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Work Package 5: Application of the classification of environmental purposes

Deliverable D 5.1

Final methodological report

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1 Summary and project achievements

This methodological report describes the development work done under WP5.

1.1 Overview

In 2025, Statistics Estonia implemented the Classification of Environmental Purposes (CEP) across several key environmental-economic statistical domains. The introduction of this classification aimed to enhance the coherence, comparability, and analytical potential of data related to environmental protection and resource management and comply to the needs of the amendment of the regulation 691/2011.

The implementation was carried out as follows:

The CEP was applied to the following environmental accounts domains which publication was scheduled as follows: Environmental Goods and Services Sector (EGSS) by October 2025, to the Environmental Protection Expenditure Accounts (EPEA) by December 2025 and Environmental Subsidies and Similar Transfers in December 2025, all for the full timeseries.

The adoption of the CEP represented a significant step towards a structured and functional categorization of economic activities, products, and expenditures contributing to environmental protection and natural resource management. By implementing CEP classification Estonia ensured consistency with the development of international statistical standards (System of Environmental-Economic Accounting Central Framework (SEEA CF)) and improved the usefulness of environmental-economic accounts for policy development in climate change mitigation, biodiversity conservation, and resource efficiency.

The methodological framework for the implementation was based on the Eurostat guideline “Implementation of the classification of environmental purposes in environmental monetary accounts” (ENV/EA-MESA/WG/2024/06). The methodological conversion to the new classification was made using 2023 data, and active cooperation with other Statistics Netherlands took place to address methodological and data-related challenges. Timeseries were revised as a second step at the end of the development and application work.

Where feasible, the CEP was applied at the most detailed data level for EGSS compilation using bottom-up methodologies. To ensure comparability and data quality, EGSS data were compiled and reported in parallel according to both the CEP and CEPA/CREMA classifications. The EGSS results for 2023, classified according to the CEP, were delivered by October 2025.

In addition to methodological development and data conversion, meta-information, publication tables, and related materials on the Statistics Estonia website were revised. Furthermore, an analysis of the feasibility of developing allocation tables was carried out to support the revision of time series.

Two key meetings were held within the framework of the project — the Kick-off Seminar and the Final Seminar — both organised by Statistics Estonia. The Kick-off Seminar focused on the planning and refinement of detailed tasks for the project team and partners, bringing together experts to discuss the implementation strategy, methodological priorities, and division of responsibilities. This meeting served as the foundation for coordinated project execution and ensured a shared understanding of objectives, timelines, and expected outputs. The Final Seminar, held at the end of the project, provided an opportunity to review and discuss the main achievements, assess progress against the initial objectives, and identify lessons learned and potential areas for future development. Both meetings were documented in minutes, which record the key discussions, agreements, and action points for reference and follow-up.

As part of the dissemination and knowledge-sharing activities, Statistics Estonia delivered a presentation at a Eurostat webinar dedicated to the implementation of the Classification of Environmental Purposes (CEP). The presentation introduced Estonia’s approach to applying the new classification within the statistical domains: Environmental Goods and Services Sector (EGSS), Environmental Protection Expenditure Accounts (EPEA), and statistics on environmental subsidies and similar transfers. It outlined the main methodological steps, application of Machine learning and challenges encountered during the conversion of data, and preliminary solutions developed to ensure consistency with Eurostat guidelines. The contribution was well received and provided an opportunity to share Estonia’s experience, exchange views with other national statistical institutes, and gather valuable feedback to further improve the methodological framework.

Through these activities, Statistics Estonia successfully ensured a smooth transition to the Classification of Environmental Purposes and strengthened the statistical basis for monitoring environmental investments, expenditures, and economic activities contributing to sustainable development.

This work, supported by EU funds for methodological development, not only advanced CEP implementation but also addressed activities outside its scope through transparent tagging and bridge solutions, ensuring Estonia's experience contributes to GN C3 guidance and the SEEA CF revision process.

1.2 Deliverables and milestones

WP5 deliverables have been completed. Outputs include the Final Methodological Report, CEP-classified datasets for EGSS, EPEA, and ESST, and presentation materials for Eurostat workshops. Milestones such as the Kick-off Seminar (28 January 2025) and Final Seminar (25 November 2025) were held, with minutes attached as Annexes 1 and Annex 2.

Deliverable D 5.1 “Final Methodological Report” and deliverable D 5.3 “Presentation materials for Eurostat workshops” are uploaded to the Funding & Tenders Portal.

Regarding deliverable D 5.2 “Datasets classified according to classification of environmental purposes”, an excel file is presented outlining the names and delivery details plus the length of the timeseries converted to the CEP.

Data for the EGSS, EPEA, and ESST classified by CEP are uploaded via eDAMIS portal for single years. These extensive datasets are not uploaded to the partnership portal as datasets for the single years by domain. In case of request the upload to the portal is also feasible.

1.3 Indicators and impact

All planned indicators were achieved. WP5 achieved the implementation of the Classification of Environmental Purposes (CEP) across:

EGSS: Complete time series (2014–2023) reclassified; bottom-up and top-down methods applied as feasible; macros developed for automated conversion.

EPEA: CEP embedded as metadata and allocation layer without disrupting CEPA-based transmission.

ESST: CEP applied at Level III using machine-learning assisted classification; 2022 data were used for model training.

Dissemination: Publication tables revised; CEP-based outputs are published; presentation delivered at Eurostat webinar and one presentation covering all CEP application activities is prepared.

Impact: CEP adoption improves thematic granularity, coherence across accounts, and policy relevance. Estonia’s experience gives an insight to structured feedback to on secondary-purpose treatment and level-of-detail pragmatism.

1.4 Impact and sustainability

From 2026 onward, CEP implementation will be maintained and enhanced by:

Stabilizing machine learning (ML) accuracy through expanded training datasets and active learning.

Updating metadata and bridge tables for time series continuity.

Incrementally extending Level III coverage based on user demand and source data quality.

Continuing methodological dialogue with Eurostat and CBS on secondary-purpose treatment and taxonomy refinements.

1.5 Risk Management

Key risks and mitigations:

Class sparsity at Level III: addressed via targeted re-annotation and fallback to Level II where needed.

Machine Learning accuracy challenges: Mitigated through incremental training and confidence-based expert review.

