Study to develop EU level Simplified Cost Options (SCOs) and other EU level results-based tools in the programming period 2021-2027

Final Study Report

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List of abbreviations

CF	Cohesion Fund
CO_2	Carbon Dioxide
DCF	Data Collection Form
DG ENER	Directorate-General for Energy
DG REGIO	Directorate-General for Regional and Urban Policy
DG RTD	Directorate-General for Research and Innovation
EC	European Commission
EE	Energy Efficiency
EPC	Energy Performance Certificates
ERDF	European Regional Development Fund
EU	European Union
FNLC	Financing Not Linked to Costs
FTE	Full-Time Equivalent
GHG	Greenhouse Gas
HICP	Harmonised Index of Consumer Prices
IB	Intermediary Body
ICT	Information and Communications Technology
LCI	Labour Cost Index
MA	Managing Authority
MS	Member State
MSCA	Marie Skłodowska-Curie Actions
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares

OP	Operational Programme
PKM	Passengers-Kilometres
PLI	Price Level Index
PO	Policy Objectives
Q&A	Question & Answer
R&D	Research & Development
R&I	Research & Innovation
RDI	Research Development and Innovation
RES	Renewable Energy Sources
SCO	Simplified Cost Option
SME	Small and Medium-sized Enterprise
TN	Transnational Network
ToR	Terms of Reference

Glossary of terms

Accuracy refers to how close a set of measurements are to their true value.

Activity is an action that can be costed under a single SCO.

Area is a policy area of interest identified by DG REGIO.

Beneficiary is the organisation, which may be private, public or in the third sector, responsible for initiating and/or implementing an operation / financial instrument.

Call (for proposal) is an open invitation for funding issued by the European Union. It is a financial contribution aiming to strengthen and leverage actions or projects that support the EU policies in the most effective way.

Completeness refers to the condition of possessing all data points needed for calculations.

Consistency is when values across different locations are identical or have a high degree of similarity.

Costs (Direct) are costs which can be attached exclusively to a single service or product (in the context of SCO, this service is usually an activity).

Costs (Indirect) cannot be tied to a specific activity but are necessary to deliver that activity. For example, the marginal increment in administrative costs resulting from an additional activity taking place may be difficult to trace.

Creaming of participants, also known as cherry-picking, implies selecting participants which are most likely to successfully enter and exit the activity and thus generate the intended outputs or results.

Extrapolation is a method of statistical inference which infers from values observed outside the sample.

Financing Not Linked to Costs is the payment method for grants and repayable assistance in which the reimbursement of expenditure is based on the fulfilment of pre-established conditions or results to be achieved.

Flat rate financing are specific categories of eligible costs which are clearly identified in advance and are calculated by applying a percentage, fixed ex ante to one or several other categories of eligible costs.

Historical data are administrative records kept by Managing Authorities and Intermediary bodies on calls / projects

Interpolation is a method of statistical inference which infers from values observed within the sample.

Lump sums are fixed, single payments based on achievement of agreed incurrence of costs.

Observations are, in statistics, one occurrence of something being measured.

Operation is a project, contract, action or group of projects selected by the Managing Authority of the programmes concerned, or under its responsibility, that contributes to the objectives of one or more priorities of a programme.

Outlier is a specific data point that deviates substantially from the remaining observations.

Parking is the practice where providers attempt to minimise costs by providing minimal assistance to those with the lowest anticipated outcomes, while concentrating their resources on those who have better prospects.

Participant(s) are the persons who benefit from the activity. Participants may include persons who started a training but did not complete it. Participants should mainly draw from the target group.

Path dependence is the process by which previous events or decisions place limitations or influence subsequent events or decisions.

Managing Authority is an institution in a Member State responsible for the strategic direction and financial management of a programme in the context of ERDF/CF.

Simplified Cost Options (SCO) are a way of reimbursing grants and repayable assistance where instead of reimbursing 'real costs', SCO allow reimbursing expenditure according to predefined methods based on process, outputs or results. SCO can take the form of flat rate financing, unit costs, and lump sums.

Slicing of operations (reduced duration, cheaper delivery methods, etc.) is a perverse incentive risking to result in reduced quality of the activity / operation.

Stakeholder is an individual or group with direct interest in the final outcomes of this study.

Target group is the group of persons who are eligible to participate in the activity.

Triangulation is the practice of employing multiple data sources in order to address a research question.

Unit costs are the cost per unit of input, output or result generated.

Executive summary

This study was launched with a purpose of developing EU-level Simplified Cost Options (SCOs) and other EU-level results-based tools in multiple areas supported by the European Regional Development Fund (ERDF) and Cohesion Fund (CF) in the programming period 2021-2027. The methodology employed in this study is aligned with the provisions of Article 94 of the Common Provisions Regulation[1]. More specifically, it builds on the analysis of **verified historical data** collected at national and/or regional levels and **statistical inference** where historical data are insufficient or unavailable. The study elaborates on potential EU-level SCOs in the following areas relevant to ERDF/CF:

- Energy Efficiency and Renewable Energy **(Area 1),** focusing on small or medium enterprises (SMEs) **(sub-area 1A),** housing sector (**sub-area 1B.1)** and non-residential (public) sector (**sub-area 1B.2**);
- Research and Innovation activities **(Area 2),** in particular knowledge / technology transfer activities of SMEs **(sub-area 2A),** innovation vouchers for SMEs for R&D implementation **(sub-area 2B)** and Research Development & Innovation research projects **(sub-area 2C).**
- SME Growth & Competitiveness **(Area 3),** in particular networking activities of SMEs **(sub-area 3A)** and consultancy / advisory services to SMEs for digital & green transformation **(sub-area 3B).**

Notably, sub-area 1B was initially divided into two separate sub-areas – housing and non-residential public buildings sectors. However, as operations in both sectors share an identical set of activities, it has been decided to merge the two to attain a more robust sample of historical data. The underlying process of historical data collection and analysis consisted of the following steps:

1. **Undertaking preparatory activities**, such as exploratory research on the relevant measures; developing structured data collection forms; organising stakeholder consultations to test data collection forms; selecting a representative sample of Operational Programmes (OP) to source data from.
2. **Collecting historical data on relevant interventions** at national and regional levels.
3. **Collecting (proxy) data from alternative sources** that could be used to triangulate, complement or replace the historical data where it is lacking.
4. **Interpreting, cleaning and analysing** the collected historical data to identify any gaps, discrepancies and/or outlier cases and re-engaging the national experts in resolving the data shortcomings.
5. **Applying and elaborating SCO methodologies** for assessing the feasibility of EU-level SCO development, including methods and techniques for determining the SCO rates / amounts for the Member States (MS) not covered / insufficiently covered by historical data.
6. **Defining the audit trail** for the most promising (data-wise) EU-level SCO in each considered sub-area.
7. **Consulting with stakeholders** about the proposed EU-level SCOs and their audit trail within dedicated focus group discussions, also during presentations to members of the network of ERDF/CF SCO practitioners and meetings with other European Commission stakeholders.

The development of SCOs is a data-driven exercise, therefore the availability and quality of data are paramount for robust calculations. The level of detail and completeness of these data varied significantly across the

[1] OJ L 231/159 30.6.2021, p. 159.

analysed areas. The most prominent shortcoming being its **insufficient granularity, especially in the case of data on incurred costs:** (a) only total costs were indicated; (b) their breakdown by activity and by category / type of costs was lacking; (c) only partial data on costs per activity was included (e.g. specified only for some types of activities). Another challenge came from **inconsistencies in the data on results and/or outputs of supported operations**, i.e. different countries used different indicators and accordingly reported on different types of results / outputs produced in their projects. Lastly, the **incongruent typology of activities** in operations supported by different Member States made the cross-country comparison difficult. This in turn complicated a common definition of the operation for the proposed SCO.

Data from alternative sources were also **used sparingly** mainly due to the insufficient level of granularity and detail. To mitigate these issues, a method of statistical inference (linear extrapolation using Ordinary Least Squares – OLS) was used to accommodate Member States which were not covered / partially covered by historical data. In a nutshell, the Member States for which unit cost rates were derived from historical data were then used to predict the missing unit cost values for all remaining Member States by using explanatory variables from Eurostat. Furthermore, to ensure that the SCO amounts / rates remain relevant in the future, the updates proposed are based on statistical indicators extracted from Eurostat. These can be used to update the established SCO rates / amounts on a regular basis.

The result of the study is a **mixture of EU-level solutions** in the form of **unit costs** and **lump sums**. For sub-area 2C, no SCO could be developed, since the collected data were very heterogeneous in terms of supported activities, cost categories and outputs.

Area	Sub-area	Data availability	Type	Indicator
(1) Energy Efficiency and Renewable Energy	Energy efficiency and renewable energy in SMEs (1A)	2 Member States (IT, PL)	Unit cost	Decrease of annual Greenhouse Gas (GHG) emissions, by tons of Carbon Dioxide (CO_2)
	Energy efficiency in households and non-residential public buildings (1B)	12 Member States (IT, PL, GR, BG, CY, CZ, DE, ES, FR, LU, MT, PT)		
(2) Research and Innovation activities	Knowledge / technology transfer activities of SMEs (2A)	9 Member States (BE, HR, HU, FR, IT, PL, PT, LU, SI)	Unit cost	Full-time equivalent (FTE) gross new working positions (that did not exist before) to directly perform R&D activities in the SME, by monthly FTEs
	Innovation vouchers for SMEs for R&D implementation (2B)	11 Member States (CY, CZ, EE, FR, IT, LV, PL, PT, HR, HU, MT)	Lump sum	Innovation vouchers issued to an SME for completing innovation/digitisation activities, by units
(3) SME Growth & Competitiveness	Networking activities of SMEs (3A)	8 Member States (CZ, ES, FR, HR, IT, PL, PT, SI)	Lump sum	SMEs attending international event, by units
	Consultancy / advisory services to SMEs for digital & green transformation (3B)	9 Member States (BE, CZ, ES, HU, IT, PL, PT, SE, SI)	Lump sum	SMEs having elaborated an internationalisation strategy, by units

Source: compiled by the study team.

The study has also assessed the feasibility of developing EU-level result-based tools in three areas that were identified by the European Commission and Member States, namely promoting sustainable multimodal urban mobility (FC1), skills for smart specialisation and transition (FC2) and climate change adaptation and risk prevention (FC3).

Introduction

A focus on results and simplification across all EU funding programmes have been a major goal of the European Commission for a number of years. In 2011, the European Commission launched an Agenda of simplification as part of the Multiannual Financial Framework (MFF) 2014-2020[2]. The Agenda proposed reducing the number of programmes, enhancing coherence and clarity of rules, clarifying priority objectives, using simplified instruments for decision-making, extending simplified forms of grants, and moving towards electronic governance. A few years later, the European Commission announced the EU Budget Focused on Results. The initiative aimed at maximising the effectiveness of the Union's budget in supporting growth, jobs and stability in Europe and beyond[3]. It encompassed several objectives and work streams, including simplification, flexibility in implementation and lower administrative burden. This was followed by the amendment to the Financial Regulation in 2016, which sought to expand the use of targets in implementing the programmes funded from the EU budget. In spite of these measures, the Reflection Paper on the Future of EU Finances published by the European Commission in 2017[4] highlighted the need for further simplification and flexibility to enable more efficient spending and greater focus on performance.

