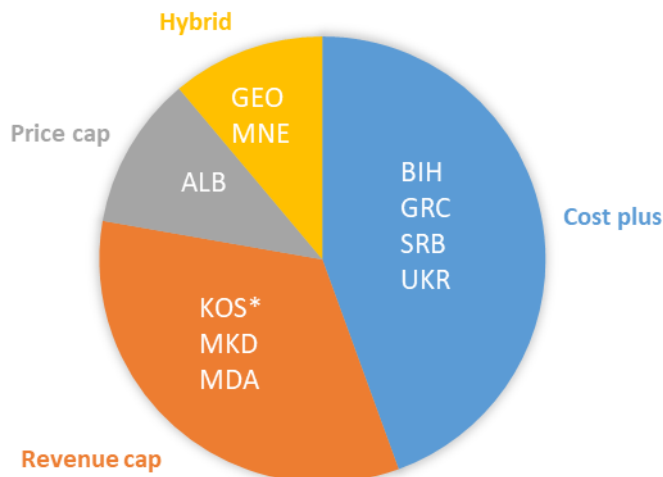
**In the analyzed markets cost plus, price cap, revenue cap and hybrid regulation are implemented.** Cost plus regulation is normally performed on yearly basis,<sup>10</sup> while in the case of incentive based regulation the revenues or prices are capped for different periods, namely three (Albania, Georgia, Montenegro and North Macedonia) or five (Kosovo\* and Moldova) years. The figure below provides an overview on the applied tariff regulation models.

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<sup>9</sup> CPI-X regulation involves setting a price-path (price-cap regulation) for a utility, allowing for changes in inflation (the CPI factor) and expected efficiency improvements (the "X" factor; These efficiency improvements are separate from the economy-wide efficiency improvements already reflected in the change in the CPI). The "X" factor may incorporate other aspects in addition to the expected improvement in efficiency, such as rewards for improvements in output quality, service levels or demand management actions. CPI-X regulation may also be applied to total required revenue under revenue-cap regulation. For more details, please see: Independent Pricing and Regulatory Tribunal (*Dennis Mahoney, Cato Jorgensen, Thomas Clay*), Incentives for cost saving in CPI-X regimes, July 2011.

<sup>10</sup> This however does not mean that tariffs are necessarily changed every year, but that the calculation base is one year. Tariffs are changed on the request of regulated company or when regulator concludes that basic parameters for allowed revenue and tariff calculation have been changed.

Figure 1 *Type of implemented regulation in electricity distribution*



The hybrid model implemented in Georgia refers to a combination of cost plus and revenue cap, differently applied to different cost components. On the other side, the hybrid regulatory method implemented in Montenegro, aims at limiting allowed revenues, providing efficiency improvement incentives, and allowing risk- sharing<sup>11</sup> between operators and users of the system.

## Allowed revenue and accounting guidelines

For all types of tariff regulation the **allowed revenue** need to be determined, i.e. those costs that are allowed to be recovered via the network tariff. Eligible costs include justified and efficient operation and maintenance costs and capital costs, namely depreciation and return on assets. Allowed revenues additionally also include the compensation of network losses as well as a correction factor addressing variations between the forecast and actual values.

In order to facilitate the process of allowed revenue calculation, some regulatory authorities require regulated companies to prepare and submit separate regulated accounts that – to a certain extent – can differ from national statutory accounting standards. Such “regulatory accounting rules” (guidelines) should not create an additional burden for regulated companies but help them in understanding the process of regulation and increase transparency.

<sup>11</sup> Risk related to changes in deployed capacity.



In the analyzed electricity markets **regulatory authorities define separate regulatory accounting guidelines** in Albania, Bosnia and Herzegovina, Greece, Kosovo\*, Montenegro, North Macedonia and Serbia. In Georgia accounting guidelines are under preparation.<sup>12</sup>

## Operating and maintenance costs

Operating and maintenance costs (O&M costs) allow regulated companies to provide and maintain the adequate service level. Regulatory authorities recognize operating and maintenance costs in the allowed revenue but have to differentiate between justified and non-justified costs in order to avoid excessive and unnecessary costs being included in tariffs.

The assessment hereinafter analyses whether regulators apply **criteria for recognition** of operational expenditures in the allowed revenue defining which costs are considered justified/non-justified, predefining some costs as controllable and non-controllable<sup>13</sup> and/or predetermining limits for certain costs.

- The regulatory authority of Kosovo\* includes all operating and maintenance costs from statutory accounting in the allowed revenue for electricity distribution.
- On the other side, regulators in other Contracting Parties and Greece include only justified i.e. reasonable costs in the allowed revenue calculation.
- In North Macedonia the regulatory authority defines limits for some costs categories: for example, maintenance costs may only amount to 25% of annual depreciation costs and gross salaries per employee are only recognized to the extent not 40% higher than average gross salaries in the country.

In case of incentive based regulation an **efficiency factor** is applied i.e. *„the regulator sets prices not on the basis of the company’s actually incurred costs, but rather on a level of cost that the regulator considers efficient. The difference between actual costs and the regulatory estimation of efficient costs is reflected in the X factor. The X factor applies for a given number of years (the regulatory period) and determines the annual change in prices in such a way that prices move in line with the anticipated efficiency improvements. Through the X factor, consumers directly participate in the expected cost reductions in the form of lower price. On the other hand, the company will also benefit as long as it manages to reduce costs in excess of the X factor. The residual cost savings can then be retained in the form of higher profits.”*<sup>14</sup>

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<sup>12</sup> Cost Audit Rules are going to be approved this year for all sectors. Also, Unified System of Accounts (USoA) is being implemented currently together with its instructions and the deadline for implementation in the electricity sector is in 2021, meaning that companies should provide year 2020 accounts according to USoA.

<sup>13</sup> Non- controllable costs, if recognized as such, are normally automatically included in the allowed revenue.

<sup>14</sup> *Efficiency factor’s determination (X factor)*, Issue paper of ERRA Tariff/Pricing Committee, prepared by KEMA International B.V. in August 2006; more information may be found at <https://erranet.org/knowledge-base/library/>.





As explained earlier, incentive base regulation for electricity distribution is only applied in Albania, Kosovo\*, Moldova, North Macedonia, and partially in Georgia and Montenegro. The following efficiency factors currently apply:

- Albania: 0%;
- Georgia: 1.5%;
- Kosovo\*: 1.5%;
- Moldova: the efficiency factor is equal for all DSOs. For costs of personnel involved in the distribution, servicing, maintenance and operation of electricity distribution networks this index is constantly set for the entire validity period of the Methodology at a rate of 20% of the consumer price index in the Republic of Moldova,  $X = 0,2CPIMn$ . For material costs necessary for the servicing, maintenance and operation of the electricity distribution networks this index is constantly set for the entire validity period of the Methodology at a rate of 20% of the US consumer price index;
- Montenegro: efficiency factor is the same for every year of regulatory period 2017-2019 and it is set at 1.67%. The methodology prescribes that efficiency factor shall be set for every DSO separately, but currently only one DSO exists;
- North Macedonia: a smoothing factor (SX) for the regulatory period is applied to the annual building blocks and for the period 2018-2020 the value is set at -0.0141467086.

Finally, in the process of distribution tariff regulation, regulatory authorities need to take into consideration not only costs, but also the **quality of service**. This is usually done by including certain incentives for distribution system operators for achieving higher levels of quality. Nevertheless, the regulators of the analyzed markets do not include such incentives in their methodologies for distribution tariff regulation. Only in Moldova, for non-compliance with the minimum values of the quality indicators, the NRA is entitled to reduce the tariffs or to determine individual penalties to be paid by the distribution system operators, in line with the Regulation on the Quality of Transmission and Distribution of Electricity Services.

## Return on assets

In order to recognize the owner's investment in the regulated company, the allowed revenues includes a return on assets. The return on assets is measured by multiplying the rate of return with the value of the regulatory asset base.

## 1. Regulatory asset base

The regulatory asset base (RAB) aggregates net asset values of fixed assets and sometimes current assets (also referred to as “working capital”), excluding capital contributions and sometimes also assets under construction.<sup>15</sup>

Asset valuation is an important element of RAB determination. Some regulatory authorities therefore prefer using their own asset valuation methodology. In any case regulators have a discretionary right to define and decide which assets belong to the regulated business and, to avoid sunk investments,<sup>16</sup> which investments are justified.

An overview of **RAB structures and asset valuation** is presented below. It has to be highlighted that in 2018 a new methodology has been adopted in Ukraine but with the transition period for which the concept of RAB does not apply yet. The allowed revenue for the majority of companies is calculated so to include all reasonable operating costs, depreciation, return on investments and income tax. The new methodology of incentive based regulation will introduce RAB concept. Therefore, the information on Ukraine in this and the following chapter will be only selective to the extent available. When providing information on RAB, this consequently does not include Ukraine.

Table 1 *Role of regulators in evaluating electricity distribution assets*

	Has the regulator right to re-evaluate assets if deems necessary?	Have assets been re-evaluated in the process of tariff regulation?
Albania	no	no
Bosnia and Herzegovina	yes	yes
Georgia	yes	no
Greece	yes	no
Kosovo*	yes	yes
Moldova	no	yes
Montenegro	yes	yes
North Macedonia	yes	no
Serbia	no	yes
Ukraine	Not applicable	

<sup>15</sup> Assets not yet commissioned, i.e. not yet in use.

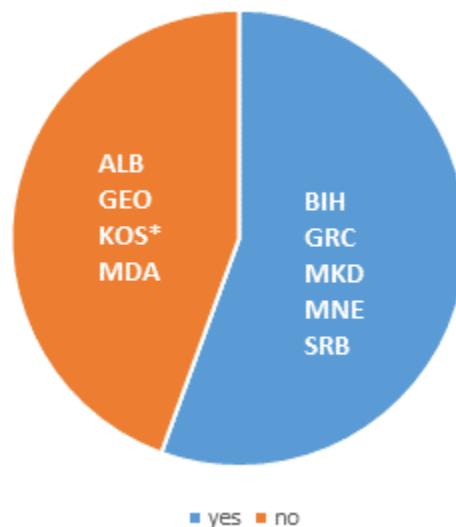
<sup>16</sup> Investments that will not allow recovering of capital invested, because e.g. relevant asset will be underused or not used at all.

In Bosnia and Herzegovina, Georgia, Greece, Kosovo\*, Montenegro and North Macedonia, the regulatory authorities have a legal right to **re-evaluate assets** of regulated companies or to request their re-evaluation. However, this right was not exercised in Bosnia and Herzegovina (SERC), Georgia, Greece and North Macedonia so far. In Moldova and Serbia the companies re-evaluated the assets on their own initiative before applying for the tariff approval.<sup>17</sup>

In all investigated markets the regulatory authorities **approve investment plans ex-ante** and monitor their implementation. The exception is Bosnia and Herzegovina, where regulators do not approve but only monitor implementation of investment plans.

