DOI: https://doi.org/10.59503/29538009-2024.2.14-164

CHARACTERISTICS OF THE DEVELOPMENT OF THE GAS SUPPLY SYSTEM IN THE REPUBLIC OF ARMENIA

Shake Isayan
Armenian State University of Economics, Ph.D. student
shakeisayan@gmail.com

Abstract: Gas distribution and transportation networks make up the gas supply system. Providing natural gas to the public and the economy is the primary objective of the gas delivery system. Every nation's gas supply network is strategically vital since the cost of natural gas directly impacts the goods and services that are produced and rendered there.

It is true that developed nations are looking for innovative technology for natural gas extraction because it is a non-renewable resource. Founded during the Soviet era and throughout multiple phases of development, the Republic of Armenia's gas supply system is a component of the worldwide network. The Public Services Regulatory Commission and the Armenian government, through the Ministry of Territorial Administration and Infrastructure, oversee the country's gas supply industry.

The article discusses the Republic of Armenia's domestic natural gas market's supply and sales, its background and present state, investment initiatives, and features that increase the system's operational efficiency.

Keywords*:* gas supply, gas distribution, gas tariff, investments, state policy

JEL codes: D00, D01, O12

Research aims: The article presents the supply and sale of natural gas in the domestic market of the Republic of Armenia, its history and current situation, investment programs, ways and characteristics of increasing the efficiency of the system's operations:

Research novelty: The principle of separation of functions, which is considered a key component of conducting state policy, has been violated in the gas supply system. Implement the separation of gas supply and gas distribution processes.

Introduction

A crucial aspect of every endeavor and the policies put in place to support it is economic efficiency, which is the attainment of the best outcome at the lowest possible cost of living and tangible labor.

Efficiency can be accepted as a feature of any activity:

- ✓ he expected results and effectiveness evaluations can be used to inform any decision about the use of resources.
- ✓ Out of all the potential spending options, the one that guarantees the intended result should be chosen.
- ✓ Methods that are both practically applicable and scientifically sound are required for assessing outcomes and efficacy as well as for choosing the optimal course of action.
- ✓ The creation of evaluation techniques based on exact methodology of efficacy is necessary for scientific validity. It is essential to create methodological guidelines in enough depth

so that the techniques for assessing efficiency and choosing alternatives may be applied effectively.

Depending on the selected form for the combination, the overall look of the effectiveness assessment indicator is determined by the definition of efficiency, which is a combination of expenditures and the results gained via them.

To determine the overall efficiency indicator, the final one can be one of the two following formulations of the difference or ratio of results and expenditures:

E^1=R - E

E^2= R / E

where E1 and E2 are the efficiency indicators, respectively, expressed in general terms as the ratio or difference between expenses (E) and results (R).

Absolute and comparative economic efficiency are different in practice.

An indicator of a certain time period that describes the entire value of economic efficiency in relation to the quantity of resources and expenses, both separately and collectively, is called absolute economic efficiency.

Ab = Result / Expenses

In order to assess the effectiveness of the suggested solutions for production development and choose the most ideal one, comparative effectiveness is calculated.

The following techniques are typically employed to evaluate comparative effectiveness:

- ✓ Expenses comparison,

- ✓ Chain-like,
- ✓ Given expenses.

These approaches are all predicated on figuring out one-time and ongoing expenses. Costs that are continuously incurred and part of the production value are referred to as ongoing expenses. Expenses incurred as one-time capital investments for the development and expansion of fixed assets are referred to as one-time expenses.

An indicator of conditional economic efficiency that comes from comparing and choosing the optimal investment option is called comparative efficiency.

First option (new construction)	Second option (reconstruction)
C1, K1	C 2, K2
K2 > K1	C2 <C1

where: C1, C2 annual production value by options, K1, K2 capital investments by options.

Comparative economic efficiency is assessed based on the following indicators.

1. Based on the calculation of the deadline for additional investment contributions.

$$Tok = K2 - K1 / C1 - C2 < TN$$

where TN is the typical time frame for capital investment returns, allowing for the lowest feasible level of investment efficiency. As an illustration, consider the standard rate of capital.

2. Based on the calculation of the comparative efficiency factor.

$$E = C1-C2 / K2- K1 > EN$$

Where: EN is the normative coefficient of comparative economic efficiency.

