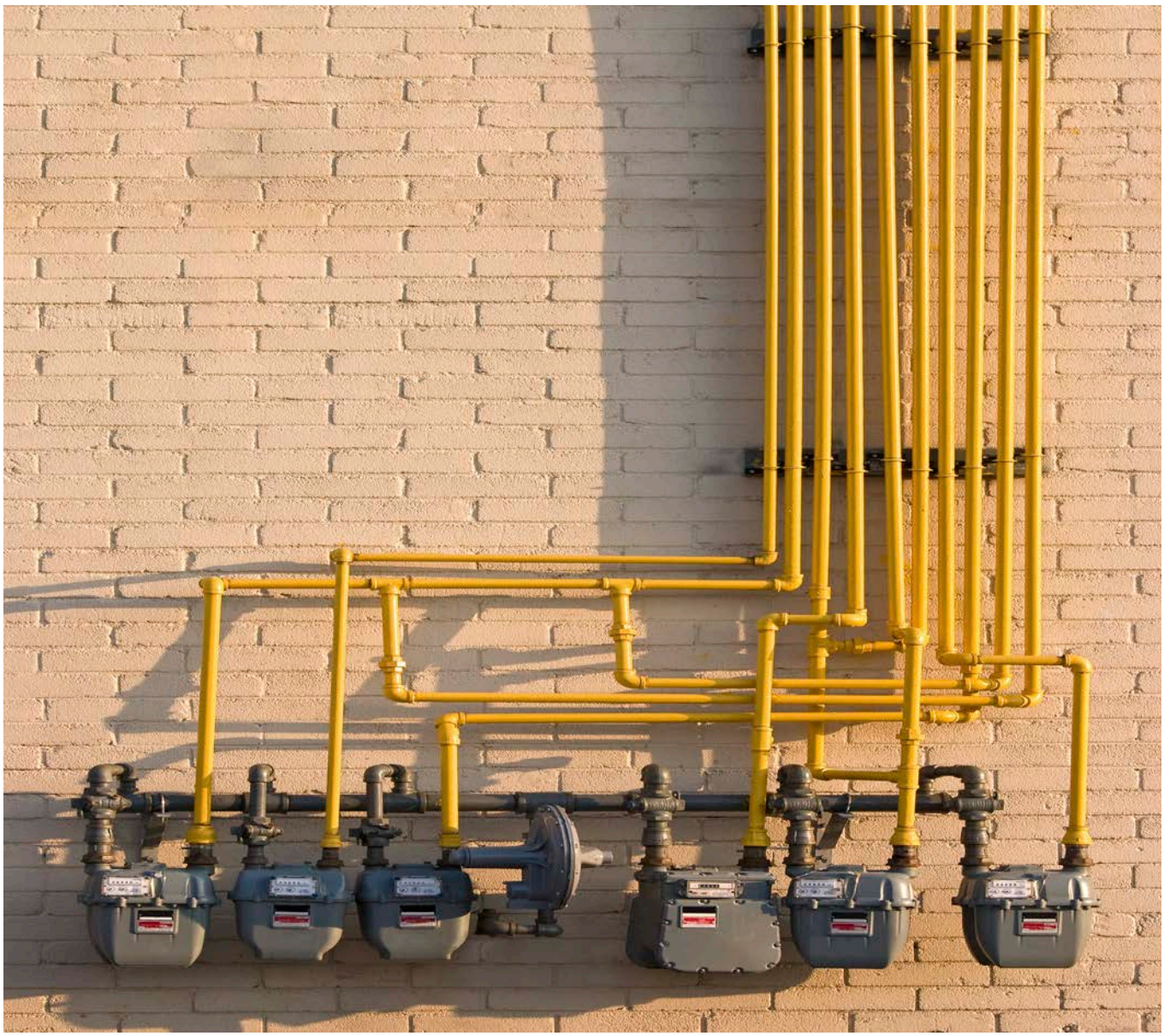

Regulatory Treatment of Distribution Network Losses in the Energy Community

December 2016

Content

I. INTRODUCTION

1. About ECRB

The Energy Community Regulatory Board (ECRB) operates based on the Energy Community Treaty. As an institution of the Energy Community[1] the ECRB advises the Energy Community Ministerial Council and Permanent High Level Group on details of statutory, technical and regulatory rules and makes recommendations in the case of cross-border disputes between regulators.