Borderline cases: Flagging and documentation procedures introduced; feedback provided to Eurostat.

Dissemination complexity: Dual coding (CEP + CEPA/CREMA) maintained during transition to preserve continuity.

1.6 Dissemination

Project results were disseminated through final Methodological Seminar (25 November 2025) and Eurostat Webinar on CEP implementation. CEP was published on Statistics Estonias's web site and relevant references to the new classification in thematic pages were made.

The implementation of CEP was not limited to methodological development; it also included the revisions in dissemination channels. Key actions:

CEP categories were integrated into Statistics Estonia's online database for EGSS, EPEA and ESST outputs. All tables previously published under CEPA/CREMA were restructured to reflect CEP coding. The dual reporting was maintained in databases during the transition period to safeguard continuity.

Dissemination tables were redesigned to accommodate CEP structure and published alongside with EGSS and EPEA press releases. highlighting the benefits of the new classification, such as improved thematic detail and harmonization across accounts.

Estonia's approach and lessons learned were presented at a Eurostat webinar, providing visibility at the European level and fostering methodological dialogue. Feedback from this event informed refinements in allocation rules and dissemination formats.

2 Methodological consolidation and governance

WP5 developed a national method for CEP application across EGSS, EPEA, and ESST, anchored in Eurostat guidance and adapted to the Estonian data ecosystem. The guidance translates the CEP hierarchy into operational decision rules for both top-down modules (where allocation relies on macro-sources and purpose keys) and bottom-up modules (where purpose is identifiable at the unit, product, or transaction level).

Terminology and translation were completed. A full Estonian-language adaptation of CEP was prepared, including definitional notes and examples to ensure uniform interpretation by compilers and stakeholders. Ambiguities arising from new purpose boundaries (e.g., CEP 0402 materials savings vs. 0401 waste management) were resolved with rule-based tests and precedence logic.

Bridge mapping from CEPA/CREMA to CEP was done. To safeguard continuity of time series and user familiarity, WP5 constructed systematic crosswalks between legacy CEPA/CREMA and CEP at the second and third levels. These bridge tables underpin both historical re-estimation (for presentation consistency) and dual-coding in 2025 dissemination where appropriate.

2.1 EGSS (Environmental Goods and Services Sector).

Third-level (Level III) CEP application was tested and implemented for those bottom-up blocks where product/service content is sufficiently specific (e.g., waste/materials management, biodiversity services).

For mixed or top-down blocks, robust Level II assignments were applied to avoid pseudo-precision.

The publication framework was revised to accommodate Level II/III CEP outputs while preserving links to earlier series.

2.2 Empirical demonstrations of added value

Waste and materials domain (CEP 0401–0402).

Bottom-up EGSS compilation now distinguishes collection/transport, hazardous vs. non-hazardous treatment, and cooling-water vs. wastewater services, and separates materials savings by resource class (e.g., metals, glass, textiles). The glass-packaging case shows how LoW codes and disposal/recycling codes can be used to drive Level III CEP assignment, yielding defensible splits between 0401 (waste management) and 0402 (materials savings).

Water domain (CEP 0301–0302).

The method differentiates sewerage network management, wastewater treatment, and cooling-water treatment (030104), enabling more policy-relevant indicators for water conservation and infrastructure.

Biodiversity and landscape (CEP 0502).

Detailed EGSS outputs now separate habitat/species protection (050201) from landscape maintenance (050202) and monitoring (050203), reflecting actual programme design and facilitating thematic analyses linked to nature restoration.

2.3 Technical enablers: automation and learning systems

Re-engineering of the ML pipeline for ESST.

The prior text-based classifier for CEPA/CREMA was ported to CEP, with updated label spaces, curated annotation, and error-inspection loops to handle under-represented Level III classes. WP5 documented the accuracy implications of greater class cardinality and introduced confidence-based fallbacks to expert review in ambiguous cases.

Process documentation and reproducibility.

All allocation rules, bridge tables, and exception logs were consolidated in version-controlled artefacts, ensuring no-black-box operation and full audit trails for internal QA and future method reviews.

2.4 Quality gains and user-facing benefits

Granularity and thematic insight.

CEP enables third-level thematic reporting (e.g., decoupling 040202 mineral-class savings from 040203 fossil feedstock savings) that materially improves the interpretability of EGSS and ESST for policy users.

Coherence across accounts.

A single purpose classification applied to EGSS, EPEA, and ESST reduces reconciliation differences, improving cross-table traceability from expenditure and subsidies to supply of environmental goods and services.

Communication and stewardship.

Clearer purpose labels and examples improve stakeholder communication, while documented bridge rules protect time-series continuity during transition from CEPA/CREMA.

2.5 Challenges encountered and how they were addressed

Class sparsity at Level III.

Some CEP subclasses occur infrequently in national data, depressing ML performance. WP5 mitigated this through targeted re-annotation, class aggregation to Level II where warranted, and human-in-the-loop review for low-confidence predictions.

Out-of-scope/secondary-purpose grey zones.

Rather than force-classify borderline flows, WP5 introduced flagging and documentation procedures and proposed that Eurostat consider secondary-purpose extensions in future guidance.

Change-management and dissemination: re-organising publication tables required user messaging, including the possibility of dual reporting (CEP and CEPA/CREMA) during the transition period to preserve continuity for established users.

3 Consistent implementation across statistical domains

3.1 Application of the Classification of Environmental Purposes for to the Environmental Goods and Services Sector (EGSS)

For Environmental Goods and Services Sector, the Classification of Environmental Purposes were applied for the whole time series 2014 to 2023 data. The process consisted of:

- Changing the working files classification throughout the calculations. Since most of the working files consist of automated formulas and links this was an important step.
- After that the methodological approach was reconsidered for multiple aspects to be able to use bottom-up method and/or the most detailed level CEP.
- (Raw) data received from other departments and databases used for EGSS needed to be reclassified from CEPA and Crema to CEP. This also consisted reclassifying of the registry of environmental producers and services providers data.
- The final consolidated outputs for Eurostat and homepage publishing were changed and CEPA & Crema were reallocated to CEP using excel macros and transition tables.

3.1.1 Bottom up and top down

EGSS in Statistics Estonia includes more than 20 different methodological blocks differing by the input data and calculation logic. Some of the calculations can be made top down where the total value is known and is then distributed to sector and NACE using various additional information. Other blocks are calculated using bottom-up approach, this regards the statistical area where the necessary information is available on an enterprise level.