If the calculation results in Tok < TN, or E > EN, then the more capital-intensive option is considered optimal. If the opposite, then a more efficient option is the one with less capital investment.

When there are more than two options, the effectiveness of the options is assessed using the reduced-cost technique. It is employed in the establishment of new businesses, the rebuilding of old ones, the introduction of new equipment, and the resolution of various problems.

The minimal decreased costs serve as the comparative economic efficiency metric when selecting from a range of solutions.

$П_3$ = C+EN* K (for each variant)

$П_3$ = C* TN+ K,

Where C is the annual production value by options,

K - capital investments by options,

П - reduced expenses by options:

The best option is the one with the lowest price.

Given the significant social issues and the need to ensure product competitiveness, "HayRusGasard" CJSC was founded in the Republic of Armenia in the early 2000s. This was based on the assumption that petrol prices supplied to Armenia from the Russian Federation would be relatively low during that time.

Therefore, it is deemed appropriate to distribute the shares in "HayRusGazard" CJSC as follows:

- ✓ RA Government- 45%
- ✓ RF "Gazprom" - 45%

- ✓ Itera CJSC (Russia) - 10%.

As a result, the Russian Federation now oversees the sector. Later, until 2013, the remaining shares also went to Gazprom. Initially, the Armenian government owned 25% of the shares, then in 2013, the remaining 20% for roughly $300 million.

It should be mentioned that the cost of petrol at the border was between $50 and $60 per 1000 m3 in 2004 and 2005.

When petrol prices rose in the ensuing years, Armenia was forced to hand over the remaining shares to Gazprom, a Russian company, in the hopes of a lower petrol price and a commensurate amount of investment.

A subsequent interstate agreement between Russia and Armenia was signed in 2013, which stipulates that the "Gazprom" CJSC operating in Armenia must maintain a minimum profitability standard of 9% until 2042. Additionally, the company is responsible for overseeing the entire gas supply and distribution system within the Republic of Armenia's territory (it should be mentioned that the Iran-Armenia gas pipeline was later transferred to the Russian "Gazprom").

In this sense, the Republic of Armenia's biggest risks may be that Gazprom should have kept its 9% profitability regardless of the number of alternative energy resources and capacities introduced in Armenia.

Stated differently, Gazprom Armenia must maintain a 9% profitability rate by consuming a certain amount of gas, including those which powers electricity generation, regardless of the number of new alternative capacities that are run in Armenia.

In regards to 2042, it is predicated on the idea that "Gazprom Armenia" should have reliable assurances for long-term investment recovery.

Naturally, on the one hand, the responsibilities involved in such a long-term interstate agreement might provide the appearance of strong and enduring relations, but on the other, they may also make it more difficult to access new, alternative energy resources.

Research results

It should be mentioned, without concentrating on the variations in border petrol prices during the last ten years, that they have mostly fluctuated between $150 and 190 per 1000$m^3$ before stabilizing and staying at $165 for the past several years.

Generally speaking, the Republic of Armenia's gas supply system can transport and distribute 4 billion cubic meters of natural gas, although it actually supplies only about 2.7 billion m3, according to different assessment procedures.

One of the problems with the gas supply is that, despite having paid all required maintenance costs, only 1/3 of the capacity is really being utilized.

The benefits of keeping petrol prices stable since Armenia joined the EAEU are also a matter of discussion.

In addition, it should be mentioned that the EAEU intends to create a single energy market while forming an exchange-based trading component for the gas supply process.

The next significant issue in the subject under discussion is that, although being supplied by the Russian Federation at a border price of $165 per 1000 m^3, gas is delivered to the end user at a cost that

is over twice as expensive for a monthly usage of 10,000 m3 of gas, at 153 drams per 1 m^3.

This means that a detailed examination of the price of petrol distribution and transportation from the border to the final user, as well as the costs associated with system upkeep and operation, profit margin, taxes, and other factors, is required.

Calculating technological and other losses along the whole chain, as well as the calculations associated with their potential reductions, is crucial in this respect. The approximate yearly operating expense calculations made by "Gazprom Armenia" are shown below.

Table1. Operating expense calculations

Gas supply volume	≈ 330 million dollars
Gas sales revenue	≈ 650 million dollars
Maintenance and operating costs	≈ 121 million dollars
Taxes	≈ 134 million dollars
Profit	≈ 65 million dollars

The Public Services Regulatory Commission sets the petrol price, which is now 143.7 drams per cubic meter for average users.