ECRB is the independent regional voice of energy regulators in the Energy Community. ECRB's mission builds on three pillars: providing coordinated regulatory positions to energy policy debates, harmonizing regulatory rules across borders and sharing regulatory knowledge and experience.

2. Background and scope

Acknowledgement of technical and/or commercial losses in energy infrastructure tariffs determination is important in particular in countries where comparably high levels of technical/commercial losses occur. Learning from other countries' experience shall contribute to reaching a harmonized regulatory approach.

The present report reviews the practice in the Energy Community with regard to the regulatory treatment of losses that exist on natural gas infrastructure (storage, transmission, distribution). Since losses are particularly significant on distribution level and substantially lower on transmission level and also bearing in mind not all countries have storage facilities, this analysis focuses on distribution level.

3. Methodology and scope

The report covers Bosnia and Herzegovina, Georgia, Moldova, FYR of Macedonia, Serbia and Ukraine as Energy Community Contracting Parties as well as Austria, Croatia and Poland as EU countries neighboring the Energy Community Contracting Parties.

Albania, Kosovo* and Montenegro are not included in the present report due to absence of gas infrastructure in these markets.

[1] www.energy-community.org. The Energy Community comprises the EU and Albania, Bosnia and Herzegovina, Macedonia, Georgia, Kosovo*, Moldova, Montenegro, Serbia and Ukraine. Armenia, Turkey and Norway are Observer Countries. [**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 Opinion on the Kosovo declaration of independence*].

II. FINDINGS

The present paper compares the actual practices implemented in the Energy Community Contracting Parties and some neighboring EU Member States with respect to regulatory treatment of distribution network losses.

1. Methodology of distribution use of system regulation

The **methodology for setting distribution system charges** influences the way distribution system losses are treated. As illustrated in the table below, most countries use the cost plus method, namely Bosnia and Herzegovina, Georgia, Serbia and Ukraine, while the regulatory authorities of Croatia and Moldova apply a revenue cap methodology, FYR of Macedonia and Austria[2] a price cap methodology and Poland a model that can reportedly be considered as cost of service with elements of revenue cap.

Table1 Methodology for setting distribution system charges

Contracting Party	Cost plus	Revenue cap	Price cap	Other
Bosnia and Herzegovina	X			
FYR of Macedonia			X	
Georgia	X			
Moldova		X		
Serbia	X			
Ukraine	X			
EU Ms	**Cost plus**	**Revenue cap**	**Price cap**	**Other**
Austria			X	
Croatia		X		
Poland				X

[2] If total losses (including measurement errors) are below 2%, costs for network losses are treated on a cost-plus basis; if the amount is above 2%, costs are capped at 2%.

The **structure of the distribution system charge also differs**. However, in all of the analyzed countries tariffs include a commodity (energy related) charge component.

Distribution tariffs include a capacity component in:

- in Serbia for other than small commercial and household consumers[3];
- Austria for larger and hourly measured consumers; as well as
- in Poland for non-household customers

A standing charge is in place in Austria, Poland and Croatia or a combination thereof: in Poland the distribution use of system charge depends on the customer category and differs for households (commodity and standing charge) and others that pay for commodity and capacity. In Croatia there are 12 categories of customers defined based on yearly consumption that pay for commodity and a standing charge. Moldova, FYR of Macedonia, Georgia and Ukraine have an only commodity based fee, but Moldova and Georgia differentiate charges depending on pressure levels.

