

Ad Hoc Expert Facility

under the INOGATE project

**“Support to Energy Market Integration and Sustainable Energy in the NIS”
(SEMISE)**

Gas transport tariffs’ calculation

TABLE OF CONTENTS

1. INTRODUCTION	3
2. GAS PRICING IN THE EU MEMBER STATES	3
2.1 EU legislation on gas pricing	3
2.2 Gas pricing principles used in EU Member Countries	4
2.3 The tariff development process	6
3.3.1 Revenue requirements	7
2.3.2 Cost allocation	8
2.3.3 Pressure level and consumption zones	9
2.3.4 Tariff design principles.....	10

1. Introduction

The present report reviews best practices from gas transport pricing methodologies in the EU, with the focus on similar gas supply features (one way gas flow, simple structure of the grid, etc.); and provides some recommendations for optimisation of the company's expenditures on providing services of gas transportation, storage and distribution.

2. Gas pricing in the EU Member States

2.1 EU legislation on gas pricing

On July 13, 2009 the European Parliament and the Council adopted the so-called Third Package paving a way to a fully competitive electricity and gas markets in Europe. One of the important elements in liberalisation of the electricity and gas markets is assurance of the third party access to the networks, and this could be done by unbundling of monopolistic network activities from the competitive generation and supply activities. The first Gas market directive (1998) required to unbundle accounts, the second one (2003) – legal unbundling.

The third Gas Market Directive (Directive 2009/73/EC) defined three possible ways for fair and transparent unbundling of the regulated monopolistic gas transmission and distribution activities from the competitive supply activity: full ownership unbundling, independent system operator (ISO) and independent transmission operator (ITO) [1]. Unbundling of the activities means also that transmission, distribution and supply tariffs should be calculated separately for every activity. There is a strong requirement from the European Commission to abandon regulated gas tariffs to the final consumers, only gas transportation (transmission and distribution) and storage tariffs should be regulated.

According to the European Regulatory Group for Gas and Electricity (ERGEG) Report, as of 1 January 2010, regulated end-user prices still existed in quite a large number of countries (15 out of 25 countries) on at least one of the various market segments – households, small businesses, medium-sized to large businesses and energy-intensive industry. Meanwhile 9 countries (out of 25) have fully opened their markets without any price regulation. As of 1 January 2010, EU member countries with price regulation have adopted roadmaps towards a competitive market without end-user price regulation in the gas sector. It should be noted that these roadmaps in most cases do not concern all market segments with end-user regulated prices. In particular, household segments are often not covered. In addition, some roadmaps do not give a concrete removal date and time-schedule for regulated prices [2].

In more than two thirds of the countries of the EU, the regulator sets or approves end-user regulated prices. In approximately one fourth of the countries for gas the decision to remove end-user price regulation lies with the regulator. Requirements for the regulated tariffs were described in more details in the Regulation No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005. Article 13 of the Regulation defines the requirements to the tariffs of the access to networks. It requires, that gas transmission and distribution tariffs (approved by the regulatory authorities pursuant to Article 41(6) of the Directive 2009/73/EC and published pursuant to Article 32(1) of the same Directive) shall be transparent, take into account the need for system integrity and its improvement and reflect the actual costs incurred, insofar as such costs correspond to those of an efficient and structurally comparable network operator and are transparent, whilst including an appropriate return on investments [3].

In calculating tariffs for access to networks, it is important to take account of the actual costs incurred, insofar as such costs correspond to those of an efficient operation of the network company, and are transparent, as well as of the need to provide appropriate return on investments and incentives to construct new infrastructure, including special regulatory treatment for new investments as provided for in Directive 2009/73/EC.

Not all regulators in the EU Member States are empowered to approve the end-users' gas tariffs; according to the last Gas Market Directive they should be responsible at least for the approval of the tariff calculation methodologies. Gas tariffs and/or the methodologies to calculate them must be transparent from the point of view of the user in the sense that they have to be clear and obvious for the user including their components (e.g. m³/h/year, system service etc.) allowing the user to be aware of the price of the respective service and thus the costs he incurs by enjoying the service. In the event that tariff methodologies, but not the tariffs are approved by the regulator, both the resulting tariffs and the tariff methodologies must be published.