The increased focus on results over implementation procedures and tracking of the actual costs incurred was again extended in the Omnibus Regulation[5] adopted in 2018. The latter extended the use of **simplified cost options** in ESI Funds and introduced a new form of financing that is not linked to the costs of the relevant operations but that is based instead on fulfilling conditions related to realising progress in implementing or achieving programme objectives (i.e. **'financing not linked to cost'**). In 2018 also, the European Commission adopted its proposals for a new MFF for 2021-2027. The proposal for the Common Provisions Regulation (CPR)[6] contained around 80 simplification measures for the Cohesion Policy 2021-2027. Bearing in mind the recommendations of the High Level Group on Simplification for post 2020[7], it was planned to further simplify the management of Cohesion Policy through an increased use of simplified cost options and payments based on conditions.

Simplified cost options (henceforth – **SCOs**) were originally introduced in the programming period 2007-2013 and are widely recognised as one of the most effective simplification measures adopted under the Cohesion Policy[8]. This recognition comes from multiple working documents and evaluation / audit reports pointing **to a number of benefits attributable to SCOs:**

- First, the use of SCOs simplifies the funding application procedures and reporting requirements, and significantly reduces the administrative workload at application and implementation stages for all actors involved in the management and implementation of the EU Cohesion Policy. This is

[2] Commission Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on A Simplification Agenda for the MFF 2014–2020, COM(2012) 42.

[3] http://ec.europa.eu/budget/budget4results/index_en.cfm

[4] European Commission, *The Reflection Paper on the Future of EU Finances*, 2017.

[5] Regulation (EU, Euratom) No 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union.

[6] COM(2018) 375 final – Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL laying down common provisions on the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, and the European Maritime and Fisheries Fund and financial rules for those and for the Asylum and Migration Fund, the Internal Security Fund and the Border Management and Visa Instrument.

[7] The High Level Expert Group on monitoring simplification for beneficiaries of ESI Funds, *Final conclusions and recommendations of the High-Level Group on Simplification for post 2020*, 2017.

[8] European Commission, *Use of new provisions on simplification during the early implementation phase of ESIF*, Final Report, SWECO, t33 & Spatial Foresight, 2017.

achieved by eliminating the need for beneficiaries to prove their actual project costs to the managing authorities or intermediate bodies by providing them with respective invoices, proofs of payments, bank statements, etc. Instead, when SCOs are used, *the tracing of every euro of co-financed expenditure to individual supporting documents is no longer required: this is the key point of simplified cost options as it significantly alleviates the administrative burden*[9].

- Second, pre-established and published SCOs allow beneficiaries to take them into account when planning project implementation and submitting their applications. On top of increased predictability, the pre-established SCO rates contribute to transparency and equal treatment of beneficiaries, and also provide incentives for the economic use of resources. In addition, less complex funding rules leads to various programme documents (e.g. guidelines for applicants, grant contracts, etc.) being clearer and more user-friendly, providing more organisations with access to funding and contributing to a better achievement of intended policy results.
- Third, SCOs allow managing authorities, intermediate bodies and beneficiaries to focus more on the achievement of policy objectives and intervention priorities rather than being concentrated on collecting and verifying financial documents. Given that beneficiaries do not need to collect, store and check the invoices, proofs of payments, bank statements and other documents, they have significantly more time to perform their primary work, i.e. planning and executing project activities. Similarly, institutions responsible for controlling and monitoring the programme can focus on implementing the supported activities and on achieving expected results rather on justifying costs. Less complex control procedures also allow for speedier reimbursement of expenditure to beneficiaries.
- Finally, the application of SCOs in different funds and programmes reduces error probability. The European Court of Auditors concluded that the projects whose costs are declared using simplified rules are less error prone if the conditions in place are not overly complex[10].

Overall, the use of SCOs positively benefits the financial and non-financial management of ESIF programmes at the level of beneficiaries, management bodies and the whole programme. A similar conclusion has been made in the study carried out by DG REGIO in 2018, which posited that '*the highest potential for reductions of administrative costs and burden lies with a massively increased uptake of SCOs, following an extension of their scope*'[11].

The use of **Financing Not Linked to Cost** (henceforth – **FNLC**) tools was very limited in ESIF programmes in the period 2014-2020. Only Austria had used this results-based tool to support business investments in the field of renewable energy and energy efficiency[12]. A number of objective reasons limited the uptake of FNLC in 2014-2020: insufficient time and resources to develop the scheme, as this innovative form of financing was introduced in the second half of the programming period; uncertainty on how FNLC tools should be designed, implemented and audited; difficulties in identifying results or conditions to be achieved to trigger reimbursements; administrative burden linked to designing FNLC tools[13]. These limitations, however, do not undermine the simplification potential and attractiveness of FNLC tools. The majority of the Member States are interested in using this form of financing in the programming period 2021-2027[14].

[9] European Commission, *Guidance on Simplified Cost Options (SCOs): Flat rate financing, Standard scales of unit costs, Lump sums* – Revised edition following the entry into force of Regulation (EU, Euratom) 2018/1046, 2021.

[10] European Court of Auditors, *Annual report of the Court of Auditors on the implementation of the budget concerning the financial year 2018*, 2019.

[11] European Commission, *New assessment of ESIF administrative costs and burden*, Final Report, SWECO, t33 & Spatial Foresight, 2017.

[12] Transnational Network (TN) of ERDF/CF SCO practitioners, *Preliminary survey on "Financing not linked to cost" Key outcomes and responses from TN members (6th meeting of the TN – July 2020).*

[13] Ibid.

[14] Ibid.

In the context of the above-mentioned policy developments and inspired by a clear demand for further simplification of the ERDF/CF management, the Directorate-General for Regional and Urban Policy of the European Commission commissioned this study. It is intended and aims to support the adoption of EU-level SCOs (under Art. 88(4) CPR) and the development of EU-level FNLC tools under the ERDF/CF during the programming period 2021-2027. To this end, the study provides **data-driven suggestions for developing EU-level SCOs** in the following policy areas:

- **Area 1: Energy Efficiency and Renewable Energy**, in particular actions / interventions for energy efficiency and renewable energy in SMEs (sub-area 1A), and energy efficiency and renewable energy in public and housing sector buildings (sub-area 1B);
- **Area 2: Research and Innovation activities**, in particular actions / interventions for knowledge / technology transfer activities of SMEs (sub-area 2A), innovation vouchers for SMEs (sub-area 2B), and research development and innovation research projects focusing on collaboration between SMEs and public / private research institutions (sub-area 2C);
- **Area 3: SME Growth & Competitiveness**, in particular networking activities of SMEs (sub-area 3A) and consultancy / advisory services to SMEs for digital and green transformation (sub-area 3B).

In addition, the study concludes on the **feasibility of developing FNLC tools** in three additional policy areas, namely (i) sustainable multimodal urban mobility, (ii) skills for smart specialisation and transition, and (iii) climate change adaptation and risk prevention.

The report is structured into three main chapters. *Chapter 1* introduces the methodological approach adopted by the study team to collect, clean and analyse the underlying data used for both the development of proposed EU-level SCOs and the feasibility assessment of potential FNLC tools. *Chapter 2* presents the main study findings and selected study results, focusing on alternatives deemed the most appropriate and feasible for EU-level SCOs and outcomes of the feasibility checks performed on potential EU-level result-based tools. *Chapter 3* summarises the end-result of analyses performed, and solutions recommended in each analysed area. Three annexes accompany the main study report and these can be found at the end of this document.

1. Methodology

The scope of the study includes the development of EU-level SCOs (Art.88(4) CPR) for each Member State in three policy areas identified namely as Energy Efficiency & Renewable Energy (Area 1), Research and Innovation activities (Area 2), and SME Growth & Competitiveness (Area 3). The said areas & actions / interventions have been identified by Member States as relevant and feasible for developing EU-level SCOs. For our approach towards developing deliverables for this task, please see section 1.1.

The study has also assessed the feasibility of developing EU-level result-based tools (i.e. FNLC) in three areas that were identified by the European Commission (EC) and Member States, namely promoting sustainable multimodal urban mobility (Feasibility Check 1, FC1), skills for smart specialisation and transition (FC2) and climate change adaptation and risk prevention (FC3). For our approach towards this deliverable, please refer to section 1.2.

1.1. EU-level SCOs

According to Article 94 of the Common Provisions Regulation[15], Simplified Cost Options defining, at EU-level, unit costs, lump sums or flat rates, their amounts and adjustment methods should be based on the following:

a) a fair, equitable and verifiable calculation method based on any of the following:
   - statistical data, other objective information or an expert judgement;
   - verified historical data;
   - the application of usual accounting practices;

b) draft budgets;
c) the rules on corresponding unit costs, lump sums and flat rates applicable in Union policies for a similar type of operation;
d) the rules on corresponding unit costs, lump sums and flat rates applied under schemes for grants funded entirely by the Member State for a similar type of operation.

In this section, we present the overall methodology for this assignment and the concrete steps taken:

- first, we operationalise our overall methodological approach for Task 1 for Areas 1-3 (section 1.1.1);
- second, we explain what preparatory activities were taken in order to kickstart the SCO development process (section 1.1.2);
- third, we provide an overview of the data collection process, its results and our approach towards cleaning the data received from Member States (section 1.1.3);
- fourth, we briefly touch upon the feasibility assessment undertaken in order to shortlist only the most feasible SCO options for further development (section **Error! Reference source not found.**);
- fifth, we outline our methodological approach to the statistical analysis of the collected data, including the method to extrapolate costs for those EU Member States that may lack complete and robust data (section 1.1.5);

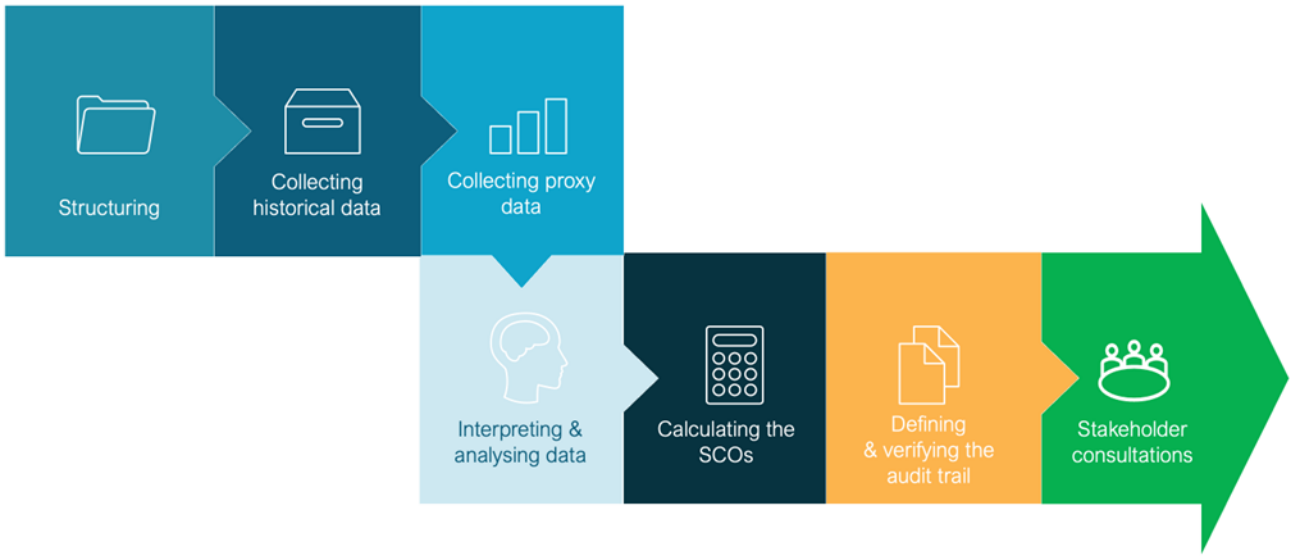
[15] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R1060

– lastly, we indicate what stakeholder consultations were undertaken throughout the duration of the study and what was their purpose (section 1.1.6).

