

IMPLEMENTATION OF THE MONITORING, REPORTING AND VERIFICATION SYSTEM FOR GREENHOUSE GAS EMISSIONS IN THE REPUBLIC OF SERBIA: FROM REGULATORY FRAMEWORK TO THE FIRST REPORTING YEAR

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ABSTRACT

The establishment of the monitoring, reporting and verification (MRV) system for greenhouse gas emissions in the Republic of Serbia represents an important step towards the future implementation of an emissions trading framework and the harmonization of national climate policy with the European Union acquis. Following the adoption of the national monitoring and reporting regulation, operators were required to apply for greenhouse gas emission permits and submit monitoring plans with supporting documentation. This paper presents the implementation process from the adoption of the regulatory framework and preparation of operators to the completion of the first reporting year. Special attention is given to practical challenges identified during the preparation and implementation of monitoring plans, including the identification of emission sources and source streams, selection of activity data sources, application of monitoring tiers, development of internal procedures and assessment of data uncertainty. Experiences from the first reporting year are illustrated through the example of a category B district heating operator with annual emissions of approximately 95.000 t CO₂. The results indicate that the first reporting cycle provided valuable experience for operators, verifiers and competent authorities, while highlighting the need for further capacity building and methodological clarification.

Key words: MRV system, greenhouse gas emissions, monitoring plan, EU ETS, Serbia

INTRODUCTION

The European Union Emissions Trading System (EU ETS) is one of the central instruments of European climate policy. It was established as a greenhouse gas allowance trading scheme within the European Union and has become a key mechanism for reducing emissions from energy-intensive sectors (European Parliament and Council, 2003). The system has been further revised in the context of strengthened EU climate targets and the broader Fit for 55 policy package (European Parliament and Council, 2023).

Although the Republic of Serbia has not yet established a full emissions trading system in the sense of allowance allocation and trading, the introduction of a national monitoring, reporting and verification (MRV) system represents the first operational step towards such a mechanism. A reliable MRV system creates the basis for transparent emissions data, consistent reporting, independent verification and future integration with carbon pricing or emissions trading mechanisms.

The implementation of the MRV system is particularly important for candidate countries and economies in the process of harmonizing their climate legislation with the European Union acquis. For installation operators, however, the introduction of MRV requirements represents a complex technical, organizational and administrative process.

In Serbia, the first reporting year for installation operators started on 1 January 2025, while reporting and verification of annual greenhouse gas emissions for 2025 were carried out during the first quarter of 2026. This period provided the first practical insight into the readiness of operators, verifiers and competent authorities to implement the new requirements. The paper therefore focuses on the transition from the adopted regulatory framework to the practical experience gained during the first reporting cycle.

The objective of this paper is to analyse the implementation of the MRV system for greenhouse gas emissions in the Republic of Serbia, with emphasis on the regulatory framework, preparation of operators, practical implementation challenges and lessons learned from the first reporting year. The experience is additionally illustrated through the example of a district heating operator, which demonstrates typical technical and methodological issues faced by operators during the preparation and implementation of monitoring plans.

REGULATORY FRAMEWORK FOR THE IMPLEMENTATION OF THE MRV SYSTEM IN SERBIA

The legal basis for the establishment of the MRV system in the Republic of Serbia is provided by the Law on Climate Change, which introduced obligations related to greenhouse gas emission permits, monitoring plans, annual emission reports and verification (Republic of Serbia, 2021a). The Law established the general framework for monitoring, reporting and verification of greenhouse gas emissions from installations and aviation activities, thereby creating the basis for further harmonization with the EU climate policy framework.

The scope of installations subject to MRV obligations was further defined by the Regulation on Types of Activities and Greenhouse Gases, which specifies covered activities, activity capacity thresholds and greenhouse gases included in the national MRV system (Republic of Serbia, 2022). On this basis, the competent ministry identified installations that were required to enter the system. This step was particularly important because the initial coverage of the MRV system depended not only on general legal obligations, but also on the correct interpretation of activity categories, capacity thresholds and applicable greenhouse gases.

The most important by-law for the practical implementation of the MRV system is the Rulebook on Monitoring and Reporting of Greenhouse Gas Emissions, adopted in December 2023 (Republic of Serbia, 2023). The Rulebook started to apply in 2024 and defined detailed requirements for the preparation of monitoring plans, monitoring methodologies, determination of activity data, calculation factors, monitoring tiers, data flow activities, control activities and reporting. In this respect, the Serbian MRV framework follows the main principles of the EU monitoring and reporting system, particularly regarding the need for transparent, accurate, complete, consistent and verifiable emissions data (European Commission, 2018a).

After the Rulebook entered into application, installation operators were given a six-month period, until July 2024, to submit applications for greenhouse gas emission permits. The application had to be accompanied by a monitoring plan and supporting documentation. During the second half of 2024, the competent ministry reviewed the submitted documentation and issued greenhouse gas emission permits. The obligation of operators to monitor and report greenhouse gas emissions started on 1 January 2025. Figure 1 presents the key milestones in the implementation of the MRV system in Serbia, from the adoption of the monitoring and reporting regulation to the first reporting and verification cycle.