Where feasible, the CEP was applied at the most detailed data level for EGSS compilation using bottom-up methodologies.

To ensure comparability and data quality, in 2025 EGSS data were compiled in parallel according to both the CEP and CEPA/CREMA classifications. The EGSS results for 2023, classified according to the CEP, were delivered to Eurostat and published in Statistics Estonia database in October 2025.

Top down approach was considered for example for:

CEP 0401

- Construction Services for wastewater treatment plants
- Landfill closure services

CEP 0601

- Light traffic road construction service
- Noise barrier construction services

CEP 0202

- Energy-efficient street lighting
- Renovation of heating systems

Bottom up was applied for some methodology blocks such as:

- waste & recycling,
- miscellaneous goods and services of S.11, S.13 and S.15 sectors

Also, all methodology blocks that use detailed bottom-up subsidies data such as:

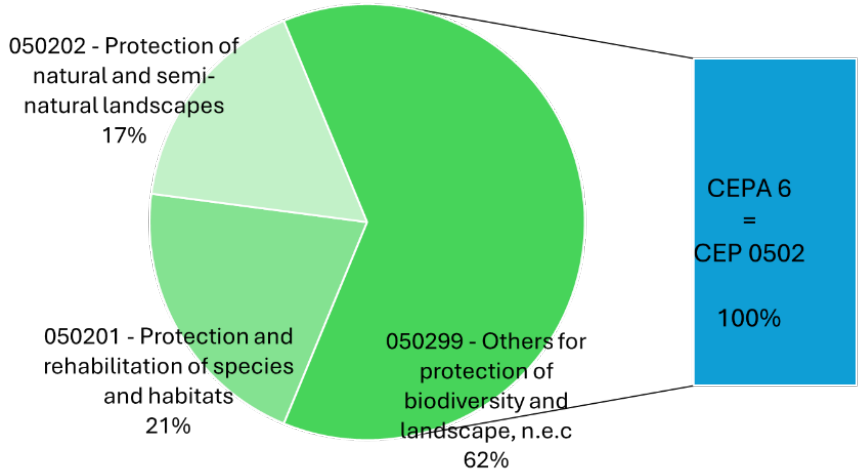
- The service for the construction and design of waste management facilities and the closure of landfill (CEP 0401)
- The service for the remediation of residual pollution and the construction and design of soil and water protection facilities (CEP 05)
- Construction and design of fish passages (CEP 0502)
- The service for converting boiler houses to renewable fuels: construction and design (0201)

EGSS register that includes companies' products and services information was reclassified using the most detailed level CEP. It was observed that identifying the most detailed CEP level is not always straightforward, as enterprises are active in multiple areas. Therefore, attributing a single CEP category can be challenging and may sometimes require more effort—such as searching for additional information—than is reasonable.

It was seen that for some categories CEP gives an opportunity to distinguish more detailed environmental activities than it was in CEPA/CReMA – this applies for example for CEPA 6 where it was possible to distinguish maintenance of semi-natural grasslands, protection of species and habitats and other activities under protection of biodiversity and landscape.

Distribution of CEP 0502 is shown in Figure 1. Shares on the Figure 1 are calculated based on 2022 data that were available in June. As the Figure shows a possible opportunity to use more detailed CEP levels for more information, it was not updated with 2023 data.

Figure 1. Distribution of CEPA 6 output to different CEP categories



In addition to CEPA 6 other distributions of CEPA to more detailed CEP were distinguished and can be seen in Table 1.

Table 1. Distribution of CEPA activities to relevant CEP categories

CEPA category	CEP	Basis
CEPA 2 - Wastewater management	030102 - Management of sewerage networks	Further detail is possible using the amounts of treated wastewater and cooling water and content of methodology blocks
	030104 - Treatment of cooling water	
	030103 - Treatment of wastewater	
	030199 - Others for wastewater management	
CEPA 3 - Waste management	040102 - Collection and transport of waste	Further detail is possible using the amounts of treated waste and content of methodology blocks
	040103/04 - Treatment and disposal of (non) hazardous waste	
	040199 - Others for waste management, n.e.c.	

CEPA 4 - Protection and remediation of soil, groundwater and surface water	050102 - Cleaning up of soil and water bodies	Further detail is obtained using content of different methodology blocks
	050105 - Monitoring and measurement for soil, surface and groundwater protection	
	050199 - Others for soil, surface and groundwater protection, n.e.c.	
Miscellaneous products and activities in various CEPA and CReMA	Various CEP categories	Further detail is obtained based on information about the enterprice

As part of the dissemination and knowledge-sharing activities, Statistics Estonia delivered a presentation at a Eurostat webinar dedicated to the implementation of the Classification of Environmental Purposes (CEP). The presentation introduced Estonia's approach to applying the new classification within the Environmental Goods and Services Sector (EGSS) among other domains.

It outlined the main methodological steps, challenges encountered during the conversion of data, and preliminary solutions developed to ensure consistency with Eurostat guidelines.

The contribution was well received and provided an opportunity to share Estonia's experience, exchange views with other national statistical institutes, and gather valuable feedback to further improve the methodological framework. The key discussion points and follow-up actions from the webinar were also summarized in the meeting minutes.

3.1.2 EGSS timeseries revision and recalculation

All methodological blocks were calculated separately in different processing files. Once the results for each methodological block have been calculated, they were filled into an aggregated EGSS table, which contains separate sheets for output, gross value added, employment, and exports, as well as additional information on NACE, CEPA/CReMA classifications, and market, non-market, and ancillary divisions.

Macros were created for the reallocation of existing reporting tables according to CEP.

Update of timeseries was done in two stages. First the data was prepared for reallocation. For this multiple added rows were created for "other environmental products" for all EGSS output, Gross Value Added, Employment and Exports sectors. After that the transition table for CEPA/CReMA was created (see Table 2).