Table 2 Structure of distribution use of system charges

Contracting Party	Capacity	Commodity	Standing charge
Bosnia and Herzegovina	X	X	
FYR of Macedonia		X	
Georgia		X	
Moldova		X	
Serbia	X	X	
Ukraine		X	
EU MS	**Capacity**	**Commodity**	**Standing charge**
Austria	X	X	X
Croatia		X	X
Poland	X	X	X

The survey (cf figure 1) shows that **distribution grid fees are presented in different units**: some countries have charges defined in cubic meters while others refer to energy delivered.

[3]The distribution fee for small commercial and household consumers only includes a commodity component.

This observation is important since different data processing procedures can lead to mismatching determination of quantities which can contribute to losses. For instance, in Serbia the measured quantity of cubic meters is adjusted according to its energy content and only then charged to system users. All analyzed countries apply the same pricing practice to all customer categories.

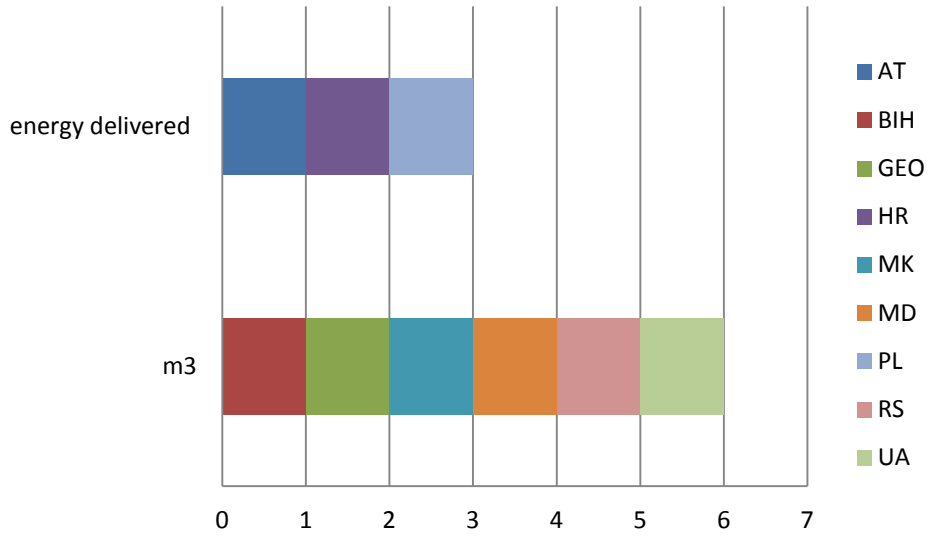

Figure 1: Charged units

2. Distribution losses

Commercial losses

In all analyzed countries so called “commercial losses” are included in the overall losses of the system. It is important to know whether these quantities belong to losses approved by the regulator, if a definition of illegal consumption is defined and, if so, how it is determined.

Table 3 Treatment of Illegal consumption

Contracting Party	Illegal consumption defined in legislation	Illegal consumption part of the losses
Bosnia and Herzegovina	Yes	yes
FYR of Macedonia	No	no
Georgia	Yes	yes
Moldova	Yes	no
Serbia	No	yes
Ukraine	Yes	yes
EU MS	**Illegal consumption defined in legislation**	**Illegal consumption part of the losses**
Austria	No	yes
Croatia	yes	yes
Poland	yes	yes

Reasons for losses, their structure and quantification

The reasons for losses on distribution networks usually include: pipe leaks, equipment damage, measurement errors and illegal consumption (Bosnia and Herzegovina, Poland, Croatia, Ukraine, Georgia, Austria, Serbia, FYR of Macedonia). Only Moldova and Ukraine have a methodology that defines different categories of losses whereby some of these categories are identical to those listed for the other Contracting Parties.