Assets under construction are differently treated in the analyzed markets- in more than half of them they are included in the regulatory asset base. More details on how these assets are included may be found below the Figure 2.

Figure 2 *Are assets under construction included in RAB?*



▪ **Bosnia and Herzegovina:**

FERK, SERC: through account 025 on ongoing investments and following realization of construction plans of fixed assets.

RERS: RAB includes funds in preparation, in connection with the construction of new and reconstruction of existing fixed assets used for performing regulated electricity activities, if it can be

<sup>17</sup> In Serbia, in accordance with International Financial Reporting Standards, the companies have the right the to reevaluate their assets temporary in case of high inflation or some other deviation that influences the value of assets.



confirmed that these assets will be activated during the tariff period and if the Regulatory Commission estimates that the investments are justified.

- **Greece**

According to the estimated cost per each year of the regulatory period.

- **Montenegro**

The value of investments is calculated in the following manner:

1) for the first year of the regulatory period 
$$I_{t+1} = IT_{t-1} + \frac{1}{2} I_t^{od}$$

2) for the second year of the regulatory period 
$$I_{t+2} = IT_{t-1} + I_t^{od} + \frac{1}{2} I_{t+1}^{od}$$

3) for the third year of the regulatory period 
$$I_{t+3} = IT_{t-1} + I_t^{od} + I_{t+1}^{od} + \frac{1}{2} I_{t+2}^{od}$$

where:

$IT_{t-1}$  - approved assets under construction, at the end of the year preceding the year of submission of the request for approval of allowed revenue and prices,

$I_t^{od}$  - approved planned investments for the year of submission of the request,

$I_{t+1}^{od}$  - approved planned investments for the first year of the regulatory period,

$I_{t+2}^{od}$  - approved planned investments for the second year of the regulatory period.

The value of investments for each year of the regulatory period is reduced by the value of investments in assets that are put into function, which means that, for example, the value of  $I_t^{od}$  in the formula for the third year of the regulatory period doesn't include the planned value of assets which should be put into function in the second year of the regulatory period in accordance with approved investment plan for the regulatory period.

- **North Macedonia**

Assets under construction are included in the RAB based on the data from investment programs. The percentage of the completed investments in comparison to the approved, is used in the process of approval of the future investments in the next regulatory period.

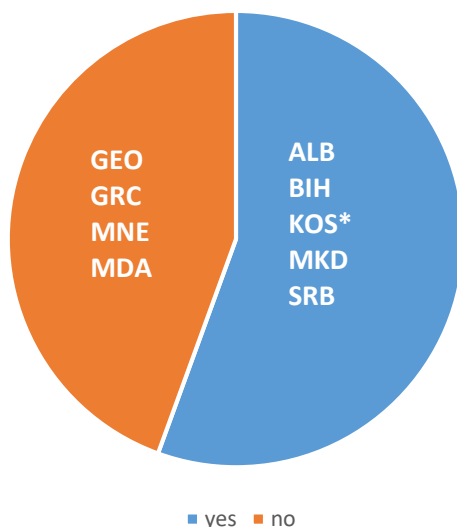
- **Serbia**

Regulated assets in the regulatory period include only assets under construction that will be activated during the regulatory period (existing as well as planned assets under construction). This is an ex-ante approach, but with an ex-post correction.

Another very important element of RAB calculation are **capital contributions**, i.e. grants from e.g. the government or an international institution and direct payments by asset users, in case of networks typically connection assets. Normally the assets financed from such contributions are excluded from the RAB, in order to avoid return on assets that are not the result of the regulated company's investment. In some cases however, depreciation of these assets is allowed with a view to enable replacing of the assets in the future.

In all analyzed markets **capital contributions are excluded from the RAB** by the regulators.<sup>18</sup> However the **depreciation of capital contributions** is included in the allowed revenue for electricity distribution in some of the markets as it can be seen from the following figure.

Figure 3 Recognition of depreciation of capital contributions in electricity distribution



Other elements considered for calculating the RAB are intangible assets and working capital. **Intangible assets** are long-term resources of the company, but have no physical existence. They derive their value from intellectual or legal rights and from the value they add to the other assets.<sup>19</sup> When determining the RAB some regulatory authorities decide not to include the value of these assets. **Working capital**, defined as difference between company's current assets<sup>20</sup> and current liabilities<sup>21</sup> is also sometimes excluded from RAB.

The graphs below shows the applied approaches in detail.

<sup>18</sup> Only the regulatory authority of Federation BIH (FERK) includes 50% of connection costs in the RAB.

<sup>19</sup> Examples are patents, copyrights, goodwill.

<sup>20</sup> Assets that will be turned into cash within a year.

<sup>21</sup> Liabilities that will be repaid within a year.

Figure 4 *Treatment of intangible assets in RAB for electricity distribution*

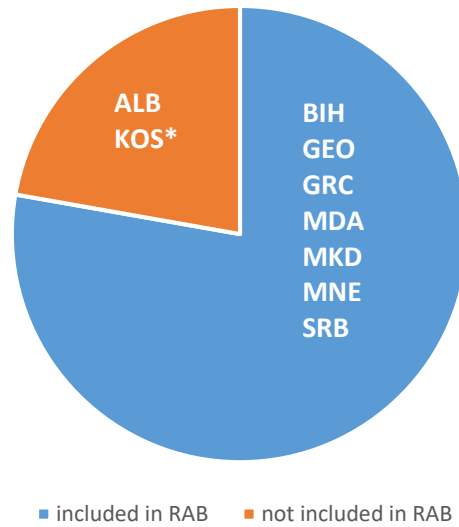
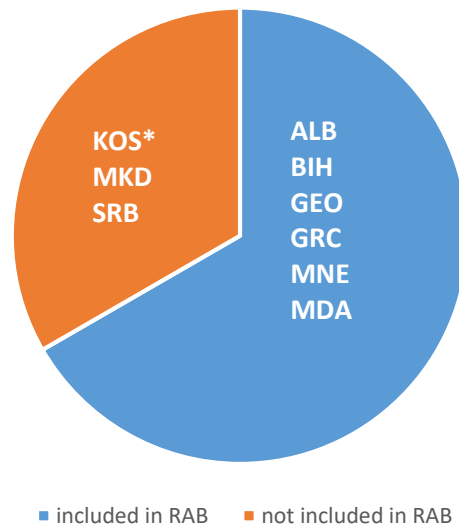


Figure 5 *Treatment of working capital in RAB for electricity distribution*





From the graphs above it can be concluded that regulatory authorities of the analyzed markets **treat values of intangible assets and working capital differently** when calculating the RAB.<sup>22</sup> Both approaches however are justified.

Finally, once the RAB has been calculated for the regulatory period, it may be adjusted on yearly basis in case of incentive based regulation, i.e. when regulatory periods are longer than 1 year. As shown above, this is the case in North Macedonia, Kosovo\*, Moldova, Montenegro and Turkey. The table below provides explanations on the approaches applied.

Table 2 *Treatment of RAB during the regulatory period - electricity distribution*

	Treatment of RAB during the regulatory period
Albania	The realization of investments is monitored every year and the RAB corrected, if needed, so to allow for actual investments occurred.
Georgia	In case the realized revenue differs from the allowed for more than 10%, the regulated company may require adjustment of allowed revenue, including RAB
Kosovo*	When there are differences between the allowed values and those realized for the regulatory period, the regulator makes the necessary adjustments. These adjustments can be made on an annual basis or after expiry of the five- year regulatory period. In practice, it is done at the end of the regulatory period.
Moldova	The RAB is revised every year.
Montenegro	The RAB may be changed if in the period of application of determined prices, it comes to deviation in non-controllable and partially controllable costs, in revenues from regulated activities, in other revenues, depreciation and return on assets, cumulatively higher than 10% compared to the allowed revenue, the NRA shall set adjustments upon the request of the undertaking or shall act in official capacity.
North Macedonia	RAB is not changed during the regulatory period.

While the purpose of incentive based regulation, in principle, is to allow revenues remaining unchanged during the regulatory period and therefore allowing regulated utilities to consume the benefits of cost reductions during that time, the adjustment of RAB with the purpose of recognizing actual investment occurred has to be assessed very positively against incentivizing investments. On the other side, in case investments are recognized in the RAB before their commission, there needs to be control over their implementation with a view not to allow regulated utilities to earn return on not realized investments.

<sup>22</sup> In Montenegro, the value of recognized working capital is limited to 1/12 of the justified operational costs. In Albania, the default value is also 1/12 of the operational expenditures unless the DSO submits a study justifying other amount. In other analyzed markets the NRAs developed different formulas/indicators for calculation of allowed working capital.



## 2. Rate of return

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Regulated service providers will only have interest to invest if the recognized return allows them to cover costs of equity and debt finance needed for the realization of the envisaged projects. The rate of return determined by regulators has to take into consideration the credit conditions available to particular regulated companies but also to comparable industries since the utilities in the energy sector do not only compete among themselves for financing sources. Furthermore, the rate of return has to enable investors to cover their finance (equity) requirements and to secure at least the risk-free rate of interest plus a risk premium reflecting risks specific for the particular sector of energy industry.

**Weighted Average Cost of Capital (WACC)** is a commonly used method for calculation of the rate of return in regulated energy business. As the name suggests, it reflects weighted average of the cost of each individual component of the capital structure.<sup>23</sup> WACC may be determined as pre-tax or post-tax figure. Pre-tax WACC allows not only coverage of finance cost but also tax coverage. Post-tax WACC assumes that the utility already paid the tax. For the estimation of costs of equity usually the Capital Assets Pricing Model is applied.<sup>24</sup>

The regulatory authorities of the analyzed markets reported figures for real pre-tax WACC for electricity distribution,<sup>25</sup> including the relevant components for its calculation and they are presented in the table below. As mentioned in the previous chapter, Ukraine does not implement the concept of RAB and return on assets; consequently, there will be no related information on Ukraine in this chapter.

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<sup>23</sup> Weight is the share of capital component.

<sup>24</sup> For more details on WACC calculation please see e.g. <https://corporatefinanceinstitute.com/resources/knowledge/finance/what-is-wacc-formula> or [http://regulationbodyofknowledge.org/wp-content/uploads/2013/03/Jenkinson\\_Regulation\\_and\\_the.pdf](http://regulationbodyofknowledge.org/wp-content/uploads/2013/03/Jenkinson_Regulation_and_the.pdf)

<sup>25</sup> These figures refer to the WACC as approved in the last tariff calculation process.