2.2 Gas pricing principles used in EU Member Countries

When designing a tariff methodology the following major principles of gas pricing are taken into account: economic efficiency, cost recovery, simplicity and transparency, non-discrimination as also social affordability and political acceptance.

Economic efficiency means that efficient tariff structure should signal to users the marginal costs that they impose on the regulated company and encourage the operator to utilise its assets optimally.

Cost recovery means that the tariff system allows the regulated service provider to recover the operating and maintenance costs and also capital costs that are commensurate with the efficient provision of the service. Efficient regulation aims to minimise the costs to the service provider of complying with the regulation.

Simplicity and transparency means that the regulated tariffs are understandable and transparent so that a user can readily determine the charges it faces and respond to them. Furthermore, to avoid disputes the tariff regime needs to be clear and should be based on explicit rules as far as possible.

Finally, transparency can be seen as a prerequisite for general acceptance by users and the general public. Non-discrimination principle requires to ensure that a level playing field is created for all service users - all users should be treated equally, irrespective of size, ownership or other factors, i.e. non-discrimination between users unless they generate different underlying cost patterns. In practice, this means that all users should face the same methodology for calculating charges – not necessarily the same charges.

Social affordability and political acceptance is another important issue. Introducing cost reflective tariffs often means high price increases for smaller customers, especially, residential ones. Introduction of two component tariffs usually means also an increase of payments for small consumers (single persons, pensioners, etc.). Calculation of cost reflective tariffs is a quantitative effort and depends mainly on the quality of available data and professional knowledge, but their implementation for all customer categories cannot be completed overnight. Therefore in order to achieve political acceptability and social affordability, a gradual approach supported by transition arrangements may be required. Otherwise a reliable social protection system should be put in place, which is usually not a case.

Although all countries declared similar main pricing principles (described above) and against the general background provided by the Gas Market Directive, the EU Member States (MS) have developed a large variety of different products and tariff structures. These differences range from the choice of the general tariff model or the range of products offered to the market to the principles for the determination and pricing of individual products. Analysis of different approaches towards gas transmission tariffs calculations is given in a recent report [4].

At first, there are different basic tariff models applied in individual MS: though the entry-exit system is the most popular and used in majority of EU MS, some countries apply locational signals, some use several market areas, some others postage stamp tariffs, etc. Where is a simple entry-exit system with the entire costs of transmission being charged to consumers, the postage stamp tariffs system is used (it is applied in many smaller countries, especially, with a single external supplier).

Next, two different approaches in gas price regulation are used: rate of return (or cost plus) regulation and incentive regulation (price caps or revenue caps). Under the rate of return regulation the regulator sets the allowed revenue for the company in such a way that it covers the reasonable costs of operation plus gives a return on capital (assets) necessary for providing the regulated services. Under the revenue cap regulation the revenue the company may earn is set in advance (usually, for 3, 4 or 5 years) and the company may benefit from any costs savings during the regulatory period. Similarly, the price cap regulation means that the price cap is set for a fixed 3-5 year period and company is encouraged to reducing its costs and improving efficiency. For the next price control period revenues or prices are recalculated based on the company's costs and given returns. In the EU a big majority of the countries use incentive pricing principles (price cap or revenue cap) to calculate the transmission and distribution tariffs, and it is clear trend towards implementation of incentive pricing in the rest of MS.

2.3 The tariff development process

The general objectives of a gas tariff methodology used in any of the EU member states are:

- to enhance financial sustainability of the natural gas industry,
- to foster the provision of safe and reliable gas service at affordable and fair tariffs levels,
- to separate the regulated and non-regulated business costs,
- to attract the capital necessary for the System upgrade and expansion, at reasonable costs
- to encourage the efficient use of natural gas by each customer class.

These objectives are declared in the Armenian document "Tariff Calculation Methodologies within the Natural Gas Supply System" also.

The process of developing and implementing tariffs consists of three major stages, each containing numerous steps that involve mathematical calculations as well as expert judgments in technical, financial and accounting areas. The process involves:

- revenue requirement– the determination of annual amount of revenue required by the company to cover all costs of operations and providing a return for stakeholders
- cost of service analysis– the determination of the company’s costs of providing service to each type of customer through the functionalization of costs and the allocation of the revenue requirements to all customer classes
- tariff structure design– the design of the structure of the tariffs for each type of customer classes.