1.1.1. Design

The approach to development of EU-level SCOs adopted in this study is based on a tried and tested methodology utilised in multiple studies related to the development of SCOs. It consists of seven strongly interlinked and highly complementary steps – this approach is illustrated in **Error! Reference source not found.**.

Figure 1. SCO development process



Source: prepared by the study team.

Step 1: Preparatory activities (structuring). This step is dedicated to developing the data collection tools and preparing to launch the full-scale data collection exercise. In turn, this step is also crucial for anticipating and managing the potential challenges behind the historical data collection in this assignment.

Step 2: Collecting historical data on the selected interventions (funded by ERDF and CF; and/or national and regional sources, to the extent they would be eligible under ERDF/CF) from EU Member States. This data collection exercise covers all 27 EU Member States. The data collection covers data at the level of 'call for proposals' and projects. As explained under Step 4, if information on actual costs and outputs or inputs is difficult to obtain or unavailable altogether in some Member States, the incomplete historical data may sometimes be replaced by / complemented / enriched by the data collected from alternative sources (see Step 3). If, however, comparable proxy data are unavailable, only historical data collected from Member States will be used to extrapolate (i.e. to infer from values within an interval observed in the sample) the SCO amounts / rates to Member States that did not provide such data.

Step 3: Collecting (proxy) data from alternative sources. Step 3 complements and expands the scope of data collection activities carried out under Step 2. It seeks to map and collect other data (e.g. relevant studies, statistical databases, market survey data, etc.) which may prove useful for filling in the gaps in the historical data collected from Member States, comparing the SCO amounts / rates when they can be established by

utilising data from multiple sources and informing the extrapolation of SCO amounts / rates for Member States otherwise not covered by collected (historical) data. The exact purpose and utility of (proxy) data collected during this complementary step depends on the quality of historical data collected in Step 2. In extreme cases (e.g. when a historical data sample is very small or when collected historical data are of very low quality), proxy data may even be used as the main source for calculating the SCO amounts / rates, including extrapolation of SCO amounts / rates for Member States not covered by this proxy data.

Step 4: Interpreting and analysing the collected data. This step involves constant checking of collected data to ensure its consistency, comparability, and robustness. It is implemented largely in parallel to Steps 2 and 3. Depending on data quality and availability, it may result in an additional effort to collect missing or additional data from Member States. During this step we also consider the evident synergies of historical and (proxy) data collected in Steps 2 and 3. For example, if historical data for some areas of activity or for certain Member States were of insufficient quality, we check whether merging of historical and proxy data are an option for building a more complete sample. This step involves conducting a comprehensive feasibility analysis of possible SCO options.

Step 5: Applying and elaborating methodologies for calculating SCO rates and amounts. Step 5 is used to further elaborate and specify the calculation method that has been applied in the study to estimate the proposed unit cost rates or lump sum amounts. If multiple alternatives (e.g. both input-based and output-based unit costs) are deemed feasible for development of an EU-level SCO in the analysed area, a selection of proposed calculation methods and their outcomes are presented to the client. Among other things, this step includes i) proposing a method to extrapolate SCO rates for Member States not covered or incompletely covered by the sample of historical and/or proxy data; ii) defining a detailed scope (categories of costs, types of activities and/or operations) of each SCO alternative proposed for further consideration; iii) agreeing on the preferred SCO alternative(s) with the Directorate-General for Regional and Urban Policy (DG REGIO); and iv) reporting on calculated rates and providing a detailed description of each established SCO, including the proposed method for their adjustment in the future.

Step 6: Defining and testing the audit trail. This step is usually implemented in parallel with Step 5. It consists of analytical work to define the specific audit trail arrangements for each EU-level SCO alternative proposed by the study, and their validation with the Managing Authorities (MAs). This step is required to ensure an effective and sufficient documentation of quantified inputs, outputs or results of operations covered by the proposed EU-level SCOs.

Step 7: Consulting with stakeholders. This step is designed to gather inputs and feedback from key stakeholders within Members States, namely Managing Authorities, Intermediary Bodies (IBs), line ministries responsible for policy areas relevant for this study and members of the network of ERDF/CF SCO practitioners). In addition, other stakeholders within the European Commission have also been closely involved in the final definition and structure of the proposed EU-level SCOs. This step took place during several stages of the SCO development process:

- Contribution to structuring phase (Step 1) by piloting the draft data collection form and giving initial feedback on its suitability and effectiveness for collection of historical data.
- Data collection phase (Step 2) involves approach Member States on historical data on relevant calls / projects from ERDF/CF. As historical data are the primary source of data used in this study, it was crucial to involve National Experts in order to support and engage data owners to provide the study team the necessary data to conduct further SCO calculations.
- Member States have been asked to help the study team when interpreting collected data (Step 4). As data collection is an iterative process with multiple steps, checks and follow-ups with Member

States were facilitated in order to collect and validate the most comprehensive sample of historical data possible.
- Member States also provided feedback and their suggestions on the possible approach to the audit trail (Step 6) during several focus groups conducted for all three Areas.

Lastly, stakeholders were also closely consulted on the study's outputs, caveats and potential impact to ensure that the developed SCOs are aligned with the needs and priorities of Member States and key stakeholders within the European Commission. Overall, the step should be seen as an ongoing feedback loop throughout the duration of the study. This enables the final product to be properly disseminated, discussed and deliberated upon in various formats (bilateral or multilateral).

1.1.2. Preparatory activities

This step is dedicated to developing the data collection tools and preparing for the launch of the full-scale data collection exercise. In turn, this step is also crucial for anticipating and managing the potential challenges behind the historical data collection in this assignment.

The EU-level SCOs in the area of Energy Efficiency and Renewable Energy (Area 1), Research and Innovation activities (Area 2) and SME Growth and Competitiveness (Area 3) presented in this report are accordingly drawing on analysis of **verified historical data** collected at national and/or regional levels and **statistical inference** where such data are insufficient or unavailable. A comprehensive set of preparatory steps had to be taken to collect the historical data enabling such analysis:

1. **exploratory research** of the underlying interventions was carried out to collect information on their key constituent parts: activities and cost items typical in implemented projects, indicators used to track their progress and overall performance in terms of produced outputs and/or results, etc;
2. **a comprehensive structured grid / data collection form** (DCF) and accompanying guidelines were developed for collecting historical data from the Member States;
3. **stakeholder consultations** were organised to test the fit-for-purpose of developed DCF and collect more in-depth information on relevant interventions. This was done through piloting the draft data collection forms with the pre-selected Managing Authorities and focus group discussions with the Managing Authorities and Implementing Bodies from all 27 Member States.

In the case of Area 1, preparations for the data collection process ended in late May 2022, immediately after the sample of 74 Operational Programmes selected for historical data collection had been agreed upon and approved by the Commission. The study team used the stratified disproportional sampling method to select this sample from the sampling frame of 137 OPs. The parameters used for the sampling frame are presented in Box 1.

Box 1. Sampling frame conditions

Investment in priorities contributing to energy efficiency and renewable energy

OPs must invest in interventions under Thematic Objective 4 – Low-carbon economy[16] and cover the following **investment priorities:**

a) promoting the production and distribution of energy derived from renewable sources;

[16] https://ec.europa.eu/regional_policy/en/atlas/programmes

b) promoting energy efficiency and renewable energy use in enterprises;
c) supporting energy efficiency, smart energy management and renewable energy use in public infrastructure, including in public buildings, and in the housing sector.

Application of common ERDF/CF indicators

OPs collect information on outputs or results achieved in supported interventions using the following common ERDF/CF indicators:

- CO30 Additional capacity of renewable energy production, measured in MW
- CO31 Number of households with improved energy consumption classification, measured in households
- CO32 Decrease of annual primary energy consumption of public buildings, measured in kWh/year
- CO34 Estimated annual decrease of GHG, in Tons of CO_2 equivalent, measured in tons of CO_2 equivalent

This criterion ensures that historical data on achieved outputs and/or results collected from sampled OPs is **comparable across the EU Member States.** An EU-level SCO cannot be developed if the collected cost data cannot be linked to the same type of output or result in all EU Member States providing such data.

Tracking of common ERDF/CF indicators

OPs monitor the progress made against the common ERDF/CF indicators listed above, i.e. their values are >0. This information was cross-referenced with data from the annual implementation reports.

Please note that the sampling frame was retained for Areas 2 and 3, with only slight amendments to account for those OPs which were not relevant in the case of Areas 2 and 3 (i.e. those which did not fund any relevant operations). This decision was also taken in order to utilise already existing contacts within the respective OPs, thus ensuring both the timeliness and quality (as a result of the familiarity with the data collection exercise) of the provided data. Please refer to Annex 3 where we elaborate upon the details of the historical data collection process and specify how effective it has been in terms of the Operational Programmes covered.

The primary goal of the data collection process was to collect **historical data** on interventions related to **the following sub-areas**:

- **Energy Efficiency and Renewable Energy (Area 1)**
  - implementation of energy efficiency and renewable energy measures in small or medium enterprises **(sub-area 1A)**;
  - implementation of energy efficiency and renewable energy measures in housing sector (**sub-area 1B.1)**;
  - implementation of energy efficiency and renewable energy measures in non-residential (public) sector (**sub-area 1B.2**).

- **Research and Innovation activities (Area 2)**
  - implementation of knowledge / technology transfer activities of SMEs **(sub-area 2A)**;
  - implementation of innovation vouchers for SMEs for R&D implementation **(sub-area 2B)**;
  - implementation of Research Development & Innovation research projects **(sub-area 2C)**.

- **SME Growth & Competitiveness (Area 3)**

- implementation of networking activities of SMEs **(sub-area 3A)**;
- implementation of consultancy / advisory services to SMEs for digital & green transformation **(sub-area 3B)**.

Please note that sub-areas 1B.1 (housing) and 1B.2 (non-residential public buildings) have been merged together into a single sub-area 1B in later stages of the study. As a result, the outcomes from the SCO development process are presented together in this report in Chapter 2. This was done as there were concerns related to the solidity of the historical data collected from the Member States. In particular, due to data limitations, few unit cost rates were derived from historical data, with the rest coming from extrapolations. To mitigate this, the study team proposed to merge the two sub-areas based on the following rationale:

– Both sub-areas share an identical set of activities as part of relevant operations.
– SCO rates initially calculated for 1B.1 and 1B.2 were very similar for the majority of eligible activities.

A larger combined sample of historical data is now being used to establish a single unit cost rate per Member State for Energy Efficiency (EE) and Renewable Energy Sources (RES) operations in housing and non-residential buildings sectors. As a result, rates had to be revised for the new sub-area 1B. The key reasons for these changes:

– Merging data from the two sub-areas tends to favour the larger historical sample coming from either housing or non-residential buildings, thus changing the values calculated based on historical data.
– Outlier analysis was redone based on the merged dataset, so certain projects may be included in the calculations or vice versa, thus changing the values calculated based on historical data.

The data collection process was guided and structured by **tailored data collection forms** developed specifically for this assignment. The forms asked the MAs and IBs responsible for sampled OPs to provide the following information:

- ***source of funding***, i.e. whether ERDF, CF or national funds had been used to finance the projects;
- ***type of operation***, i.e. energy efficiency and renewable energy measures; research and innovation measures; measures linked to SME growth and competitiveness;
- ***any national or regional level SCOs in this area*** and their application in the sampled projects;
- ***type of data*** provided at the request of the study team, i.e. if the data in question are provided aggregated at the level of calls for proposals or disaggregated at the level of individual projects;
- ***reference information***, i.e. number, title, period of calls / projects;
- ***activities supported***, including the activities listed in the data collection form (see Table 1 for the typologies of activities in all sub-areas).
- Data on all ***direct[17] and indirect[18] costs covered*** in the sampled projects broken down by category for each type of measure;
- ***results achieved and/or outputs produced***, focusing primarily on results / outputs measured by common ERDF/CF indicators;
- any ***additional information*** in the form of comments and/or clarifications.