Table 3 WACC and its components for electricity distribution (all in %)

	WACC (real, pre-tax)	Gearing (debt/(debt+equity))	Return on equity	Return on debt	Risk free rate	Beta coefficient	Market return
Albania	7.81	60	16.44	2.7	6.9	1.31	-
Bosnia and Herzegovina	ERS: 3.34	ERS: 7.63	ERS: 3.12 EP BiH: 0.4 EP HZHB: 0.0 Komunaln o Brčko: 0.0	ERS: 6.00 EP BiH: 3.344 EP HZHB: 2.026	-	-	-
Georgia	16.40 <sup>26</sup>	60	18.36	12.93	12.22	0.84	6.17
Greece	7 <sup>27</sup>	32	5.8	4.6	0.7	0.56	5
Kosovo*	8.3	40	9.1	7.2	3.7	1	4.5
Moldova	10.10	35	11.3	5.02	2.33	0.19	5.22
Montenegro	5.86	50	12.4	2.31	0.5	1.06	6
North Macedonia	6.5652	47.27	7.01	5.20	3.83	1	7.01
Serbia	4.87 <sup>28</sup>	60	5.25	4	-	-	-

<sup>26</sup> Nominal WACC.

<sup>27</sup> Nominal WACC.

Table 4 Shares of allowed return in the allowed revenues for distribution

	Shares of allowed return in the allowed revenues for distribution (based on the last calculated allowed revenue)
Albania	4.90%
Bosnia and Herzegovina	EP BIH: 3.88%   EP HZHB: 1.77%   ERS: 3.34%
Georgia	23.4% and 26.9%
Greece	28.1%
Kosovo*	21.22%
Moldova	16% and 28%
Montenegro	20.22%
North Macedonia	13.66%
Serbia	13%

Regulatory authorities of the majority of analyzed markets do not have any influence on the use of allowed return by the distribution system operators. The exceptions are Albania and Ukraine, where certain parts of the return have to be used for investments. Although in Ukraine the concept of return is not related to the value of assets, the regulatory authority allows a profit share (which depends in particular on capital investment for developing operational activity) as part of the allowed revenue.<sup>29</sup>

With the exception of the abovementioned recognition of investments *ex ante*,<sup>30</sup> the regulatory authorities do not apply specific investment incentives, pointing out that the adequate rate of return is an appropriate incentive *per se*. Nevertheless, the Greek regulator envisages the application of a WACC premium and a special depreciation rate for projects of major importance in the newly prepared methodology.

<sup>29</sup> Percentage of costs instead of value of assets.

<sup>30</sup> Montenegro and North Macedonia.

## Depreciation

Depreciation is an allocation of asset costs to the accounting period in which the asset provides benefits to the company. The purpose of calculating depreciation is to build up financial resources for the replacement of assets. There are a number of approaches for calculating depreciation, but the most widely used method is straight-line/linear depreciation where the assets are written off every year with the same amount. In order to quickly write off an asset and therefore return the invested capital sooner, some regulators use accelerated depreciation where yearly deductions are greater in the first years of asset use. It has to be noted that depreciation used for regulatory tariff setting can deviate from national tax law depreciation rules. The regulatory authorities of the analyzed markets use **straight-line depreciation**. In Georgia, Greece, Kosovo\* and Serbia, the regulators determine assets as used in the allowed revenue calculation. In other cases the regulator accepts the asset lives used by the regulated companies, in line with applicable national accounting standards and rules. In Albania and Kosovo\*, the asset lives applied to the assets obtained before the privatization of the distribution companies differed from those applicable today. In Georgia, the assets obtained before 2015 are depreciated by companies' depreciated norms and those obtained afterwards in line with regulator's norms set in the tariff methodology. Details on the depreciation methods for electricity distribution are shown in the table below. The information on asset lives in straight-line depreciation explains how quickly the asset costs are actually recovered.

Table 5 *Depreciation of electricity distribution assets*

	Depreciation method applied	Does the regulator define asset lives for the regulatory purposes?	Asset lives (in years)
Albania	Straight- line	No	According to fiscal rates
Bosnia and Herzegovina	Straight- line	No	Network 25-40, substations 35-60

	Depreciation method applied	Does the regulator define asset lives for the regulatory purposes?	Asset lives (in years)
Georgia	Straight- line	Yes	30-45 network, 60 for substation buildings, 30 for transformers and 20 for meters
Greece	Straight- line	Yes	35 years
Kosovo*	Straight- line	Yes	Network, transformers, substations 35, meters 20
Moldova	Straight- line	No	Network 15-45 depending on type and material, transformers 15-20
Montenegro	Straight- line	No	buildings 40-80, substations 60, plant and equipment 15-65
North Macedonia	Straight- line	No	Network 40, transformers 20
Serbia	Straight- line	Yes	Network 40, substations 35
Ukraine	Straight- line	No	Buildings 30-70, network 30-40, substations/transformers 25-35, measuring equipment 15

## Losses

During the transport of electric power through an electricity network, power is lost due to physical and non-physical reasons. Two types of network electricity losses exist:

- *Technical losses* resulting from heating of conductors and transformers during electricity transmission and
- *Non-technical losses* i.e. consumed energy that cannot be billed to an end user. Reasons for these losses include imprecise or incorrect readings, fraud and human error.

Network operators are responsible for the compensation of losses. They purchase appropriate quantities of energy in form of a scheduled supply with the required load profile. The costs of network losses are mostly controllable in a long-run, but not in a short-run (e.g. during the regulatory period). The way they are included in the allowed revenue (if included at all) can be different, e.g. as part of operating costs<sup>31</sup> or as separate allowed revenue category.<sup>32</sup> In any case, the regulator has to ensure network efficiency, not only by recognizing a certain amount of losses, but also by stimulating network operators to reduce them.

The table below provides information on the **definition and criteria** applied by the regulators of the analyzed markets **for recognizing losses** in the allowed revenue for electricity distribution and provides figures for allowed losses and applicable prices that are used for defining the allowed cost.

<sup>31</sup> In case of incentive based regulation the applied efficiency factor then also relates to costs of losses.

<sup>32</sup> The maximum value is set for the amount of losses as well as the rule applicable for purchase price.

Table 6 Recognition of losses in the allowed revenue (AR) for electricity transmission and distribution

	Are costs related to network losses recognized?	Are both technical and non-technical losses recognized?	Criteria for recognition of losses in the allowed revenue	How is the price for allowed losses determined?
Albania	Yes	Yes	The DSO submits for approval by the Regulator the average level of losses of electricity for each voltage level in the network distribution. Cost of purchasing power/capacity to cover losses energy will be an operating expense of the DSO according to the levels allowed by ERE.	The cost of losses is estimated at the purchase price of electricity by RES Furnizohet
Bosnia and Herzegovina	Yes	Yes	The justified rate of electricity losses in the distribution system is determined on the basis of loss rates realized in the previous three years as a minimum, the analysis of the state of the system, benchmarking of implemented loss rates by the distribution system operators in the surroundings and region and plan for the reduction of losses and measures for its implementation.	<p><u>FERK</u>: Legal unbundling between generation and distribution activity in EP BiH and EP HZHB is not in place. Therefore there is no special contract for the procurement of energy for distribution losses. Total expenditures of electricity generation increased by the amount of return on the RAB increased for the profit tax of the electricity generation plus the total cost of electricity procurement and minus the other revenues of the activity of electricity generation through total electricity purchased. In the Elektroprivreda RS, the distribution activity is separated from generation activity. Distribution companies purchase energy at regulated generation prices for public supply increased for costs of using transmission network</p> <p><u>RERS</u>: cost of generation (purchase) of electricity for public supply of customers and corresponding costs of using the transmission network. Komunalno Brčko does not have its own electricity generation. The company purchases energy for supplying its customers on the wholesale market mainly through annual contracts.</p> <p><u>SERC</u>: equal to the price of the purchase of electricity for the supply of customers that are supplied under the universal service.</p>

	Are costs related to network losses recognized?	Are both technical and non-technical losses recognized?	Criteria for recognition of losses in the allowed revenue	How is the price for allowed losses determined?
Georgia	Yes	Technical only	Percentage of allowed losses is set at the minimum between the last year's actual loss and the loss determined by the 3 year trend before that. There is a separate methodology for calculation of allowed losses and they are set by a resolution before the tariff setting. The information collected should include the nature of losses.	During every tariff calculation there is an Electricity Purchase Basket being created and its Weighted Average Price is used for losses. At the moment electricity supply is not yet a separate activity (it will become this year under the new law). So the DSOs are acting as suppliers as well, buying electricity from power plants via direct contracts or purchasing on balancing market (these prices differ from month to month, so Annual Weighted Average is calculated). Costs of dispatch and transmission are also included in this price.
Greece	No	not applicable	not applicable	not applicable
Kosovo*	Yes	Yes	Loss Allowance which shall be set at Periodic Reviews. The Agency by the decision determines the allowable loss rate in the distribution system for each year of the regulatory period. For the determination of allowed losses, consultative reports on loss reduction, a loss reduction plan and measures for its realization as well as the flow of energy are taken into the account.	Procurement of electricity for covering losses is done through a tendering procedure and bilateral contracts. This is done in accordance with the Procedure for the sale of electricity. For this purpose domestic prices and European market prices are considered. Average wholesale energy cost calculated by ERO.

	Are costs related to network losses recognized?	Are both technical and non-technical losses recognized?	Criteria for recognition of losses in the allowed revenue	How is the price for allowed losses determined?
Moldova	Yes	Yes	NRA recognizes losses in the allowed revenue for distribution at the level, which will not exceed the previous year's level.	The losses are purchased by DSO on wholesale electricity market, by using the tendering procedures in line with the instruction issued by the Ministry of economy and infrastructure.
Montenegro	Yes	Technical only	<p>The Agency determines the allowable loss rate in the distribution system for each year of the regulatory period, taking into account the results of the study on loss reduction in the distribution system, revised and updated in accordance with the Law, which the operator is obliged to submit with the request.</p> <p>If DSO fails to submit the study, the allowed loss rate in the distribution system for each year of the regulatory period will be determined by applying the average annual loss reduction from the beginning of the price and tariff regulation (2007) to the loss rate set for the previous regulatory period, but not less than the lowest loss rate reached in the largest region by the operator according to the data from the last loss study.</p> <p>The total costs of losses that are covered by distribution system users include the costs of losses described above and the related part of the cost of losses in the transmission system allocated to distribution system operator.</p>	<p>The price of electricity for covering the allowed losses shall be determined as the average of electricity price realized in the previous year and the futures for the next year on the reference exchange, which will be appointed by the Agency.</p> <p>The DSO is obliged to buy electricity for covering losses on the market in a transparent procedure.</p>
North Macedonia	Yes	Yes	ERC recognizes the quantities defined with the Plan for reducing electricity losses in the distribution grid prepared by DSO and approved by the ERC. Electricity purchases for covering the losses in the distribution grid are done under market conditions, in line with the Electricity Market Code. DSO purchases losses in accordance with Rules for purchasing the losses prepared by DSO and approved by ERC. Once in three years, DSO is obliged to prepare Rules for purchasing losses and send's it for approval to ERC.	Procurement of electricity for covering losses is done through a transparent tendering procedure and the required quantities are procured on the liberalized market. The average price for allowed losses is market based.