In Bosnia and Herzegovina, Moldova and Ukraine information about the losses structure is available; this is not the case in Poland, Croatia, Georgia, Serbia, Austria and FYR of Macedonia.. In Moldova the structure of technical losses is determined according to a formula and for commercial losses as percentage of volumes delivered and there is an obligation to submit to the regulator a breakdown of components of the actual losses by DSO.

In the procedure of allowed losses determination, Ukraine and Moldova apply a formula defined in a methodology approved by the Ministry or the regulatory authority, while others calculate the overall (i.e. not just the allowed) losses as difference between the quantities entering the system and the quantity exiting the system. In FYR of Macedonia losses are determined as a percentage of the gas volumes in the system.

According to the American Gas Association[4] losses are represented as difference between the quantities available from all sources, the quantities recorded as traded, the quantities necessary for system operation and quantities needed for company internal processes. This difference includes leakages, metering irregularities, variation in pressure/temperature and other variables such as non-coincident metering.

For regulatory distribution fee setting some DSOs determine the percentage of losses, some determine the quantity and some both. In Serbia, Poland and Georgia the values for calculated losses can be also negative.

Table 4 Determination of losses

Contracting Party	%	volume
Bosnia and Herzegovina	X	X
FYR of Macedonia	X	
Georgia	X	X
Moldova		X
Serbia	X	X
Ukraine		X
EU MS		
Austria	X	X
Croatia	X	
Poland	X	

Procurement of losses

In all analyzed markets distribution system operators are responsible for procurement of gas for covering losses.

Although the procurement responsibility is on DSOs, the ownership of the distributed gas differs. Gas is owned by the DSO in Georgia and Bosnia and Herzegovina, while it is owned

[4] www.aga.org.

by the system users i.e. suppliers in FYR of Macedonia, Ukraine, Moldova, Serbia, Croatia, Austria and Poland.

In Poland, Bosnia and Herzegovina, Georgia and Serbia quantities procured for covering losses are provided along with other gas quantities, i.e. there are no separate contracts for losses. In Austria and Ukraine distribution and supply companies are unbundled which most evidently entails separate contracts for losses procured. In Croatia some DSOs have separate contracts for losses procurement, but still under regulated prices, while others that are not unbundled do not; this situation is expected to change over time.

In this context it is further relevant to look into the question whether procurement of losses is market based along with quantities procured on the free market for the purpose of supply on the free market or provided at regulated tariffs along with the quantities procured for supply on the regulated market. Prices for losses procurement are:

- regulated in Poland, Bosnia and Herzegovina, Croatia, Moldova
- market based in Ukraine, Georgia, Serbia.
- In Austria prices for losses procurement can be negotiated or market based and are determined at the moment of transaction.

3. Distribution use of system charge determination

In the process of distribution use of system charges determination, countries use expected and calculated losses.