Table 2. Transition table between CEPA/Crema to CEP

CEPA 1	CEPA 1.1.2 and 1.2.2	CReMA 13 A	CReMA 13 B	CEPA 2	CReMA 10	CEPA 3	CReMA 11 B	CReMA 13 C	CReMA 14	CEPA 4	CEPA 6	CReMA 12	CReMA 11	CReMA 11 A	CEPA 5	CEPA 7	CEPA 8.1.2	CEPA 8	CReMA 15.5.1	CReMA 15	CEPA 9	CReMA 16
Protection of ambient air and climate	Protection of climate and ozone layer (as a subgroup of protection of ambient air and climate)	Production of energy from renewable sources	Heat/Energy saving and management	Wastewater management	Management of waters	Waste management	Minimisation of the intake of forest resources	Minimisation of the intake of fossil resources as raw material	Management of minerals	Protection and remediation of soil, groundwater and surface water	Protection of biodiversity and landscapes	Management of wild flora and fauna	Management of forest resources	Management of forest areas	Noise and vibration abatement	Protection against radiation	R&D for the protection of climate and ozone layer (as a subgroup of research and development for environmental protection)	Research and development (R&D) for environmental protection	R&D for the production of energy from renewable sources (as a subgroup of R& D for resource management)	Research and development (R&D) for resource management	Other	Other
CEP 01		CEP 0201	CEP 0202	CEP 0301	CEP 0302	CEP 0401	CEP 0402			CEP 0501	CEP 0502		CEP 0503		CEP 06		CEP 0701 + 0703 + 0705 + 0707 + 0709		CEP 0702 + 0704 + 0706 + 0708		CEP 08	
Air and climate		Energy from renewable sources	Energy savings and management	Wastewater management	Water savings and management of natural water ressources	Waste management	Materials recovery and savings			Protection of soil, surface and groundwater	Protection of biodiversity and landscape		Management of forest resources		Noise and radiation		Research and development environmental protection		Research and development resource management		Cross-cutting and other environmental purposes	

Using this transition table Macros were used to reallocate Cepa and Crema allocations to CEP for EGSS output, Gross Value Added, Employment and Exports results and also for methodology blocks that are used for preparing EGSS.

With created macros full timeseries was revised from 2014 to 2023 which was a basis for Eurostat tables and for published tables in Statistics Estonia web database. Without the automatization (developed macros) converting whole timeseries to CEP would have taken more time and contribution. Macros could be used from now on continuously, as long as the tables throughout timeseries have the same structure and the logic behind CEP and CEPA/CReMA categories can be simply followed with formulas.

For more detailed view of CEP, additional columns could be added to the aggregated EGSS table where various products and activities could be brought out. Testing the attribution of most detailed CEP was one of the investigation tasks of the grant work, there is now a bases for the future work in this area. Continuation of the application of the detailed CEP levels for output categories depends on the user needs and financing.

3.1.3 Revision of the EGSS calculation rules and metainformation

Creation of macros for the generation of Eurostat reporting tables and web database dissemination tables.

3.1.3.1 Allocation logic

Revision of the publication tables and information on webpage, dissemination related activities

3.1.3.2 Dissemination

New CEP was applied in dissemination tables and was published in the framework of publishing 2014-2023 data. Also press release was compiled for this release comprising new CEP.

3.1.4 Conclusions

The implementation of the Classification of Environmental Purposes (CEP) within the Environmental Goods and Services Sector (EGSS) represents a substantive methodological advancement in Estonia's environmental-economic accounting framework. The exercise demonstrated that CEP can be successfully integrated across the entire EGSS time series (2014–2023), provided that a systematic and multi-layered approach is adopted.

First, the conversion from CEPA/CREMA to CEP required a comprehensive restructuring of working files and automated calculation chains, ensuring that allocation logic remained internally consistent throughout the process. This technical adaptation was complemented by the development of transition tables and macro-based reallocation tools, which enabled the recalibration of historical data and safeguarded continuity in published outputs.

Second, the dual application of bottom-up and top-down methodologies proved essential for achieving both granularity and feasibility. Where enterprise-level data were available, CEP was applied at the most detailed level, unlocking analytical opportunities that were previously unattainable under CEPA/CREMA—particularly in domains such as biodiversity protection and waste/materials recovery. Conversely, for aggregated blocks, a top-down allocation strategy ensured methodological coherence without introducing pseudo-precision. This hybrid approach underscores the flexibility of CEP and its compatibility with heterogeneous data environments.

Third, the revision of EGSS registers and metadata confirmed that CEP enhances semantic clarity and thematic differentiation, allowing for more nuanced representation of environmental activities. For example, activities formerly grouped under CEPA 6 could now be disaggregated into distinct CEP codes, improving interpretability for policy and research users.

Finally, the successful delivery of CEP-classified EGSS results to Eurostat and their publication in 2025 marks a critical milestone in Estonia's transition toward a harmonized European statistical system. The process not only strengthened internal data governance but also contributed to international methodological dialogue through presentations and peer exchange. The experience highlights the importance of automation, transparent allocation rules, and iterative quality assurance as prerequisites for sustainable implementation.

In conclusion, the application of CEP to EGSS has demonstrated clear benefits in terms of granularity, comparability, and policy relevance, while also revealing practical challenges—such as the resource intensity of detailed coding and the need for robust conversion tools—that must be addressed in future cycles. The work provides a replicable blueprint for other domains and sets the stage for deeper integration of CEP across environmental-economic accounts.

3.2 Application of the classification of environmental purposes for environmental protection expenditure accounts (EPEA)

For EPEA transition from CEPA to CEP was very straightforward as all CEPA categories can be reclassified under corresponding CEP category. Statistics Estonia will remain to publish data on the database using former aggregation levels and no extra effort was needed and additional steps are foreseen. As data are published in more detailed level in Statistics Estonia database, some calculation steps will be added for the Eurostat reporting.

In conclusion, CEP was embedded as a metadata and allocation layer with no disruption to mandated CEPA-framed transmission where the legal basis remains unchanged, thereby ensuring methodological coherence while positioning for future Eurostat transitions.

Conversion of the earlier years 2014-2021 was time consuming due to the different layout of earlier database and questionnaires. Data were available in different files in older format making the transition time consuming. Also the aggregation of CEPA 7-9 now in different aggregations in CEP made the conversion more time consuming mainly due to the structure of the input datasets.

3.3 Application of the classification of environmental purposes for environmental subsidies and similar transfers.

CEP was successfully applied for Environmental Subsidies and Transfers account.

WP5 re-parameterised the ESST compilation to classify transfers by CEP and capital/current transfers by payer (general government, rest of the world) and recipient sector/NACE.