As the first three stages involve the tariff methodology sometimes one adds the fourth step - regulatory approval stage whereby the Regulatory Authority considers the tariff proposals, analyses the information and data, and then renders a decision on the final tariff for implementation by the company.

3.3.1 Revenue requirements

Revenue requirements are equivalent to the justified (eligible) costs that should be allowed to be recovered from the regulated services. Eligible costs should include the reasonable efficient (operation and maintenance cost - OPEX) and the capital cost (including depreciation and return on assets) - CAPEX.

The recovery of OPEX does not provide any return to the infrastructure owner, as they are paid out in the form of salaries, ongoing operating and maintenance costs, emergency service costs, etc. These costs allow the business to provide and maintain its service.

On the other hand, the inclusion of capital costs in the revenue requirement formula recognizes the owner’s investment in the regulated company and ensures reasonable return on the efficient assets. This concept of the required revenue is generally expressed through the following

formula:

$$RRev(t) = OPEX(t) + Depreciation(t) + RA(t),$$

where:

RRev(t) = required revenue (in year t)

OPEX(t) = operation and maintenance costs (in year t)

Depreciation(t) = regulated depreciation (in year t)

RA(t) = return on assets (in year t).

2.3.2 Cost allocation

Cost allocation refers to several aspects like the choice of average versus marginal cost pricing, the choice of cost drivers, application of time-of-use tariffs, application of geographically differentiated tariffs etc. With respect to the geographical differentiation the model can be divided into those that provide location pricing signals and those that do not. The latter are referred to as “postal” or “postage stamp” models. While models with location signals (e.g. entry / exit models) have often been used for pricing of gas transmission, postage stamp models are commonly used in the area of gas distribution.

Yet another issue, generally related to the choice of cost allocation model, is to decide what drivers to use in allocating costs to the chosen tariffs (or charges). This will partially determine the level of the individual charge. The main drivers of gas costs that are taken into account for the pricing are normally the:

1. Capacity required providing the service to the customers. For the individual customer, this is usually represented by a measure of the customer’s peak demand (e.g. MW or m³/day) or, in the case of gas, sometimes reserved capacity. The costs driven mainly by the level of demand are often referred to as the demand

There are other drivers of distribution costs, e.g. population density, however, the three listed here are those directly related to actions taken by customers and hence of most use to reflect in the pricing dependent or capacity dependent costs and for a network will include the costs of providing and maintaining the network.

2. Actual usage of energy. The costs driven mainly by the throughput of energy are often referred to as the energy-dependent costs;

3. Number of customers. The costs driven mainly by the number of customers are often referred to as the customer dependent costs and include for example the cost of reading meters.

Sometimes, for example in gas network pricing, a simple ratio can be used to allocate total costs between the demand dependent and energy dependent cost categories. For example, the ratio may be set equal to 50:50, normally meaning that 50% of total costs are allocated to the demand dependent category of costs and 50% to the energy dependent category.

The ratio chosen is sometimes intended to represent the actual ratio between fixed and variable costs or result from application of marginal cost pricing; other times it also takes into account such things as the impact on smaller customers. In gas pricing, the ratio between demand and energy-dependent costs is often referred to as the “capacity/commodity split”.

2.3.3 Pressure level and consumption zones

Gas customers are normally categorized by annual consumption or pressure level of connection. Pressure level may provide a reasonable proxy for cost of utilization, however it has the disadvantage that it may encourage bypass of the low pressure systems to avoid the high charges for using this part of the network. While this could encourage better pricing that aligns the network cost structure, incentives to connect to higher pressure levels would leave network capacity under-utilized and cause a price increase on lower pressure levels. This could particularly be the case for countries with developing gas markets, where a small number of industrial customers account

Some costs, such as that of system operation do not vary with the throughput of energy, but they may be included in the energy dependent costs for the purpose of allocating costs to tariffs. Such costs also do not vary with demand, customer numbers or other customer characteristics, and it may be held that a non-discriminatory way of allocating these costs among consumers is to divide them by the energy transported.