The verification component of the MRV system is based on the principle that annual emission reports should be independently assessed by competent and accredited verification bodies (European Commission, 2018b). In Serbia, the obligations of verification bodies and the requirements for verification and accreditation are defined by the national Rulebook on Verification and Accreditation of Verifiers of Greenhouse Gas Emission Reports (Republic of Serbia, 2021b).



Figure 1: Timeline of the implementation of the MRV system in Serbia

Although the national system is often discussed in the broader context of the EU ETS, it is important to emphasize that Serbia has introduced the MRV component, not a complete emissions trading system. Therefore, the current stage should be understood as the establishment of a reliable emissions monitoring and reporting infrastructure, which may serve as a foundation for future carbon pricing or allowance trading mechanisms.

PREPARATION OF OPERATORS FOR THE INTRODUCTION OF THE MRV SYSTEM

The preparation of operators began with the introduction of the new MRV requirements in early 2024. Operators had to become familiar with the concept of greenhouse gas emission permits, monitoring plans, annual emission reports and independent verification. For many operators, this represented the first systematic encounter with EU ETS-type monitoring requirements, even though some facilities had previous experience with environmental reporting or energy management.

A key element of the preparation process was the development of monitoring plans. The monitoring plan is the central document of the MRV system, as it defines emission sources, source streams, monitoring methodologies, activity data sources, calculation factors, monitoring tiers, data flow activities and control procedures. In practice, the preparation of monitoring plans required operators to analyse their technological processes in detail and to translate existing operational, metering and accounting practices into the format required by the MRV regulation.

Training activities were therefore essential during the initial phase. Operators had to be trained not only to complete formal templates, but also to understand the underlying logic of the MRV system. This included the distinction between emission sources and source streams, the classification of source streams, selection of monitoring methodologies, documentation of data sources and preparation of written procedures. The quality of the submitted monitoring plans depended significantly on the operator's understanding of these concepts.

The greenhouse gas emission permit created direct obligations for operators from the beginning of the first reporting year. Operators were required to monitor emissions in accordance with the approved monitoring plan, maintain appropriate records, apply data flow and control activities, prepare annual emission reports and submit them for verification. This meant that the monitoring plan was not only an administrative document prepared for permitting purposes, but also the operational basis for annual monitoring and reporting.

IMPLEMENTATION CHALLENGES

The first phase of implementation revealed several practical challenges. These challenges were expected, considering that the MRV system was introduced within a relatively short timeframe and required operators to establish new technical and administrative practices.

One of the most important challenges was the identification of emission sources and source streams. In many installations, existing internal documentation was not structured in the same way as required by the

MRV system. Operators therefore had to identify all relevant emission sources, define source streams and classify them according to their contribution to total emissions. This was particularly important for installations using several fuels, auxiliary materials or backup systems.

The selection of activity data sources was another significant issue. Activity data may be based on invoices, operator measurements, stock changes, conservative estimates or other documented sources, depending on the nature of the source stream and the applicable monitoring methodology. Operators had to demonstrate that the selected source of activity data was appropriate, traceable and consistent with the monitoring plan. In practice, the difference between commercial documentation, internal measurements and auxiliary estimates required careful explanation.

The determination of calculation factors also required attention. For standard commercial fuels, default values may be used under certain conditions, while for some fuels calculation factors may be based on supplier data, quality reports or laboratory analyses. Operators had to identify the correct source of information for net calorific value, emission factor, oxidation factor and other relevant parameters. In some cases, the challenge was not the absence of data, but the correct interpretation and documentation of the available data.

The application of monitoring tiers represented an additional methodological challenge. Operators needed to understand the relationship between installation category, source stream category, monitoring methodology and required tiers. This was particularly important for major source streams, where higher accuracy requirements generally apply. At the same time, simplified approaches could be used for minor and de minimis source streams, but these approaches also had to be properly justified and documented.

A further challenge was the preparation of written procedures and supporting documentation. Monitoring plans required references to procedures related to data flow activities, control activities, responsibilities, record keeping, quality assurance, data gaps and internal reviews. For many operators, the number and level of detail of these procedures were new. As a result, the preparation of monitoring documentation required cooperation between technical personnel, environmental departments, accounting departments, metering services and management.

The assessment of data uncertainty was also among the main implementation challenges. Operators had to evaluate the uncertainty of activity data, especially where metering systems were used. This required information on measuring instruments, maximum permissible errors, calibration or verification records, correction devices and, in some cases, the combination of uncertainty contributions from several measurement lines. The practical difficulty was that operators often possessed metrological documentation, but had not previously used it for the purpose of greenhouse gas monitoring.

Laboratory analyses were another area requiring methodological clarification. Where calculation factors are determined through analyses, operators need to ensure that sampling, laboratory competence, analytical methods and frequency of analysis are appropriate. In the first implementation phase, it was important to distinguish between cases where laboratory analysis was required and cases where default values, supplier data or regulatory values could be used.