This required retrofitting the machine-learning assisted classification (developed under earlier grants for CEPA/CREMA) to the CEP taxonomy and re-annotating training corpora.

3.3.1 Machine-learning assisted classification challenges

Although 2023 was the first year to be reported using CEP, CEP was also applied for 2022 subsidies data. This was because in the grant project, one of the objectives was to develop machine learning for assign CEP. The 2022 data were classified using CEP, as this was used for training the machine learning model. In this grant project, Statistics Estonia attempted to assign CEP on the most detailed level (third level).

In Estonia, subsidies data is relatively detailed – the data is acquired from administrative sources and in most of the cases, contains the project names and descriptions. This made it possible to assign CEP on the most detailed level.

In general, the process of classifying data according to CEP did not differ from previous CEPA/CReMA. Project descriptions were analyzed by an analyst, and corresponding CEP was assigned.

However, when using the most detailed CEP and dealing with large number transfers, CEP became difficult to read (Table 3). For example:

Table 3. How CEP would look like in database while processing

CEP 010201
CEP 010101
CEP 020102
CEP 020202
CEP 010202
CEP 020102
CEP 020201

Compared to CEPA/CReMA, CEP was much more difficult to read and understand. There were several cases where different CEP categories got accidently mixed and confusing when being discussed between analysts or while being processed in datasets. Although presenting data on more detail level would be beneficial to stakeholders, the classification was not convenient to read and understand at first sight to analysts, but also to the stakeholders, who did not have skilled eye and knowledge to understand specifics of the classification. As this was the first time CEP was used, it can be assumed that it takes time to learn CEP classification and apply CEP efficiently. For future reference, it would be beneficial to analyze the classifications from users and stakeholders point of view – how easy is it to apply, present, read and understand.

For machine learning, the added detailed classes provided a challenge. Compared to CEPA/CReMA, CEP has more classes on the most detailed level. This in turn leads to less examples per unique class. And the lower number of examples per class also reduces the accuracy. However, this issue could be mitigated by providing more sample data for the machine learning model to learn from in coming years as the number of the examples will build up.

3.3.2 CEP application observations and suggestions

Even though the third level of CEP provided much more detail compared to previous CEPA/CReMA, it felt like some logical classes were missing. For example, CEP provides such detail:

040102 Collection and transport of waste

040103 Treatment and disposal of hazardous waste

040104 Treatment and disposal of non-hazardous waste

In this case we have single category for collection and transport of waste, which also includes hazardous waste. However, for the treatment and disposal, hazardous and non-hazardous are clearly separated categories. For the sake of better understanding, collecting and transport of waste could be split to two different categories as well:

Collection and transport of hazardous waste

Collection and transport of non-hazardous waste

In CEP 0402 Materials recovery and savings CEP 040205 could be renamed:

Reduction of the intake of other or various materials

In addition to adjusting the name, in the technical note it could be outlined that this category also includes cases when the exact share of savings or reuse of materials could not be identified. Currently, this is described in the technical note at the end of the document, under borderline cases.

In many resource efficiency projects, the aim is to reduce the intake or reuse several different types of materials. Instead of trying to assume how much wood, minerals or fossil fuels are recovered or reused, a separate category for such wide range of projects could be used. Factories producing complex products often undergo resource efficiency upgrades that aim to reduce and reuse several types of resources, instead of focusing on one specific material. For industries specialized on raw material processing, this is not an issue, and appropriate CEP can be assigned.

In general, having more detailed CEP, in a way, made it easier to classify transfers. However, it did not eliminate the borderline cases.

As a final observation, more specific, true to life examples could be added to the CEP technical note of what is included and excluded on third level CEP. Member states could provide some examples of activities that were unique, borderline or difficult to classify.

3.3.3 Conclusions on the application of the CEP to the Environmental Subsidies and Similar Transfers account

The application of the Classification of Environmental Purposes (CEP) to the Environmental Subsidies and Similar Transfers (ESST) account marks a significant methodological enhancement in Estonia's environmental-economic accounting framework. The transition from CEPA/CREMA to CEP was successfully implemented for both 2023 and 2022 data, ensuring continuity while introducing greater thematic precision. This achievement required a comprehensive re-parameterisation of the ESST compilation process, including the adaptation of machine-learning (ML) tools originally designed for legacy classifications.

First, the integration of CEP into ESST demonstrated the feasibility of applying the classification at the most detailed (third) level, leveraging Estonia's relatively granular administrative data. The availability of project-level descriptions enabled accurate coding and facilitated the development of ML-assisted classification models. However, the expanded class structure of CEP introduced complexity: the proliferation of categories reduced the number of examples per class, thereby lowering predictive accuracy. This challenge underscores the need for larger annotated training corpora and iterative refinement of ML algorithms to maintain reliability at fine levels of detail.

Second, while CEP improved analytical granularity and policy relevance, the exercise revealed practical usability concerns. The increased complexity of third-level codes made datasets harder to interpret for both compilers and end-users, raising questions about the balance between detail and readability. This suggests that future guidance should consider user-centric design principles, including clearer naming conventions and structured examples to aid interpretation.

Third, the implementation process highlighted structural gaps and borderline cases within the current CEP taxonomy. For instance, the absence of separate categories for hazardous versus non-hazardous waste collection contrasts with the detailed treatment of disposal activities. Similarly, resource-efficiency projects targeting multiple material types lack an intuitive classification pathway. These observations point to the need for taxonomy refinements and more explicit technical notes, supported by real-world examples contributed by Member States.

Finally, despite these challenges, CEP application to ESST delivered tangible benefits:

1. Enhanced thematic differentiation of subsidies by environmental purpose, payer, and recipient sector.
2. Improved methodological transparency through documented allocation rules and ML governance.

3. Alignment with Eurostat's harmonisation objectives, positioning Estonia as an early adopter and contributor to the European methodological dialogue.

In conclusion, the CEP implementation for ESST represents a critical step toward integrated, purpose-based environmental accounting. While the transition has strengthened analytical capacity, it also exposed areas for improvement—particularly in classification usability, machine-learning scalability, and taxonomy completeness. Addressing these issues through collaborative refinement and expanded training datasets will be essential for sustaining accuracy and interpretability in future reporting cycles.