Armenian consumers have seen a roughly threefold increase in petrol prices over the past 20 years, which has had a detrimental impact on the country's economy and people's standard of living. Certain social groupings are subject to special reservations issued by the Armenian government.

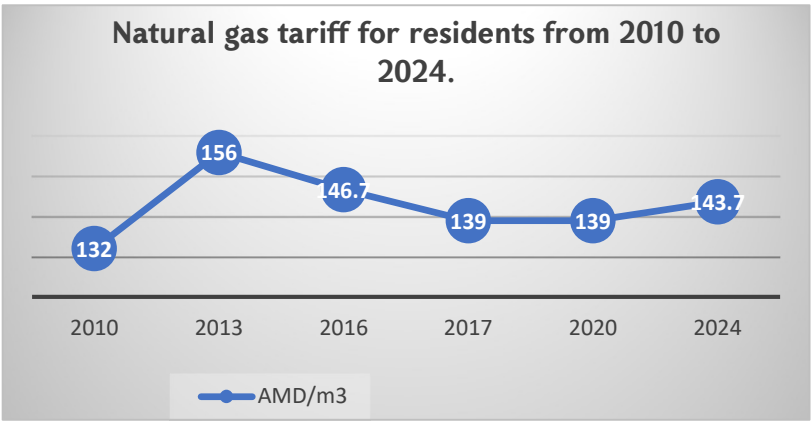

Figure 1. Natural gas tariff for residents in 2010-2024 (in AMD)

Source: *Our research results*

The agreement states that the price of petrol delivered to Armenia won't alter for ten years, and the most recent price modification was last year.

A different topic of discussion is how to optimize the gas supply system's costs for the end user. As a result, low-pressure gas distribution costs make up roughly 65% of the overall amount of gas charges provided to the populace. Since it hasn't changed in around 15 years, the entire expenditure chain hasn't undergone the required reorganizations.

One frequently asked issue is whether we can purchase petrol from the Islamic Republic of Iran for less than $165 per 1000 m^3.

It should be noted, that when transporting gas to the Republic of Armenia, the Iran-Armenia gas pipeline does not employ these so-called re-evaluation techniques. This shows that it has been supplied under a trading regime for nearly a decade at a volume of

one million cubic meters per day. Thus, for every 1 m^3 of gas, Armenia pays for 3 kWh of electricity, with an additional 1.5 kWh being essentially free. Consequently, the sanctions that the West has placed on Iran are advantageous to both Armenia and Iran.

If so, is it possible for us to send the 3 million m^3 amount of gas from Iran to Armenia? Yes, it is feasible, but only if Iran and Armenia's high-voltage power transmission lines have larger capabilities.

Allow me to add that the gas pipeline from Iran to Armenia, which was constructed using cutting-edge technology and creative ideas, increases natural gas supply capacities and guarantees the Republic of Armenia's second entrance corridor.

The new gas pipeline is roughly 190 kilometers long overall, and because some of its portions are 3000 meters above sea level, the construction process was conducted in extremely challenging weather circumstances.

The Republic of Armenia may receive around 2.2 billion cubic meters of natural gas annually from this gas pipeline, which is precisely the same amount that is used here.

Sadly, now Armenia is not a country that can transport petrol supplies, which would generate extra revenue and eventually lower petrol prices for citizens.

2730.8 million m^3 of natural gas were supplied to Armenia in 2023. 2360.4 million m3 came from the Russian Federation, while 370.4 million m^3 came from the Islamic Republic of Iran.

Actually, the Russian Federation provides 86.5 percent of the natural gas used in the Republic of Armenia, with Iran providing 13.5 percent.

A number of RA settlements do not have a gas supply, which is a priority of "Gazprom Armenia" company. Continuing the list of sole supplier challenges, obviously we can mention that in some large settlements of RA (the capital Yerevan) the unprecedented rate of construction of apartment buildings, the company can't ensure gas supply of such volumes through its distribution system.

The Government of RA should take action in the near future "On gas supply" separate and modern principles based on the work of developing a new law, because Legislation regulating the gas supply sector has been developed a lot long ago in the 2000s and both statutory and bylaws there is a need for modernization at the level of acts.