[17] These are costs which can be attached exclusively to a single service or product (in the context of SCO, this service is usually an activity).
[18] These are general administrative costs – overhead costs incurred in connection with the eligible direct costs for the action.

Table 1. Typologies of activities included in data collection forms

SUB-AREA	TYPOLOGIES
Energy efficiency and renewable energy in SMEs (1A)	• Advice consultancy to SME owners on energy efficiency and potential for renewable energy • Energy audits to identify, quantify and report existing energy consumption profiles and energy savings opportunities for SMEs • Replacement of window frames / glass / shading systems • Upgrade of thermal insulation • Upgrade of heating / cooling systems (including based on RES) • Installation of hot water system with the use of RES • Installation of photovoltaic system • Energy storage systems • Smart management systems • Consultancy service for preparing the necessary technical studies / reports as well as monitoring the implementation of the interventions • Energy efficiency upgrade of production equipment for groups of SMEs
Energy efficiency in households and non-residential public buildings (1B)	• Energy audits for buildings • Replacement of window frames / glass / moving of fixed shading systems • Upgrade of thermal insulation (walls, roofs, ceiling etc.) • Installation of new high efficiency or upgrade of existing heating / cooling systems (including based on RES) • Installation of hot water system with the use of RES • Installation of renewable electricity unit (e.g. photovoltaic system / heat pump) • Energy storage systems • Smart management systems (including automation and control system and remote smart meters) • Consultancy service for preparing the necessary technical studies / reports as well as monitoring the implementation of the interventions (project management / supervision works) • Energy efficiency upgrade of healthcare facilities • Energy efficiency upgrade of public non-residential buildings (schools, administrative, courthouse, etc.)
Knowledge/technology transfer activities of SMEs (2A)	• Intersectoral mobility activities • Support measures for creating spin-offs to increase the entrepreneurial capacity of research organisations and promote the translation of research results into economic value • Post-doctoral researcher placements in the private sector, including SMEs • Support for industrial PhDs and traineeships
Innovation vouchers for SMEs for R&D implementation (2B)	• Consultancy services provided to SMEs by universities, research centres or knowledge-intensive companies • Access to research centres and facilities • Establishing and sustaining contacts between SMEs and research facilities, nationally or internationally • Education and training activities • Development of digital capabilities • Investment in Information and Communications Technology (ICT) instruments

SUB-AREA	TYPOLOGIES
Networking activities of SMEs (3A)	• Participation in trade fair • Partnership exchange • Participation in international scientific conferences
Consultancy/advisory services to SMEs for digital & green transformation (3B)	• Market research • Export strategy • Capacity building actions

Source: prepared by the study team.

The study team did not pre-fill activities for sub-area 2C (Research Development & Innovation research projects) because desk research and piloting demonstrated that the activities in this sub-area were very heterogenous across the Member States and selected OPs. Historical data collection confirmed this assumption since activities varied significantly under this sub-area. Some of the most common examples of activities in this area included industrial research and experimental development, feasibility studies, project management and consulting. For sub-area 3B, information on activities supported in projects, including their type, number and duration.

1.1.3. Data collection, cleaning and preparation for the analysis

The process of data collection for Area 1 was launched in early June 2022, with our national experts reaching out to authorities responsible for the **74 Operational Programmes** sampled for data collection in Area 1. To facilitate the data collection process, the study team had the data collection form for each Member State pre-filled with information on (potentially) relevant ERDF/CF projects. The pre-filled information included titles of relevant calls for proposals / projects and their status (i.e. if relevant projects are completed or still ongoing).

By early September 2022, 24 Member States had responded to the study team's requests by providing historical data for **72 out of 74 sampled OPs.** The data collection process for Areas 2 and 3 was **launched in July 2022**, with our national experts reaching out to authorities responsible for 74 OPs sampled for data collection in Areas 2 and 3.

Notably, the requested historical data were often unavailable from central management systems and had to be collected at the level of IBs, in some cases directly from project documentation. To this end, as indicated above, a pool of experienced national experts had been engaged to ensure that relevant authorities were supported throughout the data collection process. These experts were responsible for disseminating the DCFs to representatives of the MAs and IBs in each Member State, aiding them in the process of the DCF population, and maintaining a constant communication throughout.

Since data collection is an iterative process, the study team performed a rigorous data quality check to determine its suitability for developing EU-level SCOs or other tools. In cases where some data were unavailable or unclear, the study team organised follow-ups with the Member States to confirm data availability, potentially fill out any data gaps or interpret the previously collected data. In addition, the study team was unable to follow-up with some Member States that submitted significantly later than the deadline.

The study team also explored why some Member States could not provide data for certain sub-areas or data points. Some of the common responses were that: a) Member States did not implement relevant interventions; b) In some cases, even if relevant interventions were implemented, data could not be extracted from the projects since it was not monitored to the requested detail due to different reporting requirements; c) In certain cases,

where the Member States included ongoing projects and/or calls, the information about outputs and results was not provided since it wasn't finalised and reported yet.

As part of the **historical data cleaning process**, outliers were iteratively removed from the sample to ensure that only high-quality and reliable data were included in the calculations. The study team conducted interquartile analysis (see Box 2 for details) and applied expert judgement to reliably identify the outliers and justify their exclusion from further analysis.

Box 2. Approach to interquartile analysis for the purpose of removing outliers

A quartile is a statistical division of a dataset into four equal groups, with each group making up 25 % of the data. The top 25 % of a collection is considered the 1st quartile, while the bottom 25 % is considered the 4th quartile. They can be calculated as follows:

- Calculating the interquartile range for the data by subtracting the third quartile value from the first quartile value;

$$IQR = Q3 - Q1$$

- Multiplying the interquartile range by 1.5 (a constant used to discern outliers);

$$IQR * 1.5$$

- Add 1.5 x (IQR) to the third quartile. This is the upper bound – any number greater than this is a suspected outlier;

$$Upper\ bound = Q3 + 1.5 * IQR$$

- Subtract 1.5 x (IQR) from the first quartile. This is the lower bound – any number less than this is a suspected outlier.

$$Lower\ bound = Q3 - 1.5 * IQR$$

Notably, the interquartile rule is only a rule of thumb that generally holds but does not apply to every case in the quantitative analysis. Therefore, the study team analysed each outlier obtained by the interquartile method in the context of the entire dataset and, where a clear choice was not evident, expert judgement was applied. This type of outlier analysis is typically used whenever statistical modelling is insufficient, and when expert judgement may provide reassurance with respect to resilience and accuracy[19]. Such outlier cases may occur when the quantitative sample is low enough for the statistical methods to be ineffective. An example of the situation where expert judgement may be applied can be found in Box 3 – both instances in the example would be qualified as outliers, as they contain insufficient qualitative information to explain why reported amounts are so low or so high. As suggested, outliers may also occur between Member States, rather than within Member States.

[19] Bellini, T., (2019) in IFRS 9 and CECL Credit Risk Modelling and Validation.

Box 3. Hypothetical scenario for outlier analysis based on expert judgement

A relatively low amount of EUR 1000 was spent per one advisory consultancy for SMEs in several projects implemented in Member State A (a high living cost country). Information on the scope, duration and other aspects of this activity are not provided.

A relatively high amount of EUR 10,000 was spent per one advisory consultancy for SMEs in several projects implemented in Member State B (a low living cost country). Information on the scope, duration and other aspects of this activity are not provided.

A detailed description of the sample interventions / operations used to establish SCOs, as well as the data cleaning techniques and unit cost calculation methods applied in this study, are provided in Chapter 2 of this report.

1.1.4. Feasibility analysis of potential SCO alternatives

The development of EU-level SCOs is primarily a data-driven exercise. Therefore, the study team conducted a comprehensive feasibility assessment of the quality of data utilised to calculate each of the proposed SCO alternatives. To enable an informed selection of the SCO alternatives which were shortlisted for further analysis in the study, it was necessary to carry out a rigorous assessment of their feasibility, in liaison with the Commission. To this end, we have assessed each SCO alternative against the following **set of criteria**: 1) data availability, 2) data granularity, and 3) data reliability. For a more comprehensive assessment of data quality for all areas, please refer to Annex 3 of the report.

The exploring potential alternatives (per each area covered under Task 1) were then compiled considering the feasibility assessment mentioned earlier and other conceptual aspects of SCO development such as whether:

- the proposed indicator is commonly used throughout Member States (common ERDF/CF indicator);
- the proposed indicator is result-based, output-based or input-based / process-based SCOs;
- the proposed indicator is a unit cost or a lump sum.

For a more comprehensive overview of the feasibility analysis done of potential SCO alternatives, please refer to Chapter 2 of the report.

1.1.5. Calculation and adjustment methods

The calculation process of the SCO options shortlisted for development consisted of the following:

- developing approaches and main unit cost estimation methods for SCOs;
- conducting exploratory analysis to test the feasibility of different methods for establishing off-the-shelf solutions;
- calculating SCO amounts for each Member State based on the historical data sample collected;
- adjusting SCO amounts to 2021 price levels based on inflation indices; and
- adjusting SCO amounts to include eligible indirect costs based on Common Provisions Regulation flat rates.

For more details on the precise calculation method used for each SCO, please refer to Chapter 2 of the report.

For those Member States that did not provide us with (sufficient) data, a method of statistical inference (extrapolation) was used to establish the rates / amounts for each proposed EU-level SCO. In a nutshell, we

took **the unit cost rates and/or lump sum amounts calculated for those Member States that provided the study with relevant historical data and used it to predict the missing rates / amounts for all remaining Member States.** Extrapolation as a tool to overcome the historical data quality issues was also applied in similar studies the study team has carried out to develop SCOs at EU-level.

The extrapolation process was conducted by calculating proxy rates from Member States with data on a full or partial set of activities and then applying a **linear regression model**, with selected statistical indicators as explanatory variables, to predict the proxy rates for countries without sufficient historical data.

In sub-area 1A, a bivariate extrapolation model was used by utilising the cost index as the explanatory variable, followed up by with further indexation of inferred estimates based on the results index. This is because the size of the base historical data sample is too small to utilise a multivariate approach. For example, if the multivariate model is applied in the case of 1A, it will not return the parameter estimates (e.g. degrees of freedom, r-squared, f-statistic, p-value etc.) needed to ensure that the model works in the intended manner. For more details on the exact method, please see section **Error! Reference source not found.**.

In sub-area 1B, the extrapolation was based on a multivariate linear regression model with the cost index and result index as explanatory variables. A similar approach was also taken when deriving rates for sub-area 2A. For more details on the exact methods used in these areas, please see section 2.1.2 and section 2.2.1 respectively.

In sub-areas 2B, 3A and 3B, the extrapolation measures taken were done at the level of operation. This was done in order to account for the different type of SCO utilised (lump sum) which does not lend itself well to disaggregation at activity level. For more details on the exact methods used in these areas, please see sections 2.2.2, 2.3.1 and 2.3.2 respectively. Table 2 indicates the statistical indicators we propose to serve as explanatory variables of cost variation in Member States.