4 Policy and international methodological dialogue

4.1 Secondary-purpose activities and scope edges.

In consultation with Statistics Netherlands, WP5 set out a bridge-table approach for activities with environmental co-benefits but non-primary environmental purposes (e.g., certain public transport, grid investments, nuclear-related items). The approach marks such flows for methodological disclosure and future Eurostat guidance, avoiding forced or non-robust CEP assignments while preserving transparency.

4.2 Level-of-detail pragmatism.

Estonia piloted Level III publication in targeted domains, while the Netherlands maintained Level II. Both experiences underscore the resource implications of deep granularity and the need to align detail with user demand—a message relayed to Eurostat for future standard-setting

4.3 Relevance to SEEA CF Update (GN C3):

WP5 implemented CEP across EGSS, EPEA, and ESST, but Estonia also tested activities which are extended SEEA scope—such as climate change mitigation investments and circular economy actions. These include electric vehicle infrastructure, low-carbon transport, and energy-efficient construction developed under WP4. Many of these activities are only partially covered by CEP or fall outside its current scope. Estonia's experience confirms UN SEEA CF revision recommendation (GN C3's) to use CEP as a backbone while introducing pragmatic solutions for out-of-scope items, such as flagging, bridge tables, and secondary-purpose tagging. This feedback was and is shared with Eurostat and the UN SEEA CF revision process to support harmonized treatment of mixed-purpose projects and emerging environmental topics.

GN C3 proposes extending SEEA CF beyond environmental protection and resource management to include topics such as climate change mitigation (CCM), circular economy (CE), bioeconomy, and others. Estonia's WP4 and WP5 projects provide practical insights into these areas.

Table: Tested Topics vs. CEP Coverage

Topic (GN C3)	**Tested in Estonia**	**CEP Coverage**	**Estonia's Handling**
Climate change mitigation – EV infrastructure	Yes (WP4)	Partial (CEP 0201/0202)	Subsidy-based estimation; flagged out-of-scope components
Climate change mitigation – EV acquisition	Yes (WP4)	Partial (CEP 0101)	Price-panel method; scope refinement for hybrids
Public transport (Rail Baltica)	Yes (WP4)	Partial (CEP 0101, 0202)	Component tagging; documented secondary-purpose logic
Energy-efficient buildings	Yes (WP4)	CEP 0202	Applied extra-cost principle (36% share); EPBD alignment
Circular economy (materials savings)	Yes (WP5)	CEP 0402	Detailed bottom-up allocation; ML classification

Out-of-CEP items (nuclear, grids)	Observed	None	Flagged for disclosure; proposed "n.e.c." categories

4.4 Key recommendations for SEEA CF revision

As a member of the SEEA CF Revision Committee and respective Task Team, Estonia's representative can provide structured feedback and practical insights to the development of GN C3 and the subsequent revision process, ensuring that lessons learned from WP4 and WP5 inform international standards.

Maintain CEP as the backbone for environmentally friendly topics.

Introduce "n.e.c." extensions for CCM and CE activities beyond CEP.

Provide guidance on extra vs. full cost and primary vs. secondary purpose.

Develop operational lists for circular economy and bioeconomy

Utilize Estonia's role in the SEEA CF Revision Committee and Task Team to channel these recommendations into the GN C3 guidance and future framework updates

5 Revision of the publication tables and information on webpage, dissemination related activities

In addition to the methodological development and data conversion activities, significant attention was devoted to the revision and improvement of supporting materials that ensure transparency, usability, and long-term sustainability of the statistical outputs. The meta-information describing the data sources, compilation methods, and classification principles was thoroughly reviewed and updated to reflect the transition to the Classification of Environmental Purposes (CEP). This process helped to document methodological changes clearly and to provide users with a coherent overview of the new structure and its implications for time series comparability.

The publication tables and related dissemination formats were also revised to align with the new classification system. Adjustments included updates to the structure, terminology, and coverage of tables to ensure consistency across the Environmental Goods and Services Sector (EGSS), Environmental Protection Expenditure Accounts (EPEA), and statistics on environmental subsidies and similar transfers. These updates enhanced the accessibility and analytical value of the published data, supporting both national users and international data reporting requirements.

In parallel, an analysis of the feasibility of developing allocation tables was carried out. This work aimed to explore options for systematically linking and reallocating historical data according to the new classification framework, thereby enabling the revision and extension of time series. The analysis considered methodological alternatives, data availability, and potential estimation techniques that would ensure continuity and comparability between historical and newly classified data.

Overall, these complementary activities strengthened the methodological and dissemination framework of environmental-economic statistics, ensuring that the transition to the new classification not only modernized the statistical production process but also enhanced data quality, documentation, and user understanding.

5.1 Deliverables and readiness for transmission

All planned deliverables were prepared and delivered on time:

D5.1 Final methodological report (due M12): A comprehensive national specification covering allocation rules, crosswalks, examples, quality assurance checks, and machine-learning governance for ESST.

D5.2 CEP-classified datasets: EGSS datasets delivered by Month 10; EPEA and ESST datasets delivered by Month 12, including embedded metadata

D5.3 Presentation materials (M12): Delivered for Eurostat workshops and working groups, highlighting bottom-up demonstrations (waste/materials, biodiversity) and the machine-learning transition for ESST.

6 Consultations and study visit to Statistics Netherlands regarding the application of the Classification of Environmental Purposes will be carried out

Consultations and Study Visit to Statistics Netherlands

As part of the implementation process of the Classification of Environmental Purposes (CEP), consultations and a study visit to Statistics Netherlands (CBS) were planned and carried out to exchange experience and ensure methodological consistency. The objective of this cooperation was to gain practical insights into the application of the new classification across environmental-economic statistical domains and to strengthen the alignment of national practices with those developed by leading statistical institutions in Europe.

During the consultations, particular attention was given to the methodological challenges and practical solutions related to the reclassification of existing data, the integration of CEP into the Environmental Goods and Services Sector (EGSS) and Environmental Protection Expenditure Accounts (EPEA), and the classification of environmental subsidies and similar transfers. Experts from both institutions discussed conversion methods, coding principles, and approaches to maintaining time series comparability, as well as the development of metadata and dissemination structures consistent with Eurostat requirements.