	Are costs related to network losses recognized?	Are both technical and non-technical losses recognized?	Criteria for recognition of losses in the allowed revenue	How is the price for allowed losses determined?
Serbia	Yes	Yes	Justified rate of electricity losses in the electricity distribution system in the regulatory period is determined on the basis of: the realized rates of losses of electricity in the previous three years, the analysis of the state of the system, a comparative analysis of the realized loss rates (benchmarking), a loss reduction plan and measures for its realization.	The price of electricity for the compensation of losses is the weighted average justified purchase price of electricity, including all justified dependent costs of electricity procurement in the regulatory period. This price cannot be higher than the wholesale market price calculated based on the price for the futures for the next year on HUDX. The procurement of electricity for losses is to be done via tendering procedure, however this is still not applied in practice. Therefore the criterion for the maximal price, as described above, is applied.
Ukraine	Yes	Technical only	On the basis of the forecasted amount of distributed electricity and coefficient of the forecasted technical losses for 1st and 2nd voltage level	The wholesale electricity price corrected for DSO's coefficient of loading schedule.



With the exception of Greece, costs related to network **losses are recognized** in the allowed revenue for distribution in all analyzed markets. In Greece, energy for losses on distribution networks is injected in the system by suppliers.

The majority of regulatory authorities **recognize certain levels of both technical and non-technical (commercial) losses**. The exceptions are Georgia and Ukraine, where only technical losses are taken into account. In those cases where more than normative technical losses are recognized in the allowed revenue, the criteria used mainly rely on historical data on losses and benchmarking with other comparable networks.

When **calculating the level of losses** related costs in the allowed revenue, regulators use different supply or purchase electricity prices (including transmission charges for distribution losses). Only in North Macedonia this price is explicitly market based, i.e. a DSO has to organize a tender for purchasing electricity to cover losses. The procedure of this tender is approved by the regulator. Currently allowed percentages of losses in distribution networks are presented in the table below.

Table 7 *Allowed levels of losses for calculation of distribution tariffs (in 2018)*

	Allowed level of losses (range for more DSOs, if separately defined)
Albania	17.9%
Bosnia and Herzegovina	8.8% - 12.24% (9.37% realized in 2018)
Georgia	5.81% - 9.80%
Kosovo*	18.80%
Moldova	8.25% - 9.77%
Montenegro	8.43%
North Macedonia	13.4%
Serbia	13.5%
Ukraine	11.45%

## Deducted revenues

Distribution system operators may earn revenues from non-regulated activities performed by using the same assets already included in RAB, e.g. revenues from connection/reconnection, lease or sell of assets. In order to avoid double earnings from the same assets, the regulators often deduct such non-regulated revenues from the regulated allowed revenue.

All regulatory authorities of the investigated markets, except ANRE Moldova, deduct some non-regulated revenues from the distribution allowed revenue:

- **Albania:** revenues from new connections
- **Bosnia and Herzegovina:** business income, financial income, revenues from selling fixed assets, surpluses, dismissed reservations, writing off liabilities, collection of bad debt, revenues based on harmonization of values
- **Georgia:** revenues for renting rooms in administrative buildings, special vehicles making some revenues on contracts outside regulated activity, extra amounts of connection fees, reconnection fees, cell phone company antennas installed on the roofs of their administrative buildings etc.
- **Greece:** revenues from non-regulated activities and revenues from provision of regulated services at user request (e.g. meter checks, disconnection/reconnection, replacement of meter fuse), in case associated costs are not already excluded from allowed/required revenue.
- **Kosovo\*:** revenues from non-regulated activities
- **Montenegro:** revenues from non-regulated activities performed by using regulated assets, revenues from the services, recurring revenue, connection revenue, income from donations, income from lease of business space and land, other rental income, revenues from previous years, other revenues from damage claims, revenues from activation and consumption of goods for own needs
- **North Macedonia:** revenues that the DSO earns by using the regulated asset base. ERC approves the pricelist of services, which the DSO can provide to the customers according to the grid code and by this generate additional revenues, e.g. connection charges. These revenues are then deducted from the allowed revenues.
- **Serbia:** revenues collected by the employment of resources meant for electricity distribution activities and electricity distribution system operation, such as: revenues arising from the sales of side-products and services, revenues from activation of own goods and outputs, revenues collected by selling regulated assets, revenues arising from damage compensation, revenues arising from electricity delivery suspension and other revenues.
- **Ukraine:** revenues for reactive energy.

## Quantities

Once the allowed revenue is calculated, the quantity of sold products needs to be established for the determination of the actual tariff. Overestimated or underestimated quantities may substantially

influence the level of tariffs. This is the reason why most of the regulators revise and finally approve the level of quantities to be used for determination of tariffs. In order to be transparent when calculating or approving tariffs, regulators should establish and publish criteria for revising or approving these quantities.

The table below provides an overview of the criteria implemented for revision and determination of quantities used for calculation of distribution tariffs.

Table 8 Sources of quantities used for electricity distribution tariff calculation

	Sources of quantities used for distribution tariff calculation
Albania	According to article 6 of the Methodology, the DSO submits the electricity balance and the balance for coincidence peak flow for the base year.
Bosnia and Herzegovina	<u>FERK</u> : based on DSOs' plans, taking into account electricity losses by voltage levels and classes and groups of consumption in the distribution system. The mentioned plans are an integral part of the electricity balance that is harmonized with the electricity balance of FBiH and ISO; <u>RERS</u> : on the basis of the electricity balance of the DSO. The NRA considers the electricity balance, the electricity distribution plan for each regulated company, and if it finds that the plan has not been done in accordance with the established balance sheet rules, the optimum utilization of the capacity, or if it is not harmonized with the Electricity Balance of Republika Srpska, it requires the regulated electricity company to make the necessary adjustments. <u>SERC</u> : A regulated undertaking performing the activity of electricity distribution is obligated to submit to SERC the power balance made on the basis of planning and historical data elements. The power balance contains electricity flows in the distribution network on an annual and monthly level, such as: electricity take-on from the transmission network, take-on from other distribution systems, generation on the distribution network, delivery to other distribution systems, electricity losses by voltage levels and consumption of final categories by consumption categories and groups. The above balance must be harmonized with an annual power balance that is done by the ISO in BiH.
Georgia	Forecasted volumes, based on national balance and trends from the past years.
Greece	Quantities relevant for calculating distribution tariffs (i.e. metered energy consumption, peak demand, capacity) are determined on the basis of forecasts produced by the DSO.
Kosovo*	Yearly energy balance
Moldova	Quantities forecasted by DSOs
Montenegro	The data for the energy component is taken from the Energy Balance of Montenegro adopted by the Government. The data for capacity component is taken from documentation that DSO is obliged to submit with the request. The legal basis is the Methodology for setting the allowed revenue and prices for use of distribution system ("Official Gazette of Montenegro", no. 43/2016 of 20.7.2016)
North Macedonia	Quantities forecasted by DSOs
Serbia	Electricity balance for the next year corrected by approved losses
Ukraine	Forecasted quantities determined based on actual quantities for the previous accounting year

From the information presented in the table above it can be concluded that in the majority of cases regulators prefer having a **concrete and provable source of data for quantities used for tariff calculation**, such as the energy balance. However, in most of the markets regulators also have the right to change the amounts of volume taken over from energy balances or other sources, for the purpose of tariff calculation.

## Correction

After expiry of the regulatory period regulators have the opportunity to calculate the difference between the allowed and actually earned revenue. These two values are always different due to the difference between planned and actual quantities, but also because of different planned and realized costs. The amount of over/under-recovery is then to be compensated in the next regulatory period.

The methodologies for the calculation of distribution allowed revenues and tariffs in all analyzed markets, except Moldova where calculation of the correction factor is based on both realized quantities and costs.

## Tariff design

Once the allowed revenue of a distribution system operator is determined, i.e. approved by the regulatory authority, the second part of the tariff methodology (sometimes also issued as a separate act) prescribes how this revenue will be recovered by charging different categories of system users. Tariff design is focused on efficient use of the distribution system, on one side, and on the cost-reflectivity of tariffs, on the other.

The present chapter summarizes the main features of tariff designs in the Energy Community Contracting Parties and Greece.

Table 9 *Distribution tariff elements and percentages of allowed revenue recovered through them*

	energy	% of AR recovered through energy	capacity	% of AR recovered through capacity	Fixed charge	% of AR recovered through fixed charge	other
Albania	yes	83%	yes	17%	no	-	-
Bosnia and Herzegovina	yes	EP BIH: 50.29% EP HZ HB: 49.73% ERS: 79.8% BRCKO: 65%	yes	EP BIH: 49.71% EP HZ HB: 50.27% ERS: 19.5% BRCKO: 35%	no	-	Yes, only RERS-0.7%
Georgia	yes	100%	no	-	no	-	-
Greece	yes	MV: 50% LV (residential):90% LV (other): 80%	yes <sup>33</sup>	MV: 50% LV (residential):10% LV (other): 20%	no	-	-
Kosovo*	yes	100%	no	-	no	-	-
Moldova	yes	100%	no	-	no	-	-
Montenegro <sup>34</sup>	yes	66.59%	yes	23.88%	yes	9.53%	-
North Macedonia	yes	90.59%	yes	9.41%	no	-	-
Serbia <sup>35</sup>	yes	66%	yes	32%	no	-	2%
Ukraine	yes	100%	no	-	no	-	-

Table 9 shows that capacity tariffs are charged in six out of ten analyzed markets. To the extent charged, they represent usually an only smaller percentage in comparison to the energy element. A fixed charge is used only in Montenegro, replacing the capacity charge for users connected at 0.4kV without capacity measurement. In one entity of Bosnia and Herzegovina (Republika Srpska) and in Serbia reactive energy is charged.

Where **capacity tariffs** are applied, they are calculated for the following users:<sup>36</sup>

<sup>33</sup> Capacity charge is based on peak demand for MV users and on subscribed capacity for LV users.

<sup>34</sup> Customers connected at 35 kV voltage level, customers at 10 kV voltage level and customers at 0.4 kV voltage level with power measurement - capacity charge; customers connected at 0.4 kV voltage level with two-tier metering without power measurement and customers at 0.4 kV voltage level with single-tier metering without power measurement – energy and fixed charge.

<sup>35</sup> Users on MV and on LV with a possibility of metering reactive energy are paying all three elements (energy, capacity and reactive energy), while the others on LV (consumer spending) are paying two elements (energy and capacity). For public lighting only the energy charge is applied.

<sup>36</sup> For Albania the information was not available.