Table 2. Proposed explanatory indicators for areas of the study

AREA	STATISTICAL INDICATOR	RATIONALE
Energy Efficiency and Renewable Energy	• the composite **cost index** drawn from: o Price Level Index (PLI) (EU-27_2020=100) for machinery and equipment o Labour cost for Labour Cost Index (LCI) (compensation of employees plus taxes minus subsidies) (EU-27 = 100), industry, construction and services (except public administration, defence, compulsory social security) • the composite **results index** based on the overall energy efficiency score of each EU Member State in 2021 taken from the 'EU energy efficiency scoreboard' developed in the framework of the Horizon 2020	The selected indicators are deemed relevant for predicting and explaining the missing values (i.e. unit cost rates for Member States not covered / partially covered by historical data) **because**: - they consider if the price level for equipment and machinery in one Member State is higher or lower than equipment and machinery in another Member State; - they consider the extent to which labour costs in the specific economic activity are different across Member States; - they consider the potential CO_2 savings that each Member State will be able to generate, based on the energy efficiency level (i.e. baseline situation), energy efficiency progress (i.e. energy

AREA	STATISTICAL INDICATOR	RATIONALE
	project *Odyssee Mure*[20] which quantifies the following aspects: o the energy efficiency level; o the energy efficiency progress (i.e. energy efficiency trends); o the energy efficiency policies.	efficiency trends) and energy efficiency policies (quantitative impacts collected from energy efficiency evaluations, based on energy savings in the past) in different Member States.
Research and Innovation activities	• Labour cost for LCI (compensation of employees plus taxes minus subsidies) in professional, scientific and technical activities (EU-27_2020 = 100) (Eurostat, LC_LCI_LEV). • Price level index for communication, machinery and equipment, and software (EU27_2020 = 1) (Eurostat, PRC_PPP_IND).	The two indicators are deemed a relevant predictor of missing values for Member States not covered / partially covered by historical data as they consider the extent to which labour costs and price levels in the selected economic activities differ across Member States.
SME Growth and Competitiveness	• Labour cost for LCI (compensation of employees plus taxes minus subsidies) in business economy (EU-27_2020 = 100) (Eurostat, LC_LCI_LEV).	This indicator best reflects the differences between Member States in a key cost item within the area – staff costs – which is prone to significant variation. The economic activity 'business economy' most closely reflects the operations within this area.

Source: prepared by the study team.

To ensure that the amounts / rates of developed EU-level SCOs retain their relevance in the future, the study team also proposed how these amounts / rates should be adjusted. To this end, we identified a set of **annually updated statistical indicators** tracked by Eurostat (Table 3). These indicators are considered to best **reflect the inflation** affecting operations in Areas 1, 2 and 3.

Table 3. Proposed inflation indicators for areas of the study

AREA	STATISTICAL INDICATOR	RATIONALE
Energy Efficiency and Renewable Energy	Construction cost index (or producer prices), new residential buildings. Percentage change compared to same period in previous year (Eurostat, STS_COPI_A)	The study team reviewed indicators which would encompass both the labour costs and material costs – a single, multi-faceted indicator would allow for easier adjustment of SCO values and address the fluctuating costs of the two main cost categories seen in Area 1. The proposed indicator is relevant for adjusting the SCO values in both sub-areas. The objective of the construction cost index is to show the development of costs incurred by the contractor to carry out the construction process.

[20] https://www.odyssee-mure.eu/data-tools/scoring-efficiency-countries.html

AREA	STATISTICAL INDICATOR	RATIONALE
		Construction costs may be used if the reporting country is not compiling producer prices of new residential buildings. The construction cost index shows the price developments of production factors used in the construction industry. The index encompasses both material costs and labour costs. The material costs are generally calculated using material prices. Here, prices of materials are based on actual prices rather than list prices. Furthermore, prices are based on a sample of products and suppliers. The labour costs cover wages and salaries and social security charges for all persons employed.
Research and Innovation activities	Labour cost index in professional, scientific and technical activities (Eurostat, LC_LCI_R2_A). Percentage change compared to previous year. Harmonised Index of Consumer Prices (HICP) in industrial goods, services and communication (Eurostat, PRC_HICP_AIND). Annual average rate of change.	The proposed indicators are relevant for adjusting the SCO values in both sub-areas as they consider price developments of labour in selected sectors for each country compared to the previous period, as well as consumer price inflation in the euro area.
SME Growth and Competitiveness	Harmonised Index of Consumer Prices. Percentage change compared to previous year.	The proposed indicator is relevant for adjusting the SCO values in both sub-areas as it considers consumer price inflation in the euro area. We utilise the general index because given the nature of 3A and 3B operations, none of the specific items of the provided index contain additional information which would help explain the variation of prices for this operation.

Source: prepared by the study team.

1.1.6. Consultations to test and validate study outcomes

The study team conducted an extensive stakeholder consultation programme at separate stages of the study. The main objectives of these consultations were the following:

- introducing key stakeholders to the study, its objectives and desired outcomes;
- piloting data collection forms before finalising them and disseminating to all Member States;
- informing stakeholders on the key parameters of proposed SCOs;
- testing and verifying if the definition of SCOs (activities covered) is accurate, sufficient and applicable for their intended purpose;
- testing and verifying if the audit trail arrangements and requirements are appropriate, fit-for-purpose and manageable;
- consulting on the potential value of the approach considered for SCO value estimates in the Member States not covered by historical data;
- addressing any arising caveats for the implementation of proposed SCOs.

The stakeholder consultation programme included the following forums:

- bilateral consultations with Member States in order to pilot data collection forms;
- focus group discussions with representatives from Managing Authorities and Intermediary Bodies;
- presentations of study results and Question & Answer (Q&A) sessions during meetings with the Transnational Network of ERDF/CF SCO practitioners;
- meetings with the Steering Group of the study;
- consultations with the Directorate-General for Energy (DG ENER).

The **first presentation to members of the Transnational Network of ERDF/CF SCO practitioners** was meant to introduce the study and the envisaged role of stakeholders within Member States. Participants were invited to discuss in groups on the next steps of the study and to provide comments and suggestions for their implementation. Specifically, participants were asked to indicate the issues that the study team might face when collecting historical data and the potential mitigation measures and suggestions to the study team on how to tackle identified issues. Stakeholders also raised questions regarding the data collection process.

The draft data entry forms had been tested on a small sample of Member States as part of the **piloting exercise** during the Inception phase of the study. The study team approached and collected feedback on this tool from Italy, Lithuania, Malta, Poland, Portugal and Spain. The piloting exercise was carried out in order to:

- check if the forms are sufficiently comprehensive for their intended purpose and to see how they could be improved, as well as to improve our team's understanding of analysed interventions;
- assess the availability and quality of historical data;
- obtain initial insights on effort required on behalf the Managing Authorities and National Experts to collect and provide all requested data.

The **first focus group discussion** was organised in order to test our data collection tools and collect feedback from a larger group of stakeholders. The focus groups involved the responding competent Managing Authorities and Implementing Bodies from the 27 EU Member States The findings that emerged during these meetings helped verify the clarity of the draft data collection forms, ensuring their uniform understanding as well as the relevance and coherence of the data which would be collected.

The **second focus group discussion** was organised in order to validate the proposed SCO alternatives and inform stakeholders on the development of EU-level SCOs for ERDF/CF in the area of Energy Efficiency & Renewable Energy. The focus group discussion revolved around the discontinued modular SCOs and the prospective audit trail of the proposed SCO alternatives.

The study team presented the results of Area 1 in the **second meeting with the Transnational Network of ERDF/CF SCO practitioners**. Here, the stakeholders were presented with further details of the proposed SCOs, including the development steps, the reasons for selecting the indicator and the calculation method of the proposed SCOs. In the Q&A after the presentation, feedback was given on the proposed modular SCO approach, which Member States were satisfied with. The stakeholders shared a similar sentiment to the participants of the focus group discussions, referring to the flexible nature of the suggested modular approach. Some concerns were raised on the proposed adjustment methods and how the study team would address the rising inflation and revise the rates accordingly.

The **third focus group discussion** was used to present and discuss the preliminary study results on Areas 2 and 3. The stakeholder consultation was crucial in verifying whether the preliminary study findings were clear and relevant for the participating Member States. It also helped the study team to anticipate and flag any possible issues to be addressed in the later stages of the project. Finally, the preliminary discussions on the audit trail helped the study team to develop and propose audit trail requirements for the shortlisted Alternatives.

Other stakeholders within the European Commission, such as DG ENER, have also been consulted. During these consultations, DG ENER expressed concerns over the modular unit cost rates and whether they are based on CO_2 reductions directly attributable to costs of a particular activity / module. In addition, some reservations were expressed about the sample size of the historical data collected from the Member States and the overreliance on statistical methods used to derive SCO rates. Some concerns regarding the extrapolation method which predicts values for countries with partial / missing historical data were put forward. Here, the question was raised on how accurately the rates were calculated without considering the capacity of different Member States to reduce the CO_2 emissions, as the initial proposal of the statistical indicator used for extrapolations only considered price variation across the EU.

The **second presentation to members of the Transnational Network of ERDF/CF SCO practitioners** was meant to present the outcomes of SCO development in Areas 2 and 3 and the feasibility checks. Participants were invited to discuss in groups and provide feedback on the proposed SCOs in the respective areas and ask for clarifications on the material presented before the meeting (via background notes) and during the meeting (via presentations). A compiled list of questions posed by Member States and the responses by the study team are presented in the table below (responses to questions received for feasibility checks are presented in section 1.2).

AREA	QUESTION	RESPONSE
All areas	Can we use EU-level SCOs at a lower level when we already know that we are not able to cover all the necessary cost of the activities?	SCOs proposed in this study are meant to be used at EU-level. However, they are based on historical data about similar operations implemented in the past and, therefore, should be suitable for using at lower levels as well.
All areas	Which parameters have been taken into account to extrapolate the figures for those MSs which did not provide data?	For each operation type analysed in the study, the study team considered their cost composition to identify and define their main cost items. A selection of hand-picked statistical indicators best suited for explaining and predicting the cost variation of these cost items was then used for extrapolation, drawing in most cases on the labour cost index and price level index (for equipment, materials etc.) data.
All areas	The audit trail mentioned related to the EU-level SCO is a recommendation as a minimum requirement or it has to be further extended by the auditors if necessary?	Audit trails for all proposed EU-level SCOs encompass all the necessary checks needed to prove that activities have taken place and that results have been achieved. Any further requirements for audit checks are at the discretion of the European Commission.
All areas	Is it compulsory to use an EU-level SCO only for some operations of the OP and not for all operations of the same type?	The proposed EU-level SCO is intended to be used for all operations of the same kind supported by the OP.
All areas	In the case of a similar programme-specific SCO already developed and being used on a programme level, is it possible to switch for the EU specific once the latter has been published and proven more beneficial for beneficiaries?	SCOs proposed in this study are meant to be used at EU-level. However, they are based on historical data about similar operations implemented in the past and, therefore, should be suitable for use at lower levels as well.
All areas	Could Member States use the result of the study as a base to further develop or adapt it to other programme areas or sub-areas not covered to develop their own SCOs? Can the data collected be used for this purpose?	Data collected throughout this study could be used by the Member States for future development of their own SCOs.
All areas	Can a correction coefficient be developed / introduced to correct big differences within a country and also on the different cost of the mission destination (for the internationalisation, e.g. costs of a participation fair in Seoul is different to a mission to Turkmenistan, for instance).	Based on the available data, country coefficients at regional NUTS2 level would only be available for GDP PPP which is not a good proxy to calculate price level differences within different regions in a Member State. As regards differing costs for the mission destination, the study team has not found evidence to suggest that differentiation between different destinations is warranted.