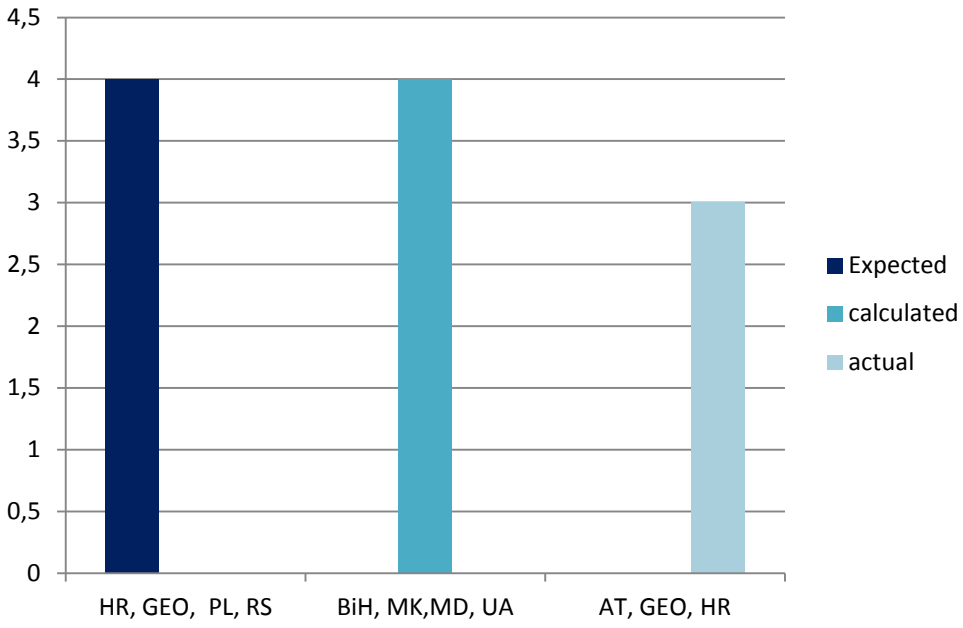

Figure 2: determination of distribution use of system charge

In all analyzed countries distribution system operators are reimbursed for losses via the regulated network tariff. However, only up to a certain level. In Moldova and Ukraine only normative losses are reimbursed. One of the reasons for using a special methodology for losses determination (normatives) is the absence of metering devices in some part of delivery points. In the majority of cases the decision on the amount of losses to be recovered is responsibility of the regulator. The only exception is Ukraine where the Ministry of Energy and Coal Industry determines the methodology how losses are to be calculated and which losses are to be approved. Only Bosnia and Herzegovina declared distribution losses are determined by law.

This implies that in the prevailing number of cases the responsibility for approval of losses is with the regulatory authorities as well as the possible impact on the financial viability of distribution system operators for cases where actual losses are much higher than the approved level.

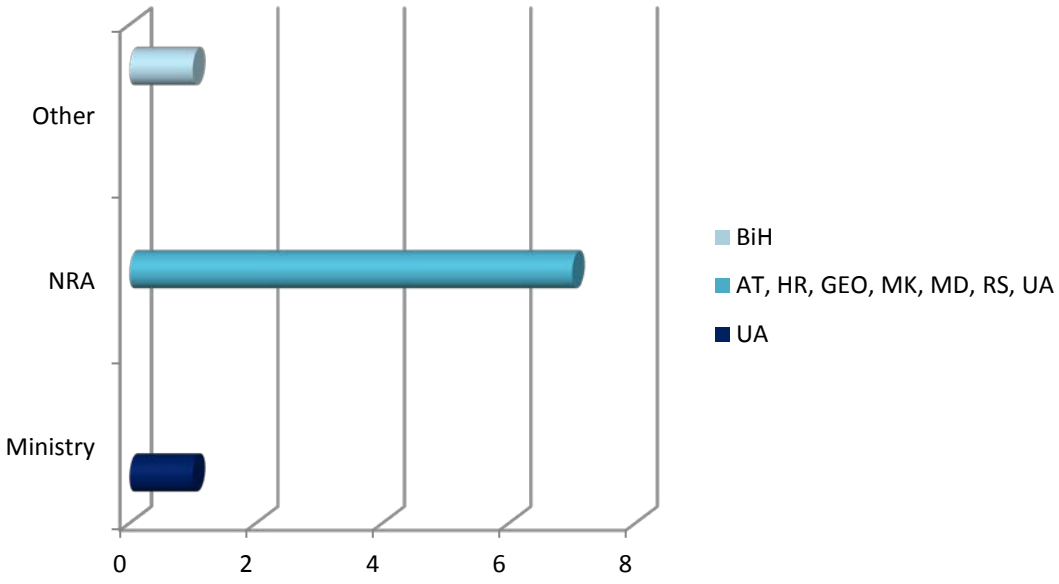

Figure 3: Responsibility for the approval of losses to be recovered

In all countries the allowed (approved) level of losses is limited. The graph hereinafter shows the applied maximum percentages.