The study visit provided an opportunity for in-depth discussions with CBS experts responsible for environmental-economic accounts. Demonstrations of data processing workflows, classification procedures, and quality assurance methods offered valuable input for refining Statistics Estonia's own methodological framework. The visit also facilitated networking and the exchange of documentation, which will support future cooperation on methodological developments and harmonization efforts.

All key points, discussions, and conclusions from the consultations and study visit are documented in the minutes, which provide a comprehensive record of the activities and agreements reached.

Overall, the consultations and study visit significantly contributed to building capacity within Statistics Estonia and ensured that the implementation of the CEP followed international best practices, enhancing both the quality and comparability of Estonia's environmental-economic statistics.

Full minutes of the study visit regarding CEP are displayed in annex 3.

7 Concluding perspective

WP5 has delivered the conceptual, technical, and organisational infrastructure needed to operationalise CEP across Estonia's environmental-economic accounts. The implementation is fit-for-purpose, demonstrably policy-relevant, and methodologically transparent, with clear pathways to deepen Level III coverage as user demand and source data quality allow.

Immediate next steps include (i) stabilising ML accuracy through incremental data augmentation and active learning, and (ii) contributing structured methodological feedback to Eurostat and SEEA CF revision process on secondary-purpose treatment and publication-level detail. In doing so, WP5 consolidates a durable foundation for integrated, purpose-based environmental accounting in Estonia, aligned with European statistical governance and the analytic needs of the Green Deal era in wide implementation for a.

8 Annex 1 Minutes of the Kick off Seminar

Minutes

Kick off Seminar with Statistics Netherlands – Cooperation under Grant (CEP Implementation)

Date: 28 January 2025

Time: 11:00–12:30 (EET)

Project: Development of Environmental Accounts (2024-EE-EGD)

Prepared by: Kaia Oras

Participants

Statistics Estonia: Kaia Oras, Grete Luukas, Raigo Rückenberg, Hanna Pentsa

Statistics Netherlands (CBS): Sjoerd Schenau

Agenda

Planning and refining of the detailed tasks of the project team and contractors, expert meeting

Classification of Environmental Purposes (CEP): conversion table, list of issues and problems to be addressed across domains

Discussion Summary

1. Statistics Netherlands conversion table

The conversion tables between CEPA/CREMA and CEP were reviewed and discussed.

Most classes could be mapped directly; however, some problematic areas remain.

Statistics Netherlands shared their experience and confirmed that the new reporting tables differ from previous versions, requiring additional work to update the structure and formulas.

No major extra calculations are foreseen, but adjustments to reporting templates are necessary.

CBS focuses primarily on the second level of CEP, while the third level is considered too detailed for regular implementation.

2. Specific allocation examples and methodological issues

Electric vehicle investments should be included under CEP1 (in EPEA).

Discussion covered how to distinguish investments targeting greenhouse gas reduction from those targeting other air pollutants.

For EGSS, Statistics Estonia requires both level 1 and level 2 data for reporting, with an attempt to classify certain goods and services at level 3 using a bottom-up approach.

Examples: waste management, environmentally friendly products, R&D, and some service sectors.

In cases where detailed allocation is not possible, CEP will be added at the methodology block level (e.g. wastewater management → CEP0301).

In ESST, transfers will be classified at level 3 where feasible, particularly for machine learning applications.

Data quality challenges are expected; transfers cannot always be allocated 100% to a single CEP.

More clarification from Eurostat is needed for level 3 classifications.

In EPEA, crosswalk to CEP is generally straightforward, but some categories (e.g. carbon storage, electric vehicle investments) require clarification from Eurostat.

Measurement of extra costs remains a methodological issue.

For Climate Investment statistics, CEP crosswalk will be developed alongside the methodological work.

3. Data and dissemination considerations

Three years of data estimates were reviewed to assess crosswalk feasibility.

The revision of publication tables and the Statistics Estonia website was discussed — both institutions face challenges as dissemination formats must be redesigned to reflect CEP structure.

Statistics Estonia plans to design the new EGSS output tables during the first half of 2025.

The availability of official translations from the European Commission was discussed; national-level versions of the classification are not yet available.

Decisions

Testing of CEP levels and creation of practical conversion tables will begin immediately.

Further discussions and hands-on work on conversion methods for each domain will take place during the upcoming study visit to Statistics Netherlands.

Statistics Estonia will start the mapping process based on the agreed methodological logic and conversion structure.

Follow-up

Minutes and technical notes will be circulated to participants.

Next coordination point: during the planned study visit to CBS (date to be confirmed).

Annex 2 Minutes of the final methodological seminar on CEP (Classification of Environmental Purposes) application

25 November 2025

List of Participants:

Statistics Estonia:

Kaia Oras, Grete Luukas, Raigo Ryckenberg

Statistics Netherlands, CBS :

Cyril Crutzen (CBS), Sjoerd Schenau, Mirthe Greve

CEP Application

Agenda

- Overview of CEP implementation
- Methodological approach for EGSS, EPEA, ESST
- Machine learning for subsidies classification
- Issues with out-of-CEP activities
- Communication and next steps

1.Introduction on progress

Kaia Oras: Explained Estonia's implementation of CEP and translation challenges.

Progress: Overview of application. Application done for EGSS timeseries and climate investments module and in progress for ESST and EPEA (deadlines in December)

Objective

To explain how the Classification of Environmental Protection Activities (CEP) was applied in Estonian environmental accounts and climate investment reporting, and to highlight its benefits for detailed allocation.

Key Points

Scope of Work:

Implement CEP across Environmental Goods and Services Sector (EGSS), Environmental Protection Expenditure Accounts (CEPA), and Environmental Subsidies and Transfers (ESST).

Ensure compatibility with Eurostat transmission requirements.

Discussion points:

1. Translation and adaptation of CEP into Estonian language.
2. Handling out-of- CEP scope activities (e.g., climate-related investments not clearly covered by CEP).
3. Linking CEP to existing classifications (CEPA,CREMA).
4. Methodological Approach
5. Mapping Existing Data to CEP:
6. Over 20 methodological blocks analyzed in EGSS
7. Applied bottom-up and top-down approaches depending on data availability.
8. For some blocks, entire activity allocated to one CEP code; others required detailed breakdown.

