



REPORT

On unit investment cost indicators and corresponding reference values for Electricity and Gas infrastructure

GAS INFRASTRUCTURE

Energy Community Secretariat

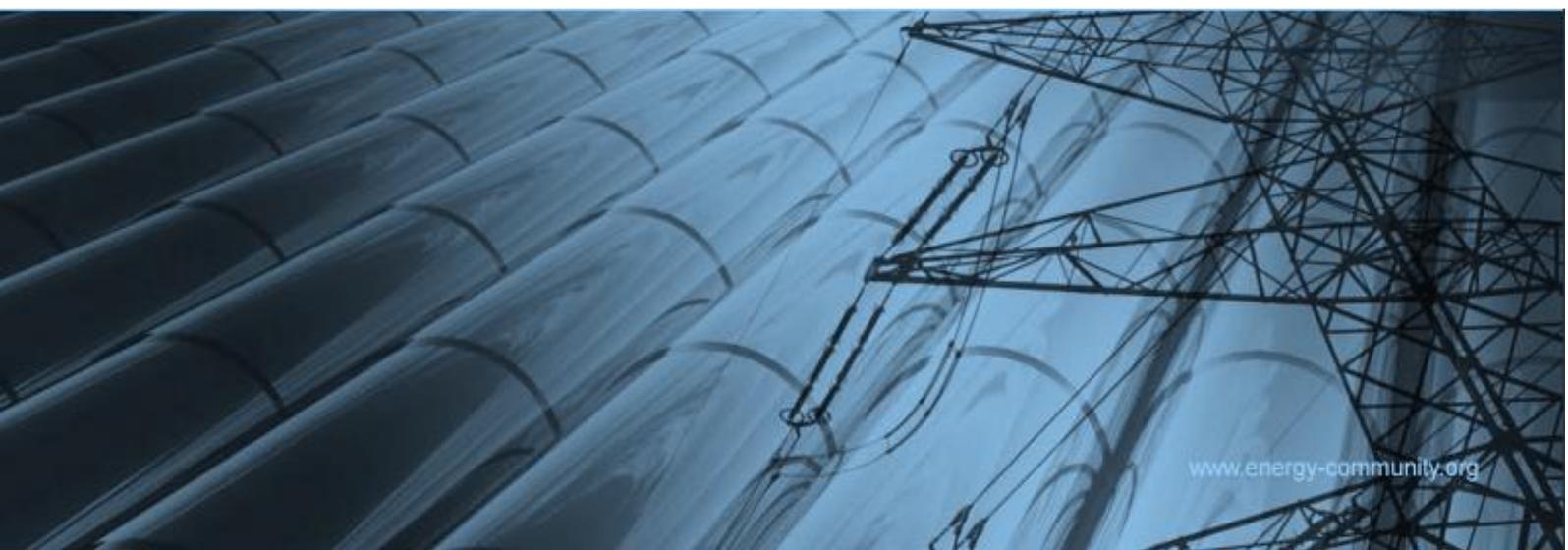


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I. Introduction

The present report is the result of the work carried out by the Energy Community Secretariat (“Secretariat”) with the assistance of National Regulatory Authorities (hereinafter NRAs or “regulators”) cooperating in the framework of the Energy Community Regulatory Board (ECRB), to develop a set of indicators and corresponding reference values for electricity infrastructure, as required under Article 11(2) of Regulation (EU) 347/2013 (“the Regulation”). For the purpose of coherent implementation of the Regulation in the Energy Community as well as in the European Union, the Report mirrors the structure of a related report of the Agency for the Cooperation of Energy Regulators (ACER).

The report contains separate documents for electricity and gas infrastructure. This document covers the set of indicators and corresponding reference values for gas infrastructure, namely transmission pipelines, underground storage facilities, reception, storage and regasification or decompression facilities for Liquefied Natural Gas (LNG) or Compressed Natural Gas (CNG), and other equipment.

The underlying information is based on historic data about the relevant gas projects, as provided by the Contracting Parties’ regulators. The data provided includes the incurred cost breakdowns and technical information about the assets. The units used are those deemed to be the most useful for the Unit Investment Cost (UIC) analysis, given the quantity of the data available.

This report cannot be considered legal or economic advice, and neither the Energy Community Secretariat nor any national regulatory authority can be held responsible for any consequence arising from the use of the UIC indicators and the reference values thereof.

II. Background and Objectives

2.1 Legal basis

Pursuant to Article 11 (2) of the Regulation,

‘national regulatory authorities... cooperating in the framework of the Energy Community Regulatory Board shall establish and make publicly available a set of indicators and corresponding reference values for the comparison of unit investment costs for comparable projects of the infrastructure categories included in Annex I of the said Regulation’.