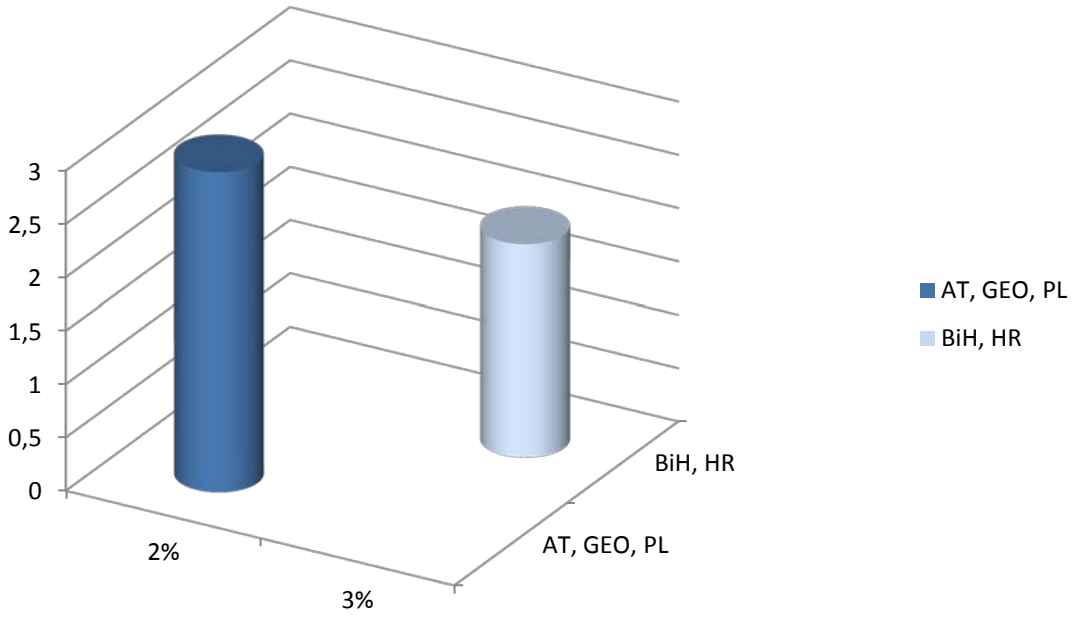

Figure 4: Allowed level of losses[5]

Some countries also reflect the allowed measurement error level that can influence the overall losses such as Poland (3%), Austria (2%), Ukraine and Moldova, while in other countries like Bosnia and Herzegovina, Croatia, Georgia and FYR of Macedonia, there are no related regulations. In Serbia the allowed measurement error level is regulated by the regulation on metrology.

Exceptions to approved losses are possible in Croatia and Serbia, depending on specific business conditions and characteristics of the individual distribution system, in Georgia[6] and Moldova, while not in Bosnia and Herzegovina, FYR of Macedonia, Poland and Ukraine. In Austria losses are usually capped at 1% but in case actual losses are higher, the regulator decides on a case by case basis.

Benchmarking techniques are used in the process of determination of allowed levels of losses in Bosnia and Herzegovina and FYR of Macedonia based on international data, in Serbia and Croatia based on both international and national data and in Georgia and Moldova based on national data. Benchmarking is not used in Poland and Ukraine.

Some countries do not use benchmarking but data from previous years (Poland, Bosnia and Herzegovina, Croatia, Ukraine, Georgia).

[5] Austria 2% composed of: 1% losses and 1% measurement error; for Georgia until 2022-2023 also higher losses are acknowledged.
[6] If losses are higher than 2% different approaches are applied.

Allowed losses are determined for each company separately in Poland, Croatia, Serbia, Ukraine and Georgia. In Moldova the technological losses are approved for each distribution company separately. In this way the companies' costs are reviewed more precisely in the process of price determination.

In FYR of Macedonia approved level of losses is the same for all companies.