AREA	QUESTION	RESPONSE
All areas	Adjustment methods: Is indexation an EU-level wide method or is it country specific. If a main framework change happens in a country that it is not reflected in the indexation method proposed, how can the SCOs be adjusted (can individual countries develop a different indexation methodology)?	The adjustment methods for EU-level SCOs are common for all Member States. They are based on statistical indicators from Eurostat. Indexation methodologies individually tailored to each Member State are not applicable to EU-level SCOs.
Area 2	Sub-area 2A. How to identify what is the new position that did not exist before in the SME?	The definition of a new position that did not exist before closely follows the definition provided under the ERDF/CF common indicator methodology, as indicated in the summary table of the proposed SCO for sub-area 2A. This is essentially a 'before-after' indicator which captures the part of the employment increase that is a direct consequence of project implementation or its completion.
Area 2	Sub-area 2A. The EU-level SCO proposed in this sub-area is a unit cost for one month of gross new working position (that did not exist before) to directly perform R&D activities in the SME. This indicator penalises those SMEs who use their own resources to invest in this area. A similar output indicator will ensure flexibility in this respect and will not change the calculation of this unit cost. Is it possible to change this to an output indicator rather than a result-based one?	The purpose of this SCO is to facilitate intersectoral, international mobility between research institutions and SMEs for the purpose of improving the research capacity of the respective SME as they employ additional research staff. This is to be done through ERDF/CF financing. It is unclear for the study team on how the change of the indicator from a result to output-based would overcome the obstacle indicated in the question.
Area 2	Sub Area 2A. Could maternity leave be included in the methodology and considered as eligible expenditure?	This is not feasible at this stage of the study, since the study team does not have the data required for such analysis.
Area 2	Sub area 2A. It was mentioned in the presentation that 're-using already existing unit cost rates from other union policies was seen as not favourable.' Please clarify why this is not favourable?	The study team, after further discussions with DG REGIO, has elected to prioritise data collected in the study as the basis for developing EU-level SCOs.
Area 2	Sub-area 2B. 'There is a risk of double-funding when using the proposed EU-level SCOs. The beneficiary should ensure that all costs claimed are eligible.' Does this also involve further examination and verification of documents for the eligibility of expenses from the IB/MA? If yes, how does this contribute towards simplification? The IB/MA should only ensure the outputs / results not actual costs incurred.	It is not necessary for the IB/MA to further examine and verify documents for the eligibility of expenses. The IB/MA will only ensure that outputs / results achieved are verifiable and real and that activities have taken place which are relevant for the operation.
Area 3	Sub-area 3A. How can the lump sum for networking activities of SMEs be applied at a lower level for MA and beneficiaries?	The implementation mechanism of the SCO is the same as applied at a higher level between the EC and the MA. Namely, to trigger reimbursement the beneficiary has to present proofs that eligible activities have taken place (i.e. documents providing evidence of actual attendance at the international event). It is worth noting that while these SCOs are formally designed for the upper level, they are specifically made to be applied at lower levels.
Area 3	Sub-area 3A. International events – is a common EU SCO planned?	It is unclear what the question exactly means. If the expression 'common EU SCO planned' refers to a single SCO rate that applies to all the Member States, then the answer is no. Different rates were calculated for each Member State, specifically for 6 Member States using historical data. For the remaining 21 Member States, rates were derived through statistical inference.
Area 3	Sub-area 3A. Is it possible to declare other eligible expenditure together with SME participation at trade fairs?	The lump sums calculated for sub-area 3A, which refer to SME trade fair participation costs, cover all the eligible costs specifically related to the activity in question.
Area 3	Sub-area 3B. Must the international strategy be outsourced or is it possible to hire somebody for this job?	The development of an international strategy can be approached in both ways: outsourcing or hiring someone for the job. There is flexibility in choosing the method that best

AREA	QUESTION	RESPONSE
		suits the SME's needs and resources. However, regardless of the approach chosen, it is crucial to ensure that the internationalisation strategy holds value and meets the necessary requirements for reimbursement. For this purpose, the selection procedure should aim to award projects that demonstrate a clear added value in terms of internationalisation.

Source: prepared by study team.

1.2. EU-level result-based tools

Simplification measures under EU cohesion policy 2021-2027 include a 'Financing Not Linked to Costs' option. This is a continuation of the 'payments based on conditions' option introduced in the Omnibus Regulation[21]. FNLC is based on fulfilling conditions related to progress being made in implementing programmes or the achievement of their objectives. It represents a radical simplification in implementation as it changes the focus from costs, reimbursement and checks linked to individual projects to tracking deliverables and results for a project, group of projects or scheme. Audits of the FNLC aim exclusively to verify that the conditions for reimbursement have been fulfilled.

As part of the study to develop EU-level Simplified Cost Options and other EU-level results-based tools in the programming period 2021-2027 (*ERDF/CF SCOs 1*), the study team was expected to conduct up to **three feasibility checks** for the development of **EU-level Financing Not Linked to Costs solutions**, focusing on areas that would be potentially feasible and relevant for developing those tools.

In accordance with Article 5(1) of Regulation (EU) 2021/1060, the ERDF/CF shall support, through its investments, five Policy Objectives (POs): 1) a more competitive and smarter Europe; 2) a greener, carbon-free and resilient Europe; 3) a more connected Europe; 4) a more social and inclusive Europe; and 5) a Europe closer to citizens.

In our experience with feasibility checks, this exercise can take many different forms depending on the area covered by the analysis and the way the analysis object is defined. In the present document, the study team proposes a rather flexible but comprehensive approach towards this exercise. This section elaborates on our approach, elaborating on the steps taken to define the selected investment area, as well as validating our main findings and suggestions.

Preparatory desk research

As the first step, our team conducted **preparatory desk research** in all areas considered for the FNLC development. The main goal of this preparatory step was to identify and familiarise ourselves with the sources important for reconstructing the intervention logic of actions / priorities / projects supported in the analysed area.

To this end, the study team revised all Policy Objectives for the ERDF/CF funds in the programming period 2021-2027 according to Article 5(1) of Regulation (EU) 2021/1060, namely PO1 (Smarter Europe); PO2 (Greener Europe); PO3 (Connected Europe); PO4 (Social Europe); and PO5 (Europe closer to citizens).

After preliminary desk research, the team was able to identify the following **five investment areas** with potential for an EU-level FNLC solution:

- **Skills for smart specialisation and transition** (RSO1.4 – 'Developing skills for smart specialisation, industrial transition, and entrepreneurship');
- **Digital connectivity** (RSO1.5 – 'Enhancing digital connectivity');

[21] Regulation of the European Parliament and of the Council on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012 (https://data.consilium.europa.eu/doc/document/PE-13-2018-INIT/en/pdf).

- **Climate change adaptation** (RSO2.4 –'Promoting climate change adaptation and disaster risk prevention and resilience, taking into account ecosystem-based approaches');
- **Sustainable urban mobility** (RSO2.8 – 'Promoting sustainable multimodal urban mobility, as part of the transition to a net zero carbon economy');
- **Sustainable transport** (RSO3.2 – 'Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility').

The shortlisted areas were selected based on the following criteria: 1) investment areas covered by Policy Objectives that are considered as main priorities for the ERDF and the CF (i.e. PO1 and PO2 in the case of the ERDF and PO2 and PO3 in the case of the CF)[22]; 2) areas with extensive Member State coverage, meaning that there are projects being implemented in multiple countries; 3) areas with higher availability of results indicators and financial data; 4) areas where EU-level simplification mechanisms have not yet been implemented under ERDF/CF.

Member States consultation

After pre-selecting the most promising investment areas for developing FNLC solutions, the study team consulted the Member States about the areas where EU-level result-based tools may be used. More specifically, we consulted the members of the Transnational Network (TN) on simplification. The consultation was carried out to further narrow down the list of investment areas pre-selected for the feasibility checks.

Member States were requested to rank the pre-selected areas on a scale of 1 (highest priority) to 5 (lowest priority). The final ranking, based on replies from 20 Member States (of which 18 provided information on their preferred order) up to 19 April 2023, is presented in Table 4.

Table 4. The ranking order of pre-selected investment areas

RANK	AREA
Highest priority	Skills for smart specialisation and transition (RSO1.4)
Medium priority	Digital connectivity (RSO1.5) Climate change adaptation (RSO2.4) Sustainable urban mobility (RSO2.8)
Lowest priority	Sustainable transport (RSO3.2)

Source: prepared by the study team based on Member State consultation.
Note: Final ranking was estimated by taking the median value attributed to each area and ranking them from the smallest to the highest value. The highest priority corresponds to areas where the median was ranked 1 or 2. Medium priority corresponds to a median of 3. The lowest priority areas are those in which the median was either 4 or 5.

[22] According to the EU cohesion policy priorities, available at: https://ec.europa.eu/regional_policy/policy/how/priorities_en. Last access: 18 April 2023.

The outcomes of this prompt consultation were used for further discussions with the Commission and informed the final selection of investment areas for the feasibility analysis. The selected areas for the feasibility checks were the following:

- Skills for smart specialisation and transition (RSO1.4)
- Climate change adaptation (RSO2.4)
- Sustainable urban mobility (RSO2.8)

Second round of desk research

After the shortlisted areas had been selected, the study team continued with data collection activities by carrying out **additional (more in-depth and better-focused) desk research**. The intended purpose of these research activities was to (i) elaborate further on the result indicators identified in previous steps, (ii) explore in greater detail the potential sources of data for estimations of costs / establishment of amounts, and (iii) assess the adequacy and sufficiency of these sources for the practical development of FNLC solutions (feasibility assessment).

Meetings with Transnational Network of ERDF/CF SCO practitioners

To validate the findings and conclusions of all feasibility checks, our team used the opportunity offered by this meeting to **present the draft ad hoc reports to the Transnational Network of ERDF/CF SCO practitioners**. As part of the presentation on the feasibility checks delivered by our team during these meetings, we asked for immediate feedback and the potential uptake of feasible FNLC solutions if they are developed in practice. The questions posed by Member States and our responses to these questions are summarised in the table below.

AREA	QUESTION	ANSWER
All areas	Will the study also provide the acceptable verification method for each FNLC Milestone and Target devised through which the achievement of the Milestones and Targets will be verified in order to have disbursements to the Member States	The scope of the study was to access the feasibility of developing a FNLC solution in the three selected sub-areas. The study team concluded that, at first glance, in all three areas, developing a FNLC solution, is feasible. Further developments, however, are outside the scope of this study. If the solutions proposed in the FCs are proven to be possible and relevant in practice, setting milestones / targets and developing the calculations would be the next logical steps. Partial achievement of the milestones can be considered.
	Does the feasibility check also comprise establishing steps to be taken / milestones for FNLC schemes?	
	Will the milestones be set for these FNLC's to trigger the payment? Will the payments be done in part if some milestones are reached but not the full results?	