Smaller customers tend to have lower utilization of their peak demand than larger customers and so they are generally hit relatively harder by a tariff structure where a high proportion of costs is allocated, via the demand dependent cost category, to the demand charge.

Hence the proportion of total costs allocated to the demand dependent category may be reduced to lower the impact on smaller customers, particularly those with a low level of energy consumption. for a large part of total gas demand and are directly connected to the transmission pipelines.

In contrast to the standard (high, medium, low) voltage levels in electricity distribution, pressure levels for natural gas distribution pipelines are usually based on historic developments and not standardized within a country.

Furthermore pressure levels within a single pipeline can already vary significantly over time and at different parts of the pipeline. Transmission and distribution pipelines operate at various pressure levels that often cannot be clearly or meaningfully distinguished. A tariff differentiation by pressure level could therefore be difficult to implement.

Customers with similar consumption patterns use the network to the same extent causing similar costs to the whole pipeline system. As a matter of equity such customers should also be charged the same tariff levels.

Customers with different usage patterns, such as customers with a relatively constant demand or large differences between base and peak load, use the gas distribution network to a different extent and require a larger or smaller back-up from the network operator via balancing and ancillary services.

Different gas distribution tariffs are therefore often calculated for different customer groups. These groups can be categorized by specific consumption levels or zones or – for simplifying purposes – by specific types of customers, such as household, small commercial and industrial customers and gas-fired power plants.

2.3.4 Tariff design principles

Tariff structures are the actual categories of measurable items to which the pricing is applied to produce the billing for each customer. Energy service tariff structures for each customer classification may be different but should be designed to closely match them with the cost-of-service results. Tariff structures should be as simple as possible and there are several practicalities that should be remembered in designing them. These include metering, billing and customer understanding and acceptance. Traditionally, the components of tariff structures consider customer costs, commodity costs, and demand costs.

The **customer costs** consist of the monthly fixed costs that company has in reading the meters, billing and collections, and a fixed cost component for the installation necessary to provide natural gas service to the customer. These costs are incurred regardless of the amount of natural gas that the customer uses.

The **commodity costs** are those costs that are directly incurred in purchasing the natural gas from the supplier and vary depending upon the amount of natural gas actually consumed by the customer.

The **demand costs** are those costs that are incurred by the gas company in providing the peak load of the customer at any given time during the month or the year. The company incurs the costs of providing the facilities (i.e. pipelines, storage, etc.) for meeting a designated peak load of the customer, regardless of whether the customer actually uses that peaking amount during the month or during the year. Because of the administrative requirements and costs, these types of charges are usually set for only large consumers.

Two-part tariff structures consist of a customer charge and a commodity charge and are used in many countries in order to better reflect the cost of providing service to consumers by the gas company. In this tariff structure, the monthly bill for each consumer would consist of a fixed customer charge and a commodity charge that would be based on the monthly gas usage, as recorded by the billing meter.

Another important reason for a two-part tariff is that it will result in more revenue stability for the company, thus preventing the large swings in revenue that result from changes in weather. From the customers' perspective, the two-part cost structure will provide better information so that they can make proper economic choices in their use of energy. If the variable cost of gas is much lower than the average cost, then the consumer may use more gas and less electricity or produce more products because the cost of production is lower on a per-unit basis.

Analysing the gas transmission tariffs in the EU countries one may notice that almost in all countries there are two component tariffs used. The charges for basic transmission services are mainly based on contracted (i.e. booked) capacity (measured, for example, in m³/h) and a commodity charge (m³ actually transported). The main component in the transmission tariff is the capacity charge, ratio between capacity and commodity charges varies between 70% and 30% to 95% and 5%; there are some cases where the capacity charges cover 100% of the costs.

List of references

1. Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC. – Official Journal of the European Union L211/94. 14.8.2009.
2. ERGEG 2010 status review of the liberalisation and implementation of the energy regulatory framework. Ref. C10-URB-34-04. 7 December 2010.
3. Regulation (EC) No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005. - Official Journal L 211, 14/08/2009 P. 0036 – 0054.
4. Gas transmission tariffs. An ERGEG Benchmarking report. 18 July 2007, Brussels.
5. Study on methodologies for gas transmission network tariffs and gas balancing fees in Europe. Kema Consulting and REKK. Arnhem. December 2009.