For gas, these infrastructure categories are defined as follows¹:

(a) transmission pipelines for the transport of natural gas and bio gas that form part of a network which mainly contains high-pressure pipelines, excluding high-pressure pipelines used for upstream or local distribution of natural gas;

(b) underground storage facilities connected to the above-mentioned high-pressure gas pipelines;

(c) reception, storage and regasification or decompression facilities for liquefied natural gas (LNG) or compressed natural gas (CNG); and

¹ Regulation: Annex I (2)

(d) any equipment or installation essential for the system to operate safely, securely and efficiently or to enable bi-directional capacity, including compressor stations.

2.2 Objectives

The main objective of the work undertaken by the Secretariat with the assistance of the NRAs cooperating in the framework of the ECRB is to compile a set of UIC indicators and corresponding reference values as required by the Regulation. The indicators are useful for the following purposes:

1. Preparation of the Ten-Year Network Development Plans (TYNDP);
2. Selection of Projects of Energy Community Interest (PECI) and Projects of Mutual Interest (PMI), where the indicators and the reference values can provide a reference point for the assessment of the project promoters' submissions;
3. Development of better informed justifications for regulatory decisions on cCross-bBorder cCost Allocation decisions, where the indicators and the values can be of help to NRAs when deciding on investment requests and considering cross-border cost allocation; and
4. Analyses associated with public financial assistance, where the indicators and the values can be informative for the agencies and the authorities in charge of the evaluation of proposals for grants to project promoters.

In addition, the indicators may provide greater transparency regarding the levels of costs of gas infrastructure in the Energy Community Contracting Parties, as well as the structure of the costs and the role of various cost factors.

2.3 Scope of the analysis

The methodology used in the preparation of this Report takes into account the variety of asset types and the large range of physical and non-physical cost drivers across the Energy Community Contracting Parties. Although only three countries provided data, namely Ukraine, Moldova and Georgia, the sample contains 24 projects in total, with 22 submitted from either Moldova or Georgia. Consequently, the findings cannot be deemed representative for the Energy Community Contracting Parties and the sample size does not enable sophisticated statistical analysis but, still, provides a solid basis for calculating UICs for the aforementioned countries. The published unit investment cost indicators and their reference values were developed by taking into account the relevant cost categories, that apply to most projects. Costs, which are heavily dependent on particular contexts, such as financing costs, were left out of the scope of this analysis.

Data on the historical costs of individual assets rather than projects was collected as projects could potentially include multiple assets, which would distort the analysis.

For certain asset categories defined in Annex I of the Regulation, only a limited number of gas infrastructure investments (or none at all) have been recently realised in the Energy Community Contracting Parties. Consequently, a meaningful empirical analysis for those categories was not possible. Moreover, only information about pipeline projects was submitted. Considering these restrictions, this study is limited to unit investment costs for pipeline infrastructure, also not including compressor stations.

The analysis aims at achieving a balance between the level of detail and the robustness of the values provided. In this respect, the objective is not to have a large number of detailed case studies, but rather to derive UICs for the analysis of infrastructure projects.

Several assumptions had to be made when designing the data collection questionnaires regarding the factors which are likely to be the main cost drivers. To avoid leaving important cost drivers out of the scope of work, the Energy Community Secretariat used the questionnaire template of ACER.

III. Work Methodology

3.1 Data collection

The NRAs were requested to submit data for new assets belonging to one of the asset categories defined in the Regulation. Regulators were asked to submit newly constructed assets, during the last 10 years. Some of the submitted projects have actually been commissioned more than 10 years ago but were still considered in the analysis.

3.2 Types of data collected

Two forms of data were collected for each asset:

- Technical characteristics of the project to assess cost drivers; and
- Total costs divided into cost categories to assess cost breakdowns.

The technical characteristics were assessed to identify reliable cost drivers in the data. Where more reliable cost drivers were found, the characteristics were used to produce the outputs outlined in chapter 4. For all asset categories, the total asset costs were divided in to the following cost categories:

1. Engineering, and project management cost;
2. Civil, mechanical, and electro-mechanical works cost;
3. Materials cost (pipes, valves, offtake points);
4. Right of way; and
5. Miscellaneous.

The categories were used to establish cost breakdowns for the submitted asset type, in order to give an indication of how costs are composed per unit.

3.3 Treatment of taxes and exchange rates

Treatment of taxes

All cost information was requested to be reported net of taxes (direct or indirect), in order to eliminate the effects of taxation on the reported investment costs.

Treatment of exchange rates

The reporting regulators converted local currency into Euro with the exchange rate at the time of commissioning.

The reported Euro values, based on the cumulated, historical inflation data of the national banks, were indexed to 2018 terms for the purpose of the present report.

IV. Set of Indicators and their Corresponding Reference Values

The following is the set of indicators and corresponding reference values for UICs for gas infrastructure. All values are rounded to the nearest Euro and are presented as anonymized UICs for the most relevant units for each asset where the data permits.