- Bosnia and Herzegovina: all users except households and some commercial in EP BIH;
- Greece: all users;
- Montenegro: users at connected 35kV, 10kV and 0.4kV with power management;
- North Macedonia: for the users within the connection categories MV1, MV2 and LV1.2;
- Serbia: all except public lighting.

These capacity charges are billed per unit of customer load expressed in kW for:

- Connected capacity of customer's installation, usually for LV users (Bosnia and Herzegovina, Greece and Serbia),
- Registered peak load of customer's installation for a defined period of time (Greece, North Macedonia and Serbia) or
- Contracted capacity (Montenegro).

For the purpose of tariff calculation, different types of system users are defined and the typical criteria used for the classification are voltage level, consumption pattern or meter type. The table below shows how the **categories of system users** in the Contracting Parties and Greece, as well as the percentages of distribution allowed revenues typically assigned to these categories when calculating tariffs.

Table 10 *Classification of system users for the purpose of distribution tariff determination*

	Criteria for classification of system users	Categories of system users	Percentages of AR assigned to categories of system users
Albania	Voltage level	35kV 20/10/60kV 0.4kV	0.3% 15% 84.7%
Bosnia and Herzegovina	Voltage level Consumption pattern	EP BIH, EP HZ HB, Brcko: 35kV, 10(20) kV, 0.4kV households, 0.4kV public lighting and 0.4kV other RERS: 110kV, 35kV, 10kV, 0.4kV (7 tariff groups, 2 of them for households), public lighting	<u>35kV</u> : 2.21% EP BIH, 0.18% EP HZHB, 0.92% Brcko, 3.19% ERS <u>10(20)kV</u> : 7.84% EP BIH, 4.42% EP HZ HB, 8.63% Brcko, 13.88% ERS <u>0.4kV households</u> : 62.09% EP BIH, 63.66% HZ HB, 62.47% Brcko, 54.09% ERS <u>0.4kV other</u> : 24.46% EP BIH, 29.02% HZ HB, 23.19% Brcko, 21.72% ERS Public lighting: 2.57% EP BIH, 2.73% HZ HB, 4.79% Brcko, 2.13% ERS
Georgia	Residential- grouped based on monthly consumption level Non- residential- grouped by voltage level	Non- residential- HV Non- residential- MV Non- residential- LV Residential- 0-101kWh Residential- 101-301kWh Residential- 301 and more kWh	7.1% 17.2% 40.4% 1.4% 19.6% 14.3%

	Criteria for classification of system users	Categories of system users	Percentages of AR assigned to categories of system users
Greece	Voltage level For LV: size, metering, connection use	MV	8.8%
		Residential V	50.8%
		Non- residential LV (1) <sup>37</sup>	11.7%
		Non- residential (2) <sup>38</sup>	10.2%
		Non- residential (3) <sup>39</sup>	18.5%
Kosovo*	Voltage level Purpose of energy consumption- households, commercial, industrial	35kV	0.5%
		10kV	5.7%
		0.4kV	93.8%
Moldova	Voltage level	35-110kV	0.3%
		6-10kV	21.6%
		0.4kV	78.1%
Montenegro <sup>40</sup>	Voltage level Possibility of power measurement Type of metering	35kV	1.08%
		10kV	11.16%
		0.4kV with power measurement	11.64%
		0.4kV without power measurement and with two-tier metering	74.08%
		0.4kV without power measurement and with single-tier metering	2.05%
North Macedonia	Voltage level Purpose of consumption Takeover of electricity directly from busbars <sup>41</sup>	MV1- electricity taken over from MV busbars	0.52%
		MV2- not covered by MV1	4.64%
		LV1.1- electricity taken over from LV busbars for public lighting <sup>42</sup>	5.74%
		LV1.2- electricity taken over from LV busbars (commercial), not for public lighting	
		LV2- not covered by LV1 (households and commercial)	89.1%

<sup>37</sup> Subscribed demand >25kVA + peak demand + reactive energy metering.

<sup>38</sup> Subscribed demand >25kVA + peak demand.

<sup>39</sup> Subscribed demand >25kVA.

<sup>40</sup> customers at 35 kV voltage level, customers at 10 kV voltage level and customers at 0.4 kV voltage level with power measurement - capacity; customers at 0.4 kV voltage level with two-tier metering without power measurement and customers at 0.4 kV voltage level with single-tier metering without power measurement – energy and fixed charge.

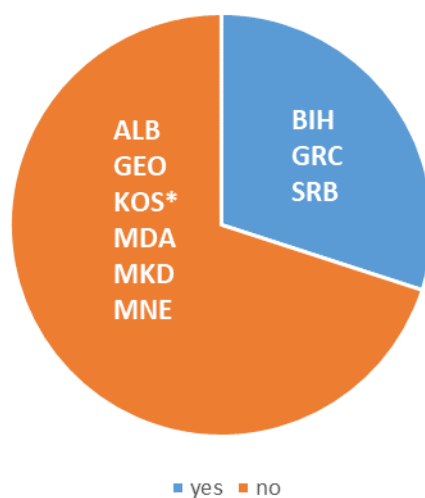
<sup>41</sup> For the users directly connected to the transformer stations, electricity taken is metered in the busbars.

<sup>42</sup> Public lighting charge is not calculated based on distribution allowed revenue, but set in accordance with the Law on communal taxes.

	Criteria for classification of system users	Categories of system users	Percentages of AR assigned to categories of system users
Serbia <sup>43</sup>	Voltage level Type of metering device Within LV user (consumer spending)- manner of metering, active energy takeover conditions and purpose of consumption	MV LV with a possibility of metering active power and reactive energy Consumer spending Public lighting	11.1% 14.6% 72.3% 2%
Ukraine	Voltage level	1 voltage class- 27.5kV and above 2 voltage class- less than 27.5kV	Not available

Finally, **time- of- use distribution tariffs** are implemented only to a limited extent in the analyzed markets; related information is provided in the figure below.

Figure 6 Application of time-of-use distribution tariffs



<sup>43</sup> Users on MV and on LV with a possibility of metering reactive energy are paying all three elements (energy, capacity and reactive energy), while the others on LV (consumer spending) are paying two elements (energy and capacity). For public lighting only an energy charge is applied.



## FINDINGS GAS

Albania, Kosovo\* and Montenegro do not have gas markets. Therefore, this part of the report does not include information on Kosovo\* and Montenegro; still, it covers the gas tariff methodology in Albania although not applicable yet. Information provided for Bosnia and Herzegovina refers to its entity Republika Srpska only, having in mind that the regulatory practice in the gas sector has been only introduced in this part of the country.<sup>44</sup>

### Type of regulation

Similar to product prices in all other regulated network industries, gas distribution tariffs can be determined by using different types of price control mechanisms:

- *Cost plus (or rate-of-return) regulation*, where tariffs are set in a way to cover the system operator's justified costs and include a rate of return i.e. a return on the capital invested;
- *Revenue or price cap regulation*, where revenues/prices are set in advance for a fixed period of several years ("regulatory period") allowing system operators to keep cost savings they are able to acquire during this period due to, e.g. increase of efficiency in system operation. Typically, yearly tariffs resulting from cap regulation only vary based on the level of inflation corrected by a predetermined percentage rate of efficiency growth<sup>45</sup>;
- *Other mechanisms*, such as yardstick regulation or performance based regulation; these models are, however, less widely spread compared to the previously mentioned mechanisms.

In the analyzed markets **cost plus and revenue cap regulation** are implemented. Cost plus regulation is normally performed on yearly basis,<sup>46</sup> while in the case of incentive based regulation

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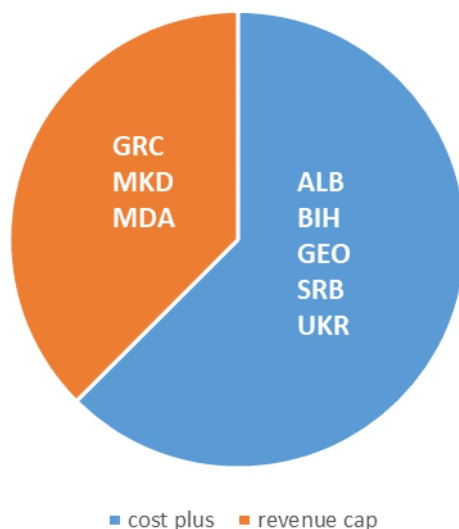
<sup>44</sup> In the Federation BIH, the competent entity Ministry performs the function of a regulator until the final establishment of an independent regulatory body competent for gas at the level of Federation BIH and/or state level. A gas law does not exist on state level in Bosnia and Herzegovina. Consequently, the competences of the State Regulatory Commission (SERC) and the entity regulator in the Federation BIH (FERK) still exclusively cover the electricity sector only.

<sup>45</sup> CPI-X regulation involves setting a price-path (price-cap regulation) for a utility, allowing for changes in inflation (the CPI factor) and expected efficiency improvements (the "X" factor; these efficiency improvements are separate from the economy-wide efficiency improvements already reflected in the change in the CPI). The "X" factor may incorporate other aspects in addition to the expected improvement in efficiency, such as rewards for improvements in output quality, service levels or demand management actions. CPI-X regulation may also be applied to total required revenue under revenue-cap regulation (Independent Pricing and Regulatory Tribunal (*Dennis Mahoney, Cato Jorgensen, Thomas Clay*), Incentives for cost saving in CPI-X regimes, July 2011).

<sup>46</sup> This however does not mean that tariffs are necessarily changed every year, but that the calculation base is one year. Tariffs are changed on the request of regulated company or when regulator concludes that basic parameters for allowed revenue and tariff calculation have been changed.

the revenues or prices are capped for different periods, namely for two<sup>47</sup> or five<sup>48</sup> years. The figure below provides an overview of the applied tariff regulation models.

Figure 7 *Type of implemented regulation in gas distribution*



## Allowed revenue and accounting guidelines

For all types of tariff regulation, **allowed revenues** need to be determined, i.e. costs allowed to be recovered via the network tariff. Eligible costs include justified and efficient operation and maintenance costs and capital costs, such as depreciation and return on assets. Allowed revenues also include the compensation of network losses as well as a correction factor addressing variations between the forecast and actual values.

In order to facilitate the process of allowed revenue calculation, some regulatory authorities require from regulated companies to prepare and submit separate regulated accounts that can to a certain extent differ from national statutory accounting standards. Such “regulatory accounting rules” (guidelines) should not create an additional burden for regulated companies but help them to understand the process of regulation and increase transparency.

Among the analyzed gas markets, in Bosnia and Herzegovina’s entity Republika Srpska, Moldova, North Macedonia and Serbia, the **regulatory authorities defined separate regulatory accounting guidelines**. In Georgia the accounting guidelines is under preparation.

<sup>47</sup> Greece.

<sup>48</sup> Moldova and North Macedonia.