The gas supply system consists of gas transmission and gas distribution systems. As of 2024, the gas distribution network of the Republic of Armenia includes 19,617.2 km of high, medium and low-pressure gas pipelines, as well as engineering structures. There are 2669 units of gas regulating points in the gas distribution network, 9194 units of individual pressure regulators, 1433 head gauges nodes, as well as 316 electrochemical protection stations.

The transportation system's primary gas pipes and their branches span a total of roughly 1668.5 kilometers. Transportation of gas is done via a 1580.94-kilometer gas pipeline. The operating reserve mode is in effect for the remaining portion.

The gas distribution system includes:

- ✓ 122 gas distribution stations,
- ✓ 20 measuring nodes, including the "Koghb" gas measuring station located at the Armenia-Georgian border,

- ✓ 231 linear valves in the main gas pipeline section, of which 28 are on the Iran-Armenia gas pipeline,
- ✓ 199 electrochemical protection stations, including 183 cathodic and 16 drainage,
- ✓ The underground gas storage facility in Abovyan, with 21 underground wells and a pressure station.

"Transgaz" LLC, founded on June 1, 1998 by "HayRusGazard" CJSC (now "Gazprom Armenia"), is in charge of managing Armenia's gas transportation infrastructure. The Yerevan Thermal Power Plant has a licence to import natural gas, in addition to "Transgaz" LLC.

Natural gas is delivered to customers via the gas distribution system, which is a comprehensive infrastructure made up of pipes, gas management units, and other equipment. This indicates that its purpose is to provide natural gas to end users (office, industrial, residential, etc.).

Continuous monitoring of "Gazprom Armenia"'s full chain of operations is required, as is the development of so-called "losses management." The pricing system will benefit from the deployment of this since it will enable the minimization of technological losses.

The Public Services Regulatory Commission has approved the methodologies for unavoidable technological losses of natural gas in the sector. These methodologies calculate technological unavoidable losses in the natural gas distribution network and determine the amount of gas used for personal needs.

Table 2. The volume of gas distributed	
The volume of gas distributed in the gas distribution system in 2023	**2578.5 million m^3**
Population	808.2
Energy	777.7
Industry	293.7
Autogas filling stations (AGLFS)	412.1
Budgetary organizations	49.9
Other consumers	237.0

As a result, it was discovered that the quantities of inevitable technical losses that were computed using the previously indicated approaches were more than the losses that really occurred.

In order to account for 6.69% of the gas entering the network - 4.64% in the transmission system and 2.05% in the distribution system - the unavoidable technological losses in the computation of gas tariffs are now defined as equal to the actual loss amount. As a result, the Energy Regulatory Commission approved approaches listed above must be revised.

Specifically, the creation of new techniques ought to be founded on easier and more approachable methods for assessing them, such as the approval of gas pipelines or the outcomes of tests conducted throughout the remodeling.

It is suggested to exclude the 9.6 million drams in costs meant for the computation of actual losses from the calculations of the natural gas tariff because the documents provided by "Gazprom Armenia" CJSC do not clearly specify the expenses for natural gas used for the company's own needs.

In addition, users fully reimburse the losses in the gas supply system, which are included in the final gas tariff. The gas supply firm may become uninterested in attempts to minimize losses as a result of this worrying situation.

There can be several ways to address the issue:

- ✓ It is possible to deduct up to 50% of the real losses from the supplier's profit account, which encourages self-interest.
- ✓ Unavoidable technological losses account for 4.64% of the volume of gas imported (90 million cubic meters per year), according to reports from "Gazprom Armenia" CJSC.

Numerous studies show that this is a greatly exaggerated number because, according to a number of international regulations, the linear portion of gas pipelines must be hermetic, or opaque, which by itself will not permit such high loss rates. Because the equipment that causes these losses is not present in transportation (mainline) gas pipes, the presence of unavoidable technological losses is excluded; yet, in the event that they are, the gas loss is still insignificant.

- ✓ The 4.64% magnitude of unavoidable technological losses reported by "Gazprom Armenia" is unfathomable in the given technological context.
- ✓ The quantity of losses reported in the transportation system has to be reviewed. These losses shouldn't be more than 1% of the carried gas, according to several estimations.

The republic's gas distribution system has 750,544 residential users as of January 1, 2023, 400,199 of whom live in apartment buildings and 350,345 live in houses.

There was a 13,337 increase in the number of subscribers to the republic's gas distribution system between January and December of last year. In Armenia, 650 localities use natural gas.