Table 1: Number of assets in the sample

Type of infrastructure	No. of Contracting Parties represented	Investment items
Pipelines	3	24

4.1 Transmission network

4.1.1 Pipelines

Table 2: UIC indicators for pipelines

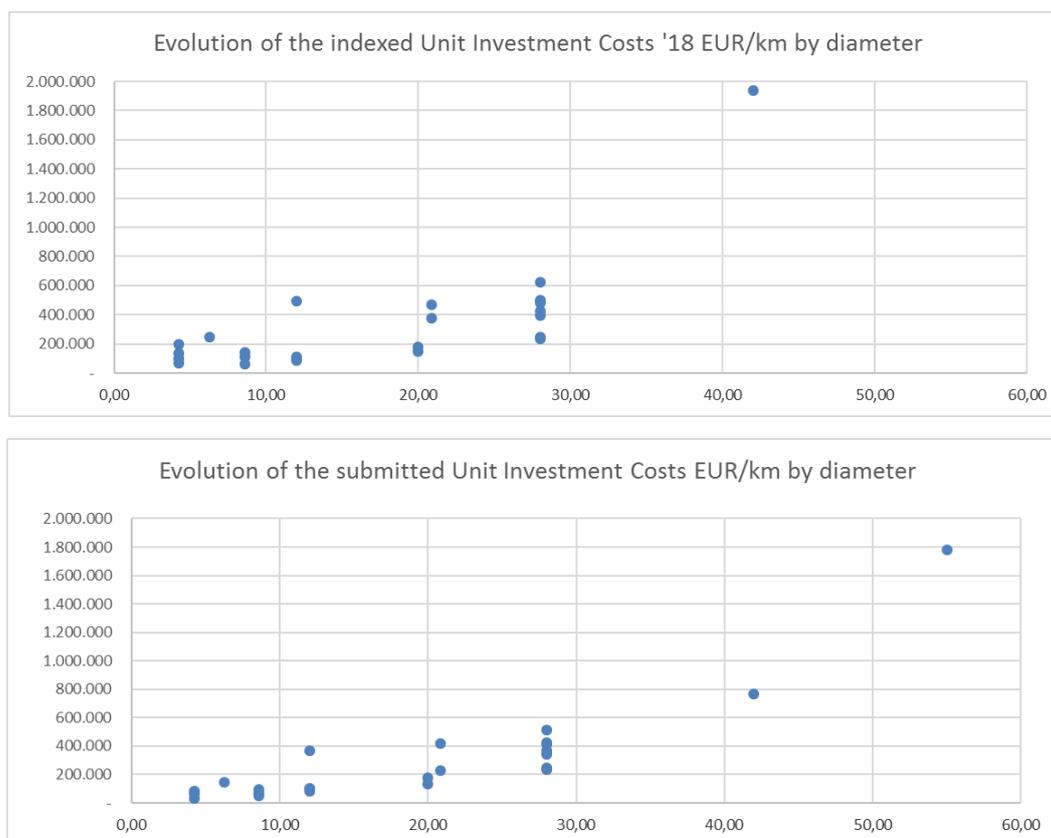
Total cost per circuit route length (km)					
Type	Mean (2018€)	Mean submitted (€)	No. of assets	St dev σ of 2018 € data (% of mean)	St dev σ of submitted (€) data (% of mean)
Diameter <10"	132.472,23	77.859,93	8	44,94%	41,16%
Diameter 10"<x<20"	185.975,19	160.283,04	6	75,82%	60,20%
Diameter 20"<x<30"	417.995,50	354.503,17	9	27,64%	26,43%
Diameter 30"<	5.064.612,07	1.275.590,76	2	61,79%	39,71%

As the sample number is small and the region is not homogeneous (Western Balkan countries, Ukraine, Moldova and Georgia), the range of the data is large. In case of the 30"+ pipelines, the sample contains only 2 elements.

The following two graphs indicate the development of the unit investment costs based on the pipeline's diameter. In case of the 30"+ pipelines, the average was not plotted².

² 5,06 mEUR/km

Figure 1: Evolution of the *submitted* and *inflation-indexed (2018 terms EUR)* Unit Investment Costs base on the diameter



As no information was submitted with regards to other infrastructure types (UGS, LNG or CNG equipment, compressor stations, other), such data cannot be presented.

V. Conclusions

It has to be noted again that the available sample size was significantly lower in the Energy Community Contracting Parties compared to the analysis carried out by ACER on EU level. Only three countries took part in the exercise, with two of them providing almost 92% of the data. Consequently, the level of the statistical analysis is relatively lower.

The inflation rates in the Contracting Parties, as reported by their respective National Banks, were significantly higher than that of the European Union Member States and represent very divergent paths even when compared to each other. The various cost types of gas infrastructure are effected differently by inflation. Cost types mostly linked with local labour are more closely connected with local inflation; while long lead items and equipment are subject to global price changes.

With the above restrictions, and bearing in mind the limited amount of available data, it can be concluded that, the gas pipeline costs in those Energy Community Contracting Parties which submitted data -but mostly in Georgia and Moldova- were within the ranges -mostly at the lower end- of the costs observed within the European Union.

VI. References

1. [EU Energy Law, The Energy Infrastructure Policy of the European Union, Volume VIII, Claves & Casteels 2014](#)
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