## Operating and maintenance costs

Operating and maintenance costs (O&M costs) allow regulated companies to provide and maintain the adequate service level. Regulatory authorities recognize operating and maintenance costs in the allowed revenue but have to differentiate between justified and non-justified costs in order to avoid excessive and unnecessary costs being included in tariffs.

The assessment hereinafter analyses whether regulators apply **criteria** for recognition of operational expenditures in the allowed revenue defining which costs are considered justified/non-justified, predefining some costs as controllable and non-controllable<sup>49</sup> and/or predetermining limits for certain costs.

- Only in Moldova all operating and maintenance costs from statutory accounting are included in the allowed revenue for gas distribution.
- The regulators in other markets approve only justified and efficiently incurred costs.
- In North Macedonia the regulatory authority defined limits for some costs categories, for example that maintenance costs may not exceed 20% of annual depreciation costs or that gross salaries per employee may be recognized only to a level 40% higher than average gross salary in the country.

In case of incentive based regulation an **efficiency factor** is applied i.e. „*the regulator sets prices not on the basis of the company's actually incurred costs, but rather on a level of cost that the regulator considers efficient. The difference between actual costs and the regulatory estimation of efficient costs is reflected in the X factor. The X factor applies for a given number of years (the regulatory period) and determines the annual change in prices in such a way that prices move in line with the anticipated efficiency improvements. Through the X factor, consumers directly participate in the expected cost reductions in the form of lower price. On the other hand, the company will also benefit as long as it manages to reduce costs in excess of the X factor. The residual cost savings can then be retained in the form of higher profits.*”<sup>50</sup> As mentioned above, **incentive base regulation for gas distribution** is applied only in Greece, Moldova and North Macedonia.<sup>51</sup> However the efficiency factors are still not in use.

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<sup>49</sup> Non- controllable costs, if recognized as such, are normally automatically included in the allowed revenue.

<sup>50</sup> *Efficiency factor's determination (X factor)*, Issue paper of ERRA Tariff/Pricing Committee, prepared by KEMA International B.V. in August 2006, please see more on X Factor determination on [http://www.erranet.org/Library/ERRA\\_Issue\\_Papers#2](http://www.erranet.org/Library/ERRA_Issue_Papers#2).

<sup>51</sup> North Macedonia: smoothing factor (SX) for the regulatory period is applied to the annual building blocks.

## Return on assets

In order to recognize owner's investment in the regulated company, the allowed revenue always includes **return on assets**. Return on assets is measured by multiplying the rate of return with the value of the regulatory asset base.

### 1. Regulatory asset base

The **regulatory asset base (RAB)** aggregates net asset values of fixed assets and sometimes current assets (also called working capital), excluding capital contributions, sometimes also assets under construction<sup>52</sup>. Asset valuation is an important element of RAB determination. Some regulatory authorities therefore prefer using their own asset valuation methodology. In any case all regulatory authorities have a discretionary right to define and decide which assets belong to the regulated business and, to avoid sunk investments, which investments are justified.

An overview of **RAB structures and asset valuation** are presented below. It has to be highlighted that currently the process of allowed revenue determination in Ukraine does not apply the concept of RAB related calculation of return. Calculation of allowed revenue for distribution is done by taking into account reasonable costs and planned profit (not determined as rate of return on capital employed). Therefore, the information on Ukraine in this and the following chapter will be only selective, as appropriate. When providing information on RAB, this consequently does not include Ukraine.

Table 11 *Role of regulators in evaluating gas distribution assets*

	Has the regulator right to re-evaluate assets if deems necessary?	Have assets been re-evaluated in the process of tariff regulation?
Albania	no	no
Bosnia and Herzegovina-RS	yes	yes
Georgia	yes	yes
Greece	yes	no
Moldova	no	yes
North Macedonia	yes	no
Serbia	no	yes
Ukraine	not applicable	

<sup>52</sup> Assets not yet commissioned, i.e. not yet in use.

The regulatory authorities of Bosnia and Herzegovina-Republika Srpska, Georgia, Greece and North Macedonia have the legal power to re-evaluate assets of regulated companies. This right has been exercised so far in Bosnia and Herzegovina and Georgia. In Moldova and Serbia the companies re-evaluated the assets on their own initiative before submitting request for tariff approval.<sup>53</sup>

In most of the investigated markets the regulatory authorities **approve investment plans of distribution system operators ex-ante** except for in Bosnia and Herzegovina and Georgia. Nevertheless, all regulators monitor their implementation.

The realization of investment plans influences the value of RAB only to the extent the allowed revenue includes some investments in advance, i.e. before commissioning of assets. In the majority of analyzed gas markets, namely in Albania, Bosnia and Herzegovina- Republika Srpska, Greece, North Macedonia and Serbia, **assets under construction** are included in the RAB. In Albania, Greece and North Macedonia these assets are included ex-ante, based on investment plans or estimated costs as a tool for incentivizing investments, while in Serbia only the part of an asset under construction that is planned be commissioned in the regulatory period is included in the RAB.

Another very important element of RAB calculation are **capital contributions**, i.e. grants from e.g. the government or an international institution and direct payments by asset users, in case of networks typically connection assets. Normally the assets financed from such contributions are excluded from the RAB, in order to avoid return on assets that are not the result of the regulated company's investment. In some cases however, depreciation of these assets is allowed with a view to enable replacing of the assets in the future.

In all analyzed Energy Community markets the capital contributions are always excluded from the RAB by the regulators. The special rule apply in Georgia: if capital contributions make only part of an asset value, then the remaining value (which is funded by company itself) is included in RAB. On the other side, if an asset is fully funded by capital contributions, then the value in RAB is 0. The depreciation of capital contributions is included in the RAB by majority of regulators, but not by those of Greece and Moldova.

Other elements considered for calculation of the RAB are intangible assets and working capital. **Intangible assets** are long-term resources of the company, but have no physical existence. They derive their value from intellectual or legal rights and from the value they add to the other assets.<sup>54</sup> When determining the RAB some regulatory authorities decide not to include the value of these assets. However, the regulators of the Energy Community gas markets decided to include intangible assets in the RABs for distribution companies.<sup>55</sup> **Working capital**, defined as difference

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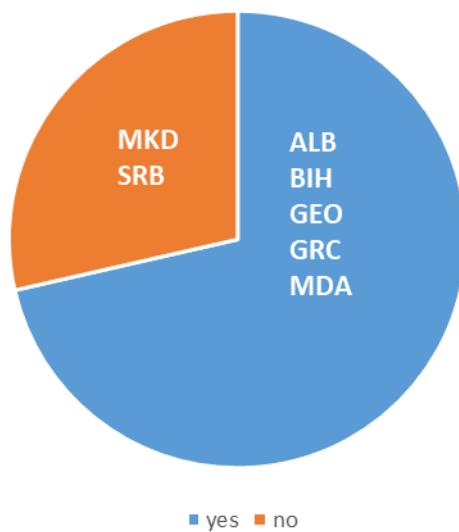
<sup>53</sup> In Serbia, in accordance with International Financial Reporting Standards, the companies have the right to reevaluate their assets temporary in case of high inflation or some other deviation that influences the value of assets.

<sup>54</sup> Examples are patents, copyrights, goodwill.

<sup>55</sup> Albania is here the only exception.

between company's current assets<sup>56</sup> and current liabilities<sup>57</sup> is also sometimes excluded from RAB. The graph below shows details on these aspects.

Figure 8 Treatment of working capital in RAB for gas distribution



Finally, once the RAB has been calculated for the regulatory period, it may be adjusted on yearly basis in case of incentive based regulation - as shown above, this is the case in Greece, Moldova and North Macedonia. The table below provides explanations on the chosen approaches chosen by regulatory authorities of these markets.

Table 12 Treatment of RAB during the regulatory period- gas distribution

	Treatment of RAB during the regulatory period
Greece	Automatic adjustments of RAB (and tariffs) according to PCI
Moldova	Tariff deviations are included in next year's tariff
North Macedoania	Not adjusted during the regulatory period

<sup>56</sup> Assets that will be turned into cash within a year.

<sup>57</sup> Liabilities that will be repaid within a year.

While the purpose of incentive based regulation, in principle, is to allow revenues remaining unchanged during the regulatory period and therefore allowing regulated utilities to consume the benefits of cost reductions during that time, the approaches of Greek's and Moldova's regulator has to be assessed very positively against incentivizing investments.

## 2. Rate of return

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Regulated service providers have only interest to invest if the recognized return allows them to cover costs of equity and debt finance needed for the realization of the envisaged projects. Therefore, the rate of return regulators determine has to take into consideration the credit conditions available to particular regulated companies but also to comparable industries since the utilities in the energy sector do not only compete among themselves for financing sources. Furthermore, the rate of return has to enable investors to cover their finance (equity) requirements and secures at least the risk-free rate of interest plus a risk premium reflecting risks specific for the particular sector of energy industry.

The **Weighted Average Cost of Capital (WACC)** is a commonly used method for calculation of the rate of return in regulated energy business. As the name suggests, it reflects weighted average of the cost of each individual component of the capital structure.<sup>58</sup> WACC may be determined as pre-tax or post-tax figure. Pre-tax WACC allows not only coverage of finance cost but also tax coverage. Post-tax WACC assumes that the utility already paid the tax. For the estimation of costs of equity usually the Capital Assets Pricing Model is applied.<sup>59</sup>

The regulatory authorities of the analyzed markets reported figures for real pre-tax WACC for gas distribution, including the relevant components for its calculation and they are presented in the table below. As mentioned in the previous chapter, Ukraine does not implement the concept of RAB and return on assets; consequently there will be no related information on Ukraine in this chapter. The regulatory authority of Albania has not calculated tariffs so far, therefore there is no information on rate of return.

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<sup>58</sup> Weight is the share of capital component.

<sup>59</sup> For more details on WACC calculation please see e.g. <https://corporatefinanceinstitute.com/resources/knowledge/finance/what-is-wacc-formula> or [http://regulationbodyofknowledge.org/wp-content/uploads/2013/03/Jenkinson\\_Regulation\\_and\\_the.pdf](http://regulationbodyofknowledge.org/wp-content/uploads/2013/03/Jenkinson_Regulation_and_the.pdf).

Table 13 WACC and its components for gas distribution (all in %)

	WACC (real, pre-tax)	Gearing (debt/(debt+equity))	Return on equity	Return on debt	Risk free rate	Beta coefficient	Market return
Bosnia and Herzegovina-RS	Information not available						
Georgia <sup>60</sup>	13.54%	60%	14.75%	11%	7.50 %	1	7.25%
Greece <sup>61</sup>	9.23%	0%	9.23%	0%	0.36 %	0.42	5.23%
Moldova	9.51%	35%	10.49%	5.02%	2.33 %	0.46	3.09%
North Macedonia	6.7889%	0%	6.11%	0%	2.72 %	1	6.11%
Serbia	7.77%	60%	10 (after tax)	5.1%	4.2%	0.8	6%

Table 14 Shares of the allowed return in the allowed revenues for distribution

	Shares of allowed return in the allowed revenues for distribution (based on the last calculated revenue)
Bosnia and Herzegovina-RS	0-4%
Georgia	Not available
Greece	39.2-47.5%
Moldova	9.51%

<sup>60</sup> Information on nominal WACC available only.