Our nation ranks among the top in the world with a gasification rate of 96%, second only to the Netherlands (97%) in this regard.

Conclusion

The gas delivery system has breached the separation of functions concept, which is regarded as a basic element of carrying out state policy.

In actuality, "Yerevan TPP" concurrently fulfils the roles of an importer and a producer, while "Gazprom Armenia" CJSC takes over and carries out the roles of importer, distributor, and regulator. Consequently, this complicates the options for independent investigation and evaluation of the effectiveness of various functions during the system's operation study.

As a result, the structure and composition of the natural gas pricing technique are multifunctional.

They should be routinely examined and modified in light of the nation's socioeconomic priorities and challenges, taking into account the current trends in the development of the gas supply system.

Because it is multifaceted and impacts not only the fuel and energy complex but also the economy's competitiveness and social stability, the price of natural gas is one of the world's most important and complicated issues:

- ✓ Maintain the implementation of extensive expenditures targeted at significantly lowering gas supply and distribution system losses.
- ✓ Optimize "Gazprom Armenia"'s spending in other areas, such as the policy of buying from a single individual, and in terms of figuring out the best pay rates, with the goal of minimizing costs that do not guarantee the degree of efficiency.
- ✓ Establish a division between the procedures for gas distribution and supply. Establishing a precise definition of the gas supply within the "Gazprom Armenia" system and making an effort to establish the gas distribution system territorially.
- ✓ We are therefore optimistic that costs will drop dramatically and that no more gas price increases will be permitted. In addition, it might be feasible to lower the gas tariff to some degree for specific groups of people and companies.
- ✓ Given the minimum profitability of "Gazprom Armenia" required by the 2013 intergovernmental agreement until 2042, why not suggest to the Public Services Regulatory Commission a reduction in profitability from 10% to 8%?
- ✓ We will receive three times more gas from Iran if the high-voltage electricity transmission lines between Iran and Armenia are completed and upgraded with increased power capacity.

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ԳԱԶԱՄԱՏԱԿԱՐԱՐՄԱՆ ՀԱՄԱԿԱՐԳԻ ԶԱՐԳԱՑՄԱՆ ԱՌԱՆՁՆԱՀԱՏԿՈՒԹՅՈՒՆՆԵՐԸ ՀՀ-ՈՒՄ

Շաքե Իսայան
Հայաստանի պետական տնտեսագիտական համալսարան,
հայցորդ

Բանալի բառեր - գազամատակարարում, գազաբաշխում, գազի սակագին, ներդրումներ

Գազամատակարարման համակարգը բաղկացած է գազի փոխադրման և բաշխման փուլերից: Այն ռազմավարական նշանակություն ունի յուրաքանչյուր երկրի համար, քանի որ բնական գազի սակագինը ուղղակիորեն ազդում է տվյալ երկրում արտադրվող ապրանքների և մատուցվող ծառայությունների արժեքի վրա: Հաշվի առնելով այն հանգամանքը, որ բնական գազը չվերականգնվող ռեսուրս է, զարգացած երկրները, ադրեն իսկ փնտրում են բնական գազի ստացման նորագույն տեխնոլոգիաներ:

Հայաստանի Հանրապետության գազամատակարարման համակարգը համաշխարհային ցանցի մի մաս է, այն հիմնադրվել է դեռևս խորհրդային ժամանակաշրջանում և անցել է զարգացման տարբեր փուլեր:

ՀՀ գազամատակարարման ոլորտը կարգավորում է հանրային ծառայությունների հանձնաժողովը, ինչպես նաև ՀՀ կառավարությունը՝ ի դեմս տարածքային կառավարման և ենթակառուցվածքնրի նախարարության:

Հոդվածում ներկայացված են ՀՀ ներքին շուկայում բնական գազի մատակարարումն ու իրացումը, պատմությունն ու ներկայիս իրավիճակը, ներդրումային ծրագրերը, համակարգի գործունեության արդյունավետության բարձրացման ուղիներն և առանձնահատկությունները:

Ուսումնասիրվել են բնակչության և գազ սպառողների համար գազի սակագնի փոփոխությունները, ինչպես նաև տվյալ համակարգի պահպանման և շահագործման ծախսերը, հարկերը, շահույթը, կորուստները:

Submitted: 05.08.2024; Revised: 20.08.2024; Accepted: 02.09.2024