2 Applied bottom-up and top-down approaches depending on data availability.

Grete Luukas described how CEP was implemented both for bottom-up and top-down approaches. For bottom-up methodologies it was possible to distinguish CEP on the most detailed level and for top-down mostly second level CEP could be applied. Overview of using CEP will be described in the methodological report with examples of detailed CEP categories.

Also benefits from using CEP were discussed – for some categories CEP gives more opportunities to distinguish different activities.

Slide presentation included examples of waste management where it was possible to distinguish recycled vs disposed waste and material (e.g., metals, plastics) and allocate under distinct CEP codes.

Regarding biodiversity & habitat protection CEP gives opportunity to distinguish maintenance of semi-natural grasslands and species protection mapped to detailed CEP codes.

Grete explained that EGSS publication has been updated already with CEP categories and timeseries was revised. EPEA publication will remain on the same level as was before while using CEPA as the CEP application does not bring in the changes.

Climate Change Mitigation Investments:

Linked to CEP categories

Out-of-scope activities flagged for future guidance (e.g., public transport, renewable energy).

3. Benefits of CEP were discussed

Kaia discussed: Highlights covered improved granularity. The new approach enables analyses and even thematic reporting at third-level granularity, providing deeper insights that will support future thematic accounts such as biodiversity and waste recovery. Regarding consistency, it ensures harmonized reporting across EGSS, EPEA, and ESST, reducing discrepancies and improving comparability. The framework will make it easier to explain methods and results to users /stakeholders.

4. Machine Learning for CEP:

Raigo Rückenberg noted challenges:

More unique classes at third level → lower accuracy.

Fixing of the manual annotation errors previously disrupted model training.

Ongoing work to improve automated classification for ESST.

Out-of-Scope Activities:

5.Discussion and suggestions

Sjoerd Schenau (CBS) suggested creating a bridge table for secondary-purpose activities (e.g., nuclear energy, public transport).

Agreed that in long run Eurostat should provide clearer guidance for secondary-purpose classification.

Level of Detail:

Estonia tested third-level CEP publication; Netherlands currently uses second-level only.

Both countries acknowledged extra detail is resource-intensive and should be driven by user demand.

Future methodological improvements:

Possible ESS level revision to include secondary-purpose investments in CEP framework.

Raigo Rückenberg: Shared machine learning challenges due to underrepresented classes and manual annotation.

Group Discussion: Discussed handling of secondary purpose and need for Eurostat guidance.

Decisions

Publish CEP-based data for EGSS at detailed level.

Continue ML approach. fallback to manual classification if needed.

Document secondary purpose: provide also future methodological feedback to Eurostat.

Action Items

Responsible	Task
Raigo	Finalize ML model corrections for subsidies.
Grete	Prepare final CEP mapping for EPEA and ESST.
Kaia/Sjoerd	Draft short feedback note on secondary purpose handling in report

Discussion Summary

Overview of project implementation

The project team provided a comprehensive overview of the work completed under the grant, focusing on the methodological development and data integration activities across Environmental Goods and Services Sector (EGSS), Environmental Protection Expenditure Accounts (EPEA), Environmental Subsidies and Similar Transfers (ESST), and climate change mitigation investment statistics.

The overall objective — to improve the coverage, comparability, and quality of environmental-economic statistics — was successfully achieved.

Collaboration with Statistics Netherlands (CBS) proved instrumental in refining conversion methods and establishing a consistent approach for applying the Classification of Environmental Purposes (CEP).

Annex 3 Minutes of the study visit regarding the application on CEP (Classification of Environmental Purposes) application

June 2-3, 2025

Statistics Netherlands

Consultations on the application of the classification of environmental purposes, development of the allocation tables and the approaches for the revision of timeseries.

Participants: Kaia Oras, Raigo Rückenberg , Grete Luukas, Hanna Pentsa, Sjoerd Schenau, Olaf Koops

Application of CEP - technical challenges, ideas, allocation tables and revision of timeseries (classification issues, borderline cases); Sjoerd **Schenau** / Olaf **Koops**

- Statistics Netherlands are planning to change their EPER questionnaire to be more useful for Eurostat reporting (and add for example question related to greenhouse gases) – the impact would be seen in the data in 2 years.
- Statistics Netherlands is planning to make the change from CEPA&Crema to CEP in the end of their process this year (mainly using a bridge table to go from CEPA/CReMA to CEP). In the future, they are planning to change their data producing process to align with CEP classification.
- Statistics Netherlands will update their time series based on conversion tables but not yet agreed on how many years back they'll go in addition to the mandatory years.
- Estonia is in the process of applying CEP to 2022 subsidies data – so far there have been no major issues converting to CEP.
- CEP has not been translated to Dutch nor into Estonian yet.
- For CEP 01 NL plans to use weights for GHG and other emissions.
- EE sees that EPEA is straightforward for implementing CEP. Concerning EGSS and ESST it is necessary to revise the time series, tables and calculations.
- CEP is mandatory for reporting for 2025 regarding subsidies, EGSS, EPEA.

Classification issues, borderline cases (i.e R@D, certain adapted goods like lubricants, in process energy savings, rail transport…); **Kaia Oras, Raigo Rückenberg**, **Grete Luukas, Hanna Pentsa**

- Similar issues with attributing one category as it was with CEPA and Crema. Focus should be on the main purpose/impact of projects. If the policy or technical description indicates ESST, it should be counted as ESST, even if one contradicts the other – otherwise, it will make the compilation subjective. This is also what the ESST handbook says. However, counting all transfers as ESST simply on policy poses the risk of greenwashing. In the case of Estonia, it has been observed that even if the policy falls in the scope of ESST, there are number of projects which technical description does not match the scope of ESST. During the discussion it was determined that this issue should be monitored in the future, and perhaps Eurostat could give more detailed guidelines for cases where greenwashing is suspected.

- CEP application in bottom-up approach. Estonian activities in 2025: connecting CEP and waste classification for waste management activities; **Grete Luukas, Hanna Pentsa**
    - EE gave an overview of how they are planning to convert from CEPA/CReMA to CEP, no major issues have been detected yet.
    - In Estonia we are planning to do more detailed CEP attribution for bottom-up methods e.g for waste where we look at the recycling/disposal code and the list of waste – this method helps us attach the most detailed level CEP. Estonia will try to do the most detailed level CEP in 2025 during grant project.
    - For top-down methods CEP classification is rather straight-forward.