<sup>61</sup> Information on nominal WCC available only.



	Shares of allowed return in the allowed revenues for distribution (based on the last calculated revenue)
North Macedonia	0-14.61%
Serbia	1-44% <sup>62</sup> .

Regulatory authorities of the majority of analyzed markets do not have any influence on the **use of allowed return** by the distribution system operators. The exceptions are Albania and Ukraine, where certain parts of the return have to be used for investments. Although in Ukraine the concept of return is not related to the value of assets, the regulatory authority allows a profit share (which depends in particular on capital investments for developing operational activity) as part of the allowed revenue.<sup>63</sup>

With the exception of the abovementioned recognition of investments *ex ante*,<sup>64</sup> the regulatory authorities do not apply specific **investment incentives**, pointing out that the adequate rate of return is an appropriate incentive *per se*. The exception is the Greek regulator that envisaged application of WACC premium.

## Depreciation

Depreciation is an allocation of asset costs to the accounting period in which the asset provides benefits to the company. The purpose of calculating depreciation is building up funds for the replacement of assets. There are a number of approaches for calculating depreciation, but the most widely used is straight-line/linear depreciation where the asset is written off every year with the same amount. In order to quickly write off an asset and therefore return the invested capital sooner, some regulators use accelerated depreciation where yearly deductions are greater in the first years of asset use. It has to be noted that depreciation used for regulatory tariff setting can deviate from national tax law depreciation rules. The regulatory authorities of the analyzed markets use mostly **straight-line depreciation** and there is usually no **differentiation between assets acquired before and during the regulatory period**. Only in Georgia, the regulator uses different norms for assets created before and after 2015: for those commissioned before 2015 the companies' norms are used, for those obtained later, the regulator applies its own norms set by the tariff methodology. In some cases (Georgia, Greece, Moldova and Serbia) the regulators determine the asset lives

<sup>62</sup> This figures are not representative as there is a huge influence of correction element on the total amount of allowed revenue.

<sup>63</sup> Percentage of costs instead of value of assets.

<sup>64</sup> Albania and North Macedonia.

that are used in the allowed revenue calculation. Details on the depreciation methods for gas transmission and distribution are shown in the table below. The information on asset lives in straight-line depreciation explains how quickly the asset costs are actually recovered.

Table 15 *Depreciation of gas distribution assets*

	Depreciation method applied	Does the regulator define asset lives for the regulatory purposes?	Asset lives (in years)
Albania	Straight- line	no	Pipelines 45-65 Compressors 25 Metering equipment 25
Bosnia and Herzegovina-RS	Straight- line	no	Pipelines 30-40 Metering-regulation station 10-20
Georgia	Straight- line	yes	Pipelines 30-45 Compressors 25 Metering equipment 10
Greece	Straight- line	yes	Pipelines 20 Compressors 20 Metering stations 40
Moldova	Straight- line	yes	Pipelines 20-25 Compressors 40-45 Metering stations 28-30
North Macedonia	Straight- line	no	Pipelines 40 Compressor 20
Serbia	Straight- line	yes	Pipelines and compressors 40 Metering and regulation station 25, for households 20
Ukraine	Straight- line	no	Pipelines 20-40, technical equipment 5-16

## Losses

During the transport of gas through a gas network, energy is lost due to physical and non-physical reasons. Therefore, there are 2 types of network gas losses:

- *Technical losses* due to gas leaks and
- *Non-technical losses* i.e. consumed energy that cannot be billed to an end user. Reasons for these losses include: imprecise or incorrect readings and fraud.

Network operators are responsible for the compensation of losses. They purchase appropriate quantities of energy. The costs of network losses are mostly controllable in a long-run, but not in a short-run, e.g. during the regulatory period. The way they are included in the allowed revenue (if included at all) can be different, e.g. as part of operating costs<sup>65</sup> or as separate allowed revenue category.<sup>66</sup> In any case, the regulator has to ensure network efficiency, not only by recognizing a certain amount of losses, but also by stimulating network operators to reduce them.

The table below provides information on the **definition and criteria** applied by the regulators of the analyzed markets for recognizing losses in the allowed revenue for gas distribution and provides figures for **allowed losses and applicable prices** that are used for defining the allowed cost. Related results are presented in the table below.

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<sup>65</sup> In case of incentive based regulation the applied efficiency factor then also relates to costs of losses.

<sup>66</sup> The maximum value is set for the amount of losses as well as the rule applicable for purchase price.

Table 16 *Recognition of losses in the allowed revenue for gas distribution*

	Are costs related to network losses recognized?	Are both technical and non- technical losses recognized?	Criteria for recognition of losses in the AR	How is price for allowed losses determined?
Bosnia and Herzegovina -RS	yes	yes		Estimated procurement price of natural gas in the regulatory period
Georgia	yes	yes <sup>67</sup>		DSOs buy gas for losses from major suppliers at the fixed price. Transmission tariff is then added to that price.
Greece	Information not available			
Moldova	yes	yes	The losses in one year cannot be higher than those in the last year	Taking into account gas purchase price, transport and supply price
North Macedonia	yes	yes	The allowed rate of losses of 0.7% is set by the tariff methodology for all DSOs.	Procurement of gas for covering losses is done through a transparent tendering procedure and the required quantities are procured on the liberalized market. The average price for allowed losses is market based.
Serbia	yes	yes	Justified rate of losses is calculated taking into consideration: realized losses in the last 3 years, analysis of the system, benchmarks with other DSOs in the country and in the region, operational life of pipelines, pipes material, quality of gas, plan for losses reduction and realization of measures for losses reduction.	Weighted average justified purchase natural gas market price for losses recovery (including all valid affiliated costs for purchase)
Ukraine	yes	Yes, except fraud	The losses in one year cannot be higher than those in the last year. NRA can use an efficiency coefficient up to 5% to reduce the losses.	Actual prices for non-households consumers

<sup>67</sup> Commercial losses are initially accepted within the normative losses and then logarithmically reduced for the next years.

The costs related to network losses are **recognized in the allowed revenue** for gas distribution in all analyzed markets. The definitions of distribution losses do not distinguish between technical and non-technical (commercial) losses i.e. they simply calculate the difference between input and output of gas.

When calculating the level of losses-related costs in the allowed revenue, regulators use different **supply or purchase gas prices** – including affiliated purchase costs and transmission charges for distribution losses.

Currently allowed percentages of losses in transmission and distribution networks are presented in the table below.

Table 17 *Allowed levels of losses for calculation of distribution tariffs (in 2018)*

	Allowed levels of losses (range for more DSOs, if separately defined)
Bosnia and Herzegovina-RS	2.5% - 3%
Georgia	5% - 10%
Greece	Information not available
Moldova	3.4%
North Macedonia	0.7%
Serbia	2%

## Deducted revenues

Distribution system operators may earn revenues from non-regulated activities performed by using the same assets already included in RAB, e.g. revenues from selling short-term capacities or from (re-)connection. In order to avoid double earnings from the same assets, the regulators often deduct such non-regulated revenues from the regulated allowed revenue.

With the exception of Bosnia and Herzegovina, Moldova and Ukraine, all regulatory authorities deduct some non-regulated revenues from the distribution allowed revenue:

- **Albania:** own work capitalized, interest and investment income, grid connection cost;
- **Georgia:** revenues from renting rooms in administrative buildings, special vehicles making some revenues on contracts outside regulated activity, extra amounts of connection fees, reconnection fees, cell phone company antennas installed on the roofs of their administrative buildings etc.;
- **Greece:** revenues from non-regulated activities;
- **North Macedonia:** connection charges;

- **Serbia:** revenues from activation of own goods and outputs, gains arising from sale of regulated assets, revenues arising from issuing approvals with conditions for works in protected area around the pipeline, revenues arising from compensations, revenues incurred by suspension of natural gas delivery and other revenues.

## Quantities

Once the allowed revenue is calculated, the quantity of sold products needs to be established for the determination of the actual tariff. Overestimated or underestimated quantities may substantially influence the level of tariffs. This is the reason why most of the regulators revise and finally approve the level of quantities to be used for determination of tariffs. In order to be transparent when calculating or approving tariffs, regulators should establish and publish criteria for revising or approving these quantities.

The table below provides an overview of the criteria implemented for revision and determination of quantities used for calculation of distribution tariffs.

Table 18 Sources of quantities used for gas distribution tariff calculation

	Sources of quantities used for distribution tariff calculation
Albania	The company presents the forecasted quantity taking into consideration the actual quantities realized in the periods t-2 and t-1
Bosnia and Herzegovina	According to the companies' reports for the previous and based on business plans for the next period
Georgia	Forecasted quantities, taking into consideration Forecasts for the Annual Balances of Gas Supply approved by the Ministry of Energy and historical data.
Greece	Information not available
Moldova	DSOs deliver the information on the volume of the distributed gas (according to the statistic yearly evolution)
North Macedonia	Based primarily on the energy balance, customer surveys and system operator forecasts
Serbia	The company plans and correlation with expectations and activities in the next regulatory period
Ukraine	The company presents the forecasted quantity taking into consideration the actual quantities distributed in the periods t-3, t-2 and t-1 and their predicted changes.

From the information presented in the table above it can be concluded that in the majority of cases regulators receive companies' forecasts/plans and then revise them in line with realized quantities of previous years or expectations. Sometimes also the national energy balances are consulted for establishing realistic forecasts.

## Correction

After expiry of the regulatory period regulators have the opportunity to calculate the difference between the allowed and actually earned revenue. These two values are always different due to the difference between planned and actual quantities, but also because of different planned and realized costs. The amount over over/under-recovery is then to be compensated in the next regulatory period.

The methodologies for the calculation of distribution allowed revenues and tariffs in all analyzed markets envisage calculation of a correction factor based on both realized quantities and costs.

## Tariff design

Once the allowed revenue of a distribution system operator is determined i.e. approved by the regulatory authority, the second part of the tariff methodology (sometimes also issued as a separate act) prescribes how this revenue will be recovered by charging different categories of system users. Tariff design is focused on efficient use of the distribution system, on one side, and on the cost- reflectivity of tariffs, on the other.

The present chapter summarizes the main features of tariff designs in the Energy Community Contracting Parties and Greece.