	Is the Commission going to assess the reality of costs proposed for achieving milestones / targets?	
	Has there been a discussion to use RRF data of MSs for all three areas?	Data from RRF have proven useful in our FCs. In the case of the third feasibility check, for instance, the study team has included as an example the case of a programme in Croatia under the RRF aimed to reduce the risks of disasters. If there are more examples of programmes under RRF using similar indicators in other areas also, they could also be used as inspiration for elaborating a FNLC solution.
Promoting sustainable multimodal urban mobility	Should the FNLC prioritise funding only the additional costs for the more sustainable option which may be more expensive?	FNLC does not consider only partial cost coverage, it is a tool used to cover the entire operation.
	What is the definition of multimodal for the purpose of funds?	Within the mobility system, multimodal mobility can be understood as the use of combined forms of transport such as road in combination with rail, inland waterway and sea transport. For example, projects related to multimodality could be related to improving connectivity between different modes of transport and adopting homogeneous ticket systems
	What is the link between the multimodal and the mobility system?	
	Any idea how the get the 'number of new users' on the national level if you haven´t collected the data so far and don´t have a baseline?	Collection of data to set the baseline is necessary. If the data are not available, implementation of the FNLC mechanism with a delay can be facilitated.
	Clarification is needed on the measurement methods for some of the proposed indicators. For example, number of cyclists using the infrastructure.	All the indicators we analyse in the FCs are common ERDF/CF indicators, which are already well-established and being collected by several MS in the current period. For instance, in the case of the number of cyclists, the indicator is defined as the users of dedicated cycling infrastructure financed by supported projects, which includes users of cycling facilities separated from roads or other parts of the same road by structural means (such as barriers), cycling street, cycling tunnels etc. The measure of the indicator should follow closely the definition of the official ERDF/CF common indicator RCR64 (annual users of dedicated cycling infrastructure).
	The results (people using the road or bikeway happens after the project has ended) and how to measure it?	
	In our view counting the bicycles is an issue, it would need to be a statistical estimate	
	How can new users of the modernised infrastructure be measured in practical terms?	The indicators define 'modernisation' of public transport as 'significant improvements in terms of infrastructure, and access and quality of service'. The measure of the indicators should follow closely the definition of the official common indicators RCR62/RCR63.

	What if the results are not durable? For example, if the bike lane is broken two years after completion, will the full amount need to be reimbursed or only the part of the final milestones?	Partial achievement of the milestones could be considered. In addition, it is important that the selection procedure focus on awarding only projects with clear added value.
Skills for smart specialisation and transition	What differentiates an SCO linked to results from a FNLC linked to results for this policy area when both are using CVT survey data?	The main difference is that SCOs are linked to the cost of the operation, while FNLC is not.
	Is it possible to come up with specific definitions of what constitutes smart specialisation, industrial transition, and entrepreneurship to avoid different interpretations during implementation?	It is possible to refer to the official definition of these concepts proposed by the EC. See, for example, the definitions proposed by the JRC.
	What happens after training? Seems more like output indicators rather than results.	We acknowledge that, theoretically, this indicator seems to primarily monitor output. However, as provided by Regulation (EU) 2021/1058 and per definition of the European Commission, it is classified as a result indicator.
	What is the link between the employees and company? How to measure the gain that the company gets?	Vocational training encompasses skill development as well as innovation diffusion, both of which can potentially contribute to the sustainable economic growth of SMEs. It is important to note that our measurement focuses solely on the gain in terms of new staff trained, rather than capturing the broader impact on the SMEs.
	Are you not afraid that there will be a lack of quality if we focus mainly on the 'countable' outcomes without defining the quality criterion?	The study team has taken this risk into consideration. To address this issue and mitigate its consequences, it is advisable to implement a quality assessment process. One way to do this is by requesting detailed information on the topics covered in the training. This enables a general evaluation of the training's relevance and alignment with the intervention field. Furthermore, during project selection, emphasis should be placed on quality. In this way the focus can be maintained on both the 'countable' outcomes and the quality of the training.
	Your example on the verification mechanism only mentioned proof of course attendance but employment would also need to be checked if the indicator is employee	Yes, indeed, this suggestion will be duly considered in the feasibility check

	What kind of adjustment methods will be used (apart from general macroeconomic indicators)?	Microeconomic indicators specifically targeting training services will be identified for the adjustment method.
	Can we use university students as 'employees' or as 'participants' for example, if a scheme for universities is developed where students are placed in an enterprise for a candidate placement period?	The operation should be consistent with the definition of the ERDF common result indicator RCR 98, namely 'Number of participants from SMEs (including micro enterprises) who complete training / activity for skills development for smart specialisation, for industrial transition and entrepreneurship'. The indicator focuses on training / activity completion by employees of SMEs therefore university students cannot be considered as 'employees' or 'participants' in this context.
Climate change adaptation and risk prevention	Have you considered emission reductions or energy efficiency reductions FNLC as a possible feasibility?	For the sub-area of climate change adaptation and risk prevention, the study team did not consider these indicators as they were not being measured by many MS in the current period, therefore considered less relevant according to our assessment criteria. In addition, all programmes analysed in this sub-area were in some way related to the prevention or management of risks, which is the reason the FC focused on these types of interventions. We must emphasise that the indicators chosen were a suggestion when the study team explored the available data on current programmes, meaning that other indicators could still be considered if they are considered relevant to many MS.
	When it comes to flooding, flooding usually happens in areas which are sparsely populated. The indicator chosen will not give you an adequate reimbursement if the area affected is sparsely populated. Is it possible to tie such measures to other indicators?	The choice of indicators was based on two criteria: the indicators should be result-based, and they should be relevant to many MS, assessed by looking at how many MS are using the same indicators in the current period. However, the study team acknowledges that there are risks associated with the selected indicators. When performing an assessment of possible risks of the proposed indicator, we anticipated that beneficiaries might, for instance, choose to implement projects in more populated areas to receive a larger outcome-based payment, therefore neglecting less populated areas that could potentially be more prone to disasters. For this reason, selecting projects with clear added value is necessary. It is important to note that the indicators proposed are a suggestion based on the available data on current programmes. Other indicators could still be considered if they are deemed as more relevant to many MS.
	Some indicators might not be suitable for specific areas of support. For example, annual users of new / modernised transport may not justify support to less populated or remote users but at the same time these areas need most support.	
	Why you chose 'population affected' as an indicator and not some other option, e.g. m2 of area? (especially for prevention of fires, but also applicable for others)	

Gaps in data, how will you handle it?	Gaps in data can either be handled by finding complementary data sources or by using statistical techniques to estimate the missing data, such as extrapolation. For instance, in the case of the disaster damage databases that was mentioned as a potential source for sub-area 'climate change adaptation and risk prevention', there are several different databases compiling information about disasters, that could potentially be used to offset the lack of data of the main data source.
How will the study consider the territorial differences that will define the type of remedial actions that you will implement as a response to the environmental risk?	It is important to have sufficient data points to consider territorial differences, so that the averages are a better reflection of each country. In the case of disasters datasets, for instance, each disaster is a different data point, which would allow the selection of more relevant events to be included in calculations of these averages.
What risk assessments have been taken into account for risk prevention / compensation costs e.g. fire or floods? Can examples be provided?	The risk assessment that should be performed for the release of funds should follow the definition and measure of the official ERDF/CF indicators RCR35/RCR36/RCR37/RCR96. For instance, in the case of flood protection measures, it should follow the definition of the indicator RCR35, an indicator that counts the resident population at risk of flooding, defined as the population living in areas where protection infrastructure (including also green infrastructure for adaptation to climate change) is built or significantly upgraded in order to reduce vulnerability to flood risks.

Source: prepared by study team.

2. Study findings

2.1. Area 1: SCOs for Energy Efficiency & Renewable Energy

This section of the report provides the results of proposed SCOs in the policy area of Energy Efficiency and Renewable Energy. A key policy objective of Cohesion Policy in the new programming period is a greener, low-carbon Europe by promoting clean and fair energy transition, green and blue investment, the circular economy, climate adaptation and risk prevention and management. This policy objective will be supported from ERDF and CF among other measures through promoting energy efficiency measures and renewable energy. The development of EU-level SCOs in the area of Energy Efficiency and Renewable Energy is divided into three sub-areas:

- Energy Efficiency & Renewable Energy in SMEs (**sub-area 1A**);
- Energy Efficiency & Renewable Energy in Buildings (public and housing sectors) (**sub-area 1B**);

Based on the availability of data, **two alternatives of a unit cost** were considered for each sub-area under Area 1:

- Alternative A: a set of unit costs linked to common ERDF/CF indicators CO30 (for energy efficiency in SMEs), CO31 (for energy efficiency in residential buildings), and CO32 (for energy efficiency in public buildings)
- Alternative B: a unit cost linked to common ERDF/CF indicator CO34 (for energy efficiency in all three sectors)

The rationale behind these alternatives was to build on a common / widely used and, preferably, result-based indicator. This simplifies the task for Member States when it comes to measuring and reporting their achieved results in the future. The definitions of proposed SCO alternatives are presented in Table 5 below.

Table 5. Alternatives considered for further SCO development under Area 1

Energy efficiency and renewable energy in SMEs (sub-area 1A)	Energy efficiency and renewable energy in residential buildings (Sub Area 1B.1)	Energy efficiency and renewable energy in public buildings (Sub-area 1B.2)
Alternative A: Cost of one MW of additional capacity of renewable energy produced (CO30) This result-based SCO would reflect the average cost of one MW of additional capacity of	**Alternative A: Cost of improving energy consumption classification per one household (CO31)** This output-based SCO would reflect the average cost of improving energy consumption	**Alternative A: Cost of decreasing the annual primary energy consumption by 1 kWh (CO32)** This result-based SCO would reflect the average cost of decreasing the annual primary energy consumption by 1 kWh. Values should be calculated based on

Energy efficiency and renewable energy in SMEs (sub-area 1A)	Energy efficiency and renewable energy in residential buildings (Sub Area 1B.1)	Energy efficiency and renewable energy in public buildings (Sub-area 1B.2)
renewable energy produced. The additional capacity of renewable energy must be the direct consequence of the project completion.	classification per one household. The improvement of energy consumption class must be the direct consequence of the project completion.	information from the energy certificates issued before and after the reconstruction. The indicator will show the total decrease of annual consumption, not the total saved consumption. The decrease in energy consumption must be the direct consequence of the project completion.
Alternative B: Cost of decreasing the annual GHG emissions by one ton of CO_2 (CO34) This result-based SCO would reflect the average cost of decreasing the annual GHG emissions by one ton of CO_2. The decrease of annual GHG emissions must be the direct consequence of the project completion.		

Source: prepared by the study team.

After assessing the historical data sample, we chose to move forward with Alternative B (CO34). The choice to move ahead with indicator CO34 for both sub-areas was primarily a data-driven decision:

- In sub-area 1A (SMEs), CO34 was the most common indicator according to historical data provided to the study team. The main limitation of its closest alternative is that CO30 measured the increase of renewable energy production capacity and did not consider the energy saving potential as a direct consequence.
- In sub-area 1B.1 (residential buildings), data availability for indicators CO31 and CO34 was higher than for CO32 and CO30. The main caveat of CO31 is that it was used to count the number of households with improved energy class, not to measure the actual energy savings. Accordingly, in the data provided to the study team on CO31, only **count of outputs** (i.e. number of households with improved energy consumption classification) and **average achieved energy class of** renovated buildings was evident.
- In sub-area 1B.2 (public buildings), availability of data for CO32 and CO34 was similar, and in both cases higher than for other indicators (CO31 and CO30). However, CO32 is only applicable to public buildings and cannot be extended to other sub-areas. In this regard, it had lower simplification potential compared to SCO based on CO34.

Based on the data quality assessment and the granularity of cost data collected, the study team proposes two approaches for the calculation and establishment of SCO values in the two sub-areas of Area 1. The key difference of these two approaches is that:

- Approach 1 first establishes rates at operation level implemented by a Member State which is then used as the basis for further extrapolations;
- Approach 2 first establishes proxy rates at activity level which are then used as the basis for further extrapolations. The sum of the proxy rates then corresponds to the rate set at operation level.

Approach 1

1. **Choice of the numerator (costs)**. The numerator is the total verified cost of the operation that facilitates a standard set of activities.