Finally, organizational challenges were significant. The MRV system requires clearly assigned responsibilities, stable data flows, internal checks and management awareness. The first reporting year showed that MRV implementation is not only a technical task, but also a management process. Operators that established internal coordination between technical, financial and environmental functions were generally better positioned to prepare consistent monitoring documentation and annual reports.

FIRST REPORTING YEAR - EXPERIENCES AND LESSONS LEARNED

The first reporting year started on 1 January 2025, while annual emission reports for 2025 were prepared and verified by 31 March 2026. This first reporting cycle provided the first practical test of the Serbian MRV system. Available implementation information indicates that approximately 120 installations were identified as subject to MRV obligations, while around 90 installations have been included in the system so

far. The difference between identified and included installations indicates the need for further clarification of coverage, communication with operators and enforcement of obligations.

The first reporting cycle also required the establishment of a national verification infrastructure. This represented an additional challenge because accreditation of verification bodies according to SRPS EN ISO/IEC 17029:2020 had not previously been applied in this field in Serbia. The Accreditation Body of Serbia therefore had to develop the necessary accreditation process and ensure competent assessors for organizations seeking accreditation as greenhouse gas verification bodies. For the first reporting year, five verification bodies obtained temporary accreditation, while additional safeguards were introduced through the engagement of experienced foreign verifiers, whose role was to support, train and supervise domestic verifiers until sufficient national experience was developed. This approach contributed to the credibility of the first verification cycle, but also demonstrated that the development of verifier competence is one of the key elements of a functioning MRV system.

During verification of the first annual emission reports, operators received recommendations related to monitoring plans and supporting documentation. In some cases, verifiers identified the need to correct or clarify certain elements of the monitoring plan, such as data sources, procedures, monitoring methodologies or source stream descriptions. As a result, operators prepared new versions of monitoring plans and submitted them to the competent ministry for approval. This process is an expected part of the initial implementation phase and may contribute to the gradual improvement of monitoring documentation.

The experience of a district heating operator can be used to illustrate typical issues in the first reporting year. The operator belongs to category B and has annual emissions of approximately 95.000 t CO₂. Its combustion activities are based primarily on natural gas, with additional source streams including light fuel oil, urea used for DeNO_x in gas engines and diesel fuel for an emergency generator. Natural gas is combusted in five boilers and three gas engines and is supplied through three gas lines, each equipped with a flow meter and volume corrector.

Table 1 presents a simplified overview of the main source streams, activity data sources, calculation factor sources and implementation challenges in this example.

Table 1: Example of source streams and monitoring approach for a district heating operator

Source stream	Type of source stream	Activity data source	Calculation factor source	Main implementation challenge
Natural gas	Major source stream	Supplier invoices	Gas quality report; NCV and EF calculated according to national regulation	Consistency between commercial data, several gas lines and monitoring documentation
Light fuel oil	Minor source stream	Operator flow meter	Default values from national regulation	Documentation of internal measurement and data flow
Urea	De minimis source stream	Conservative estimate	Default values from national regulation	Methodological interpretation and simplified monitoring approach
Diesel fuel	De minimis source stream	Conservative estimate	Default values from national regulation	Justification of simplified monitoring for very small emissions

The example shows that even installations with relatively conventional combustion processes may face complex MRV issues. Natural gas, although a standard commercial fuel, required clear documentation of the relationship between invoices, metering lines, gas quality data and calculation factors. Minor and de minimis source streams required proportional approaches, but also sufficient justification in the monitoring plan. The use of urea for DeNO_x in gas engines additionally demonstrated the importance of correctly identifying all materials that may result in greenhouse gas emissions.

Several lessons can be drawn from the first reporting year. First, the quality of monitoring plans depends on the operator's ability to understand and document existing technical and administrative practices in MRV terms. Second, data sources must be clearly defined and consistently used throughout the reporting process.

Third, written procedures are essential for ensuring continuity and traceability of data. Fourth, uncertainty assessment requires better integration of metrological documentation into emissions monitoring. Finally, the first verification cycle plays an important role in identifying weaknesses and improving the quality of monitoring documentation.

CONCLUSIONS

The introduction of the MRV system for greenhouse gas emissions in the Republic of Serbia represents an important step in the development of national climate policy and future alignment with emissions trading mechanisms. Although a full emissions trading system has not yet been established, the MRV framework provides the necessary foundation for reliable emissions data, annual reporting and independent verification.

The first implementation phase showed that Serbia established the basic regulatory and procedural framework within a relatively short period. Operators submitted permit applications and monitoring plans, the competent authority issued greenhouse gas emission permits, and the first reporting and verification cycle was completed for the 2025 reporting year. At the same time, the process revealed several practical challenges, particularly in the identification of emission sources and source streams, selection of data sources, application of monitoring tiers, preparation of procedures and assessment of data uncertainty.

The experience of the first reporting year should therefore be understood as a learning phase for all participants in the system. Further improvement should focus on capacity building, clearer methodological guidance, consistent interpretation of regulatory requirements and strengthening of internal MRV procedures at operator level. These improvements will be important for increasing the reliability of emissions data and preparing the Serbian system for possible future development towards carbon pricing or emissions trading.

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