Table 19 *Distribution tariff elements and percentages of allowed revenue recovered through them*

	Energy/ Commodity	% of AR recovered through energy	capacity	% of AR recovered through capacity	Fixed charge	% of AR recovered through fixed charge	other
Albania	yes	30% <sup>68</sup>	yes	70%	no	-	-
Bosnia and Herzegovina <sup>69</sup>	yes	79%	no	-	yes	21%	-
Georgia	yes	100%	no	-	no	-	-
Greece	yes	80%	yes	20%	no	-	-
Moldova	yes	100%	no	-	no	-	-
North Macedonia	yes	100%	No	-	no	-	-

<sup>68</sup> According to the methodology the grid tariff for exit points from the distribution grid shall consist of an annual demand rate in ALL/kW and an energy rate in ALL/kWh. For off-take without load profiling in the distribution grid, an energy rate in ALL/kWh shall be determined instead of a demand rate and an energy rate. To the extent that a monthly basic price in ALL/month is determined, this basic price and the energy rate shall be in reasonable proportion to each other

<sup>69</sup> Different types of beneficiaries have different tariff rates and depend on the share of the types of the beneficiaries in the maximum capacity at the level of the system, and are accordingly the share of total revenues are determined which are later on re-allocated to consumption of some types of beneficiaries.

	Energy/ Commodity	% of AR recovered through energy	capacity	% of AR recovered through capacity	Fixed charge	% of AR recovered through fixed charge	other
Serbia	yes <sup>70</sup>	70%	yes	30%	no	-	-
Ukraine	yes	100%	no	-	no	-	-

Table 19 above shows that capacity tariffs are charged<sup>71</sup> in three out of eight gas markets and a fixed charge only in Bosnia and Herzegovina.

Where capacity charges are used, the following units apply:

- **Albania:** kW (maximal capacity used in the previous period)
- **Greece:** MWh/year (maximal booked or forecasted capacity)
- **Serbia:** m3/day/year (maximal capacity used in the previous period)

For the purpose of tariff calculation, different types of system users are defined and the typical criteria used for the classification are pressure level, consumption pattern, purpose of consumption or meter type. The table below shows the categories of system users in the Contracting Parties and Greece, as well as the percentages of distribution allowed revenues typically assigned to these categories when calculation tariffs.

Table 20 *Classification of system users for the purpose of distribution tariff determination*

	Criteria for classification of system users	Categories of system users	Percentages of AR assigned to categories of system users
Albania	Still not defined/applicable		
Bosnia and Herzegovina	Purpose of consumption	Households commercial customers industrial customers remote heating	39% 18% 12% 31%
Georgia	No classification- uniform tariff applied		
Greece	Purpose of consumption	Households Commercial Industrial	Information not available
Moldova	Pressure level	0.3-1.2 MPa 0.005-0.3 MPa <0.005 MPa	0.008 0.242 99.75

<sup>70</sup> The distribution tariff for the group of delivery points „small consumption” contains only “energy” element.

<sup>71</sup> Or to be charged in Albania.



	Criteria for classification of system users	Categories of system users	Percentages of AR assigned to categories of system users
North Macedonia	Purpose of consumption	1) Producers of thermal energy with public service obligation 2) Combined cycle power producers 3) Households 4) Other gas consumers	Not available <sup>72</sup>
Serbia	Pressure level Purpose of consumption, consumption pattern	$p < 6$ bar $6 \leq p \leq 16$ bar	39% 61%
Ukraine	Without differentiation		

<sup>72</sup> There is only very small number of customers connected to the distribution system i.e. distribution network under development.

# SUMMARY OF RESULTS

Regulation of energy network industry follows similar principles and criteria for determining network tariffs and, where applicable, end- user prices in all analysed markets. The main findings of this report can be summarized as follows:

## Network regulation

1. The most frequently applied price control mechanisms implemented in both the electricity and gas sector are **cost- plus (rate of return) regulation or revenue- cap regulation**; price- cap regulation is used in only one case for electricity, whereby also hybrid models apply for electricity in limited number of cases.
2. For all types of tariff regulation the **allowed revenue** is determined. This report analysed the criteria applied for determining the elements of allowed revenue which are justified operation and maintenance costs, capital costs, compensation for network losses as well as a correction factor addressing variations between the forecast and actual values.
3. In order to facilitate the process of allowed revenue calculation, some regulatory authorities request from regulated companies to prepare and submit separate regulated accounts that to a certain extent differ from national statutory accounting guidelines. Such **regulatory accounting rules** are used in Albania, Bosnia and Herzegovina, Greece, Kosovo\*, Montenegro, Moldova (for gas), North Macedonia and Serbia.
4. When recognizing **operating and maintenance costs** in the allowed revenue of a regulated company, regulatory authorities have to ensure maintaining an appropriate level of service, but also to avoid excessive costs being included in the tariff. Deviating from this principle, in Kosovo\* for electricity and in Moldova for gas the regulator includes all operating and maintenance costs from statutory accounting in the allowed revenue. In all other markets some categories of costs are pre-defined as justified or non-justified, controllable or non-controllable (and therefore pass- through) and usually subject to regulator's estimation. In North Macedonia the tariff methodologies include even limits for certain cost categories, such as maintenance and labour costs. In case of incentive- based regulation an **efficiency factors for electricity** are applied (1.5% in Georgia and Kosovo\*, 0.2CPM in Moldova, 1.67% in Montenegro).
5. **Return on assets** is typically calculated as a product of the regulatory asset base and rate of return in almost all investigated markets. The exception is Ukraine, where the calculation of allowed revenue is done by taking into account reasonable level of costs and projected profit, not determined as a return on capital employed.
6. Having in mind the substantial impact of the value of the **regulatory asset base** on the return on assets and therefore on the final tariffs, regulatory authorities in the majority of markets have the right to re-evaluate assets for the purpose of tariff determination (Bosnia and Herzegovina, Georgia, Greece, Kosovo\*, Montenegro, North Macedonia). However this right has not been exercised by all regulators.

7. In almost all analyzed markets the regulatory authorities approve ex-ante investment plans and monitor their implementation. The realization of investment plans influence the value of the regulatory asset base to the extent the allowed revenue includes some investments in advance, which is the case in Montenegro and North Macedonia, as a way for incentivizing investments; in Bosnia and Herzegovina-Republika Srpska and Serbia where only part of an investment that will be commissioned in the regulatory period is recognized.
8. Some other assets are also considered when deciding on the structure of regulatory asset base, such as **intangible assets** (recognized in the allowed revenues by regulatory authorities of all analysed markets except Albania and Kosovo\* for electricity) and **working capital** (recognized in the allowed revenues for electricity and gas by regulatory authorities of Albania, Bosnia and Herzegovina, Georgia, Greece, Moldova and Montenegro).
9. Capital **contributions**, such as direct payments by asset users or different grants by governments or other institutions, are excluded from the regulatory asset base in all analyzed markets, in order not to allow earning return on assets not financed by the regulated company. However depreciation of such assets is sometimes allowed.
10. Finally, the regulatory asset base may be adjusted on yearly basis in case of incentive-based regulation; this is the case in Albania and Moldova (for the purpose of including commissioned investments), in Montenegro and Greece (for gas only).
11. Weighted average cost of capital, as commonly used method for calculation of the **rate of return** in regulated energy business, is applied in all analyzed markets. The resulting rate of return levels in the electricity sector range from 3.34% in Bosnia and Herzegovina-Republika Srpska to 12% in Kosovo\*. In the gas sector, these values are the lowest in North Macedonia (6.79%) and highest in Moldova (9.51%).<sup>73</sup>
12. With the exception of investment being approved in advance – which is the case in North Macedonia and Montenegro in electricity and Albania and North Macedonia in gas –, the regulatory authorities of the analysed markets do not apply specific **investment incentives**. Only in Greece, for Projects of Common Interest a WACC premium and special depreciation rates are applied.
13. When calculating **depreciation**, the regulatory authorities of the analyzed markets mostly use straight-line depreciation. In some cases they also determine the asset lives to be used for the allowed revenue calculation; in other cases common accounting rules apply.
14. Definition and criteria for recognizing costs of **losses** in the allowed revenue of all regulated activities do not differ substantially between the analysed markets. Exceptionally, costs for compensating losses are not included in the allowed revenue for electricity distribution in Greece. When deciding on the level of losses allowed in the regulated revenue, the regulators of the investigated markets usually analyze the level of realized losses in the previous years and plans for their decrease as well as the characteristics of the networks. In order to calculate the level of relevant costs, the regulators need also to define a price of the electricity and gas used for valuating losses and this is usually purchase price of energy (in North Macedonia market-based price for electricity and gas losses is applied). Currently allowed levels of losses in the electricity sector range from 5.81% in Georgia (the lowest of

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<sup>73</sup> The highest WACC is reported for Georgia (13.54%) but this is nominal value, while other are real and therefore a comparison is not serious.

- the range) to 18.8% in Kosovo\*. In gas sector the levels of recognized losses are from 0.7% % in North Macedonia to 10% in some cases in Georgia.
15. Once the allowed revenue for the regulated companies is calculated by including all justified costs, some regulatory authorities deduct the **revenues earned from non-regulated activities** (e.g. congestion or reconnection), with a view to avoid double earnings from the same assets. In electricity sector this is the case in majority of countries (but not in Moldova) and in gas sector in Albania, Georgia, Greece, North Macedonia and Serbia.
  16. In order to calculate tariffs, the regulators need to establish the **volumes of energy** to be used in the relevant process. In the majority of the analyzed markets the regulators prefer having a concrete and provable source of data for quantities used for tariff calculation, such as the energy balance or concluded contracts. For gas distribution, forecasts of companies are often used. However, in most of the markets regulators also have the right to change the reported volumes, especially in order to take into account the real market transactions.
  17. After expiry of the regulatory period the regulatory authorities calculate the difference between the allowed and actually earned revenue and the amount of resulting over- or under-recovery is then compensated in the next regulatory period. The regulatory authorities of the analyzed markets mostly calculate the **correction factor** based on both realized volumes of transported energy and realized costs.

## Tariff design

18. For electricity distribution, capacity tariffs are charged in six out of ten analyzed markets and, also in cases when charged, represent usually smaller percentage in comparison to energy element. A fixed charge is used only in Montenegro that is replacing the capacity charge for users connected at 0.4kV without capacity measurement. In one entity of Bosnia and Herzegovina (Republika Srpska) and in Serbia reactive energy is charged. To the extent charged, capacity tariffs are usually set for the majority of customer categories, except for public lighting (in Serbia) and households (in Bosnia and Herzegovina).
19. For gas distribution, capacity tariffs are charged in three out of eight analyzed markets (Albania, Greece and Serbia); a fixed charge is used only in Bosnia and Herzegovina.
20. Criteria for customer categorization for the purpose of calculation electricity distribution tariffs are typically voltage level, type of metering device and purpose of consumption. For gas, these criteria are the pressure level, purpose of consumption and, sometimes, consumption patterns (Serbia)
21. Time-of-use tariffs are applied in the electricity distribution tariff design only to a limited extent, namely in Bosnia and Herzegovina, Greece, Montenegro and Serbia.