2. **Definition of the numerator (costs).** For each Member State that provided data for a standard set of supported activities, the amount used as the numerator refers to costs of all types of activities funded and eligible under interventions implemented in that country.
3. **Definition of the denominator (result)**. The amount used as the denominator refers to the common ERDF/CF indicator, which (according to the historical data provided to the study team) is the most widely used across Member States.
4. **Extrapolation measures**. Extrapolation process is facilitated at operation level by using base data from Member States with all relevant activities which is then used to predict the rates at operation level for Member States without sufficient historical data.

In this approach, operations historically implemented by Member States are covered in their entirety. Their scope is consistent across Member States in the historical sample, as they cover a standard set of activities. Extrapolations are feasible as the base data at intervention level are a close match and highly comparable in terms of their implemented operations, albeit for a small sample size. This approach is specific to sub-area 1A.

Approach 2

1. **Choice of the numerator (costs)**. The numerator is the sum of verified costs of each implemented activity within the operation.
2. **Definition of the numerator (costs)**. For each Member State that provided at least partial historical data on supported activities (i.e. cost data broken down by activity), amount used as the numerator refers to costs of the predefined set of activities adjusted to make it comparable across all Member States irrespective of how distinct their interventions had been historically.
3. **Definition of the denominator (result)**. The amount used as the denominator refers to the common ERDF/CF indicator, which (according to the historical data provided to the study team) is the most widely used across Member States.
4. **Extrapolation measures**. The extrapolation process is facilitated at activity level by using proxy rates from Member States with data on a full or partial set of activities which is then used to predict the proxy rates for Member States without sufficient historical data. As the last step, the proxy rates are summed to derive rates at operation level.

In this approach, operations historically implemented by Member States are covered only to the extent they are comparable across all countries providing the historical data. To this end, statistical inference (interpolation) was used to establish the cost and expected outcomes for a standardised list of activities in each Member State providing at least partial historical cost data at activity level. This approach is specific to sub-area 1B to accommodate a larger base data sample and take advantage of the wider availability of activity-level data on incurred costs (i.e. both full and partial set of activities are considered).

2.1.1. Sub-area 1A: Energy Efficiency & Renewable Energy in SMEs

Definition of the SCO

This result-based SCO would reflect the **average cost of decreasing the annual GHG emissions by one ton of CO_2.** This SCO covers the cost of interventions aimed directly at reducing energy consumption and increasing the production of renewable energy by implementing energy saving measures in SMEs. The decrease of annual GHG emissions must be the direct consequence of the project completion and facilitate eligible activities.

Assessment of data

The historical (base) data were collected directly from Managing Authorities and Intermediate Bodies by utilising a standardised and structured data collection form. The data collected from Member States rely on verified expenditure that comes directly from ERDF/CF.

In the case of Area 1A, from 2 Member States (IT, PL) were used to calculate the SCO rate referring to a set of eight activities:

- energy audits to identify, quantify and report existing energy consumption profiles,
- replacement of window frames / glass / fixed shading systems in SMEs,
- upgrade of thermal insulation in SMEs,
- upgrade of heating / cooling systems (including based on RES) in SMEs,
- installation of hot water system with the use of RES in SMEs,
- installation of photovoltaic system in SMEs,
- smart management systems in SMEs,
- consultancy service for preparing the necessary technical studies / reports as well as monitoring the implementation of the interventions in SMEs.

For the remaining 25 Member States that provided data just for some (BG and FR) or none of the activities, the total cost of the intervention was extrapolated on the available sample (IT and PL). Differently than for area 1B, for this area the extrapolation was made at the level of the entire operation (i.e. based on the total costs of the operations) and not at activity level. This difference is due to the more limited size of the sample of historical data collected.

Calculation method

The calculation process was facilitated with the following key steps:

Step 1 – calculation of proxy rates at activity level for the Member States which provided all the necessary data to calculate this SCO. In the case of sub-area A, it was possible to calculate proxy rates for each eligible activity (see listed below) for two Member States, namely IT and PL. For the concerned Member States these proxy rates were calculated as the average ratio of total verified costs incurred to implement the activity in question (e.g. upgrade of thermal insulation in SMEs) and the total estimated annual decrease of CO_2 emissions achieved in reported ERDF/CF projects[23]. The following activities are covered by these rates:

- energy audits to identify, quantify and report existing energy consumption profiles,
- replacement of window frames / glass / fixed shading systems in SMEs,
- upgrade of thermal insulation in SMEs,
- upgrade of heating / cooling systems (including based on RES) in SMEs,
- installation of hot water system with the use of RES in SMEs,
- installation of photovoltaic system in SMEs,
- smart management systems in SMEs,
- consultancy service for preparing the necessary technical studies / reports as well as monitoring the implementation of the interventions in SMEs.

[23] Any outlier values among established proxy rates were excluded consistently with the approach presented in Box 2.

Step 2 – adjustment of established proxy rates to account for inflation. Since proxy rates were drawn from historical data on interventions implemented in the period 2014-2020, estimates obtained in Step 1 had to be updated to align them with current (2022) prices. To this end, proxy rates were indexed according to average cumulative inflation of construction costs (for more details on the 'construction cost index' used see section 1.1.5) in the period 2014-2022.

Step 3 – statistical inference (extrapolation) of missing proxy rates. For the remaining 25 Member States, rates for the entire cost of the interventions where calculated based on a linear regression. The regression draws on the following:

- independent (predictor) variable – the extrapolation index combining PLI (i.e. index on machinery and equipment costs) and LCI (index on labour cost),
- dependent (response) variable – the established proxy rates at operation level (i.e. rates calculated in Step 1 and adjusted in Step 2).

Step 4 – adjustment of rates to EU energy efficiency scoreboard[24] (i.e. EE scoreboard, overall, combined). The rates extrapolated in Step 3 were then adjusted according to the level of energy efficiency of the different countries. More precisely, for each of the remaining 25 Member States:

- the difference between the EE scoreboard of the relevant Member State and the average EE scoreboard of Poland and Italy was calculated (△ EE scoreboard),
- the rate extrapolated in Step 3 was then multiplied by one minus the difference calculated in the previous point (i.e. 1 - △ EE scoreboard) as a lower EE scoreboard corresponds to a lower level of energy efficiency so higher cost of the interventions.

It is important to highlight that the extrapolation method adopted for this sub-area differs from sub-area 1B. For sub-area 1A it was not possible to run a multivariate regression model with two variables and get all the parameter estimates (e.g. degrees of freedom, r-squared, f-statistic, p- value etc.) due to the more limited size of the sample of historical data collected.

Rates

Table 6 below indicates the SCO rates proposed by the study team for sub-area 1A.

Table 6. Proposed SCO rates in sub-area 1A

MEMBER STATE	SCO RATE, EUR/TON CO_2	MEMBER STATE	SCO RATE, EUR/TON CO_2
AT	8 131	**IE**	4 292
BE	9 461	**IT**	5 775
BG	1 368	**LT**	1 581
CY	4 109	**LU**	7 695
CZ	3 478	**LV**	1 790
DE	6 238	**MT**	5 092

[24] EU countries scoring tool for energy efficiency indicators and policies | ODYSSEE-MURE

MEMBER STATE	SCO RATE, EUR/TON CO_2	MEMBER STATE	SCO RATE, EUR/TON CO_2
DK	8 572	**NL**	8 345
EE	1 822	**PL**	1 605
ES	4 097	**PT**	3 297
FI	7 639	**RO**	1 142
FR	5 668	**SE**	8 434
GR	2 755	**SI**	3 520
HR	1 877	**SK**	3 072
HU	1 764		

Summary table

Definition of the SCO	This SCO covers the cost of interventions aimed directly at reducing energy consumption and increasing the production of renewable energy by implementing energy saving measures in SMEs.
Eligible activities	• Energy audits to identify, quantify and report existing energy consumption profiles, • Replacement of window frames / glass / fixed shading systems in SMEs, • Upgrade of thermal insulation in SMEs, • Upgrade of heating / cooling systems (including based on RES) in SMEs, • Installation of hot water system with the use of RES in SMEs, • Installation of photovoltaic system in SMEs, • Smart management systems in SMEs, • Consultancy service for preparing the necessary technical studies / reports as well as monitoring the implementation of the interventions in SMEs.
Indicator name	Tons of CO_2 equivalent
Measurement unit for the indicator	Number of tons of CO_2 equivalent, estimated as total annual decline at the end of the period. The estimate is based on the amount of primary energy saved and/or produced by the supported facilities in the given year (either one year following project completion or the calendar year after project completion). Saved energy should replace the production of non-renewable energy. Produced renewable energy should be GHG neutral and replace the production of non-renewable energy. The impact of non-renewable energy on greenhouse gases is estimated as total national GHG emission per unit of non-renewable energy produced.

<table>
<tr><td>Base calculation formula</td><td colspan="2">$\boldsymbol{SCO_{1A}} = \frac{\boldsymbol{Ctotal}}{\boldsymbol{ttCO2}}$, where
$ttCO_2$ is the total decrease of the annual GHG emissions, in tons of CO_2
C_{total} is total costs of relevant activities, in EUR</td></tr>
<tr><td>Eligible costs</td><td colspan="2">All eligible costs of the operation.</td></tr>
<tr><td>Arrangements for the audit trail</td><td colspan="2">Proof that the results delivered by projects are verifiable and real:
- Energy Performance Certificates (EPCs) completed before and after the implementation of energy efficiency measures, or equivalent</td></tr>
<tr><td rowspan="3">Key risks/limitations and measures to prevent perverse incentives</td><td>Risk/limitation 1: ‘Locked’ interventions / path dependence, i.e. it is assumed that Member States historically implementing small-/large-scale interventions will continue with implementation of small- / large-scale interventions.</td><td>Mitigation measure: Member States are allowed to freely select the activities they intend to facilitate – they will be reimbursed through the same single SCO rate.</td></tr>
<tr><td>Risk / limitation 2: SCO estimates are feasible only for Member States that provided the study with appropriate and sufficient historical data.</td><td>Mitigation measure: statistical inference allows unit cost values to be established for all Member States based on cost and result indices.</td></tr>
<tr><td>Risk / limitation 3: slicing of operation may result in overcompensation of the real costs incurred while implementing supported interventions.</td><td>Mitigation measure: slicing would also result in lower primary energy savings / lower decrease in estimated energy consumption, i.e. poorer intervention results; furthermore, slicing possibility is important for the attractiveness and flexibility of SCOs.</td></tr>
<tr><td>Method for regular adjustment of the rates</td><td colspan="2">SCO values can be adjusted regularly on the basis of the following indicator(s):
- Construction cost index (or producer prices), new residential buildings, Percentage change compared to same period in previous year</td></tr>
</table>

2.1.2. Sub-area 1B: Energy Efficiency & Renewable Energy in Buildings (public and housing sectors)

Definition of the SCO

This result-based SCO would reflect the **average cost of decreasing the annual GHG emissions by one ton of CO_2.** This SCO covers the cost of interventions aimed directly at reducing energy consumption and increasing the production of renewable energy by implementing energy saving measures in housing and the non-residential sectors. The decrease of annual GHG emissions must be the direct consequence of the project completion and facilitate eligible activities.

Assessment of data

The proposed SCO is based on historical data collected from the Member States on ERDF/CF calls and projects that supported relevant measures in this sub-area. As indicated at the beginning of the report, the base data sample for this sub-area was expanded by merging the datasets for housing and non-residential public buildings. This was done in order to better reflect the historical situation in Member States for two similar sectors and is also beneficial for extrapolation purposes as a larger base sample allows for more reliable and robust estimates for Member States without historical data.

As a result of this merge, historical data needed for SCOs was available for 12