4. Transparency, quality of supply, taxation

Transparency is very important in the process of both determination and approval of losses, having in mind that the outcome of these activities influences the final network fee charged to customers and economic viability of distribution companies. In most of the analyzed countries, namely Croatia, Ukraine, Serbia, Georgia, Moldova, Bosnia and Herzegovina, documents describing this procedure exist which does however not necessarily mean that the level of transparency is sufficiently clear to distribution system operators. There are no documents defining the procedure of determination and approval of losses in Poland and FYR of Macedonia.

Most of the countries, namely Poland, Bosnia and Herzegovina, Ukraine, Georgia and FYR of Macedonia, have not introduced quality of service regulation so there are no special concerns about the network losses envisaged within the scope of quality regulation, i.e. regular inspections in order to reveal pipe leaks, which are one of the common reasons for network losses. Croatia has introduced a quality of supply regulation but there are no limits for common standards determined yet. Moldova also introduced a quality of supply regulation but rules referring to leakages are defined separately in technical regulation. The impact of quality of service standards on the level of losses and their potential decrease goes beyond the scope of this report.

Taxation principles for losses differ: in Bosnia and Herzegovina, Georgia, Serbia and Croatia allowed losses are excluded from VAT while this is not the case in Poland, Ukraine, Moldova and FYR of Macedonia.

III. RESULTS - RECOMMENDATIONS

Half of the analyzed countries use the cost-plus methodology for setting regulated distribution charges; other methods applied are revenue cap and price cap, meaning that there is a **different practice in distribution losses treatment**.

Another **difference** exists in the unit in which distribution system fees are charged, cubic meters and energy delivered. This is important since different data processing practices (calculations) lead to a different practice in determination of quantities which, again, influences the level of losses.

In most of the countries **illegal consumption** is defined by national legislation and so called **"commercial losses"** are often included in the overall losses of the system.

The **reasons for losses** are common for all the countries: pipe leaks, equipment damage, measurement error and illegal consumption.

The way losses are determined differs: some countries calculate overall losses as difference between the quantities entering the system and the quantities exiting the system. Some countries apply a formula to determine the losses while others calculate them as a percentage of gas in the system.

In the procedure of **losses approval** in all the countries regulatory authorities are involved, except for countries where there is also involvement of the relevant ministry.

Not all losses are reimbursed via tariff. In most of the countries just losses up to a certain level are reimbursed while there are cases in which just normative losses are treated as acceptable for reimbursement.

Procurement of losses is the responsibility of DSOs in all of the countries but the practice whether they are provided at under regulated tariffs or not differs.

In the process of determination of allowed losses some countries apply **benchmarking** technique while others don`t. Also exemptions to allowed losses are in some countries possible while in others not. If there are exemptions in place, there should be clearly defined procedures or preconditions for obtaining the exemption. Sometimes allowed losses are determined for each company separately but sometimes the approved level of losses is applicable to all companies.

Most of the countries have not introduced gas quality of service regulation so there are no special concerns about the network losses (pipe leaks) within the scope of quality regulation.

Taxation principles for losses differ between the countries- in some countries allowed losses are excluded from VAT, in some countries they are not.

It can be concluded that **there are many different practices in regulatory treatment of distribution losses.** Some things that influence losses like whether metering equipment is

with or without temperature/pressure corrections, different assumptions on what should be considered as allowed metering error- whether it should relate just to the tolerances of how metering device is precise, or to the coincidental reading of the meters at the entrance and exits of the system or whether devices are equipped for corrections, are **topics that can be further elaborated** if efforts for reduction of losses are to be performed.

In cases where information on the precise structure of distribution losses is available to regulatory authorities, it could be useful for future work to learn in what way it is used.

Another issue to be further analyzed could be the effect of the applied regulation since it is reasonable to expect that introduction of distribution use of system charge regulation could lead to lower network losses. This particularly could be interesting for countries that apply incentive based regulation that should lead to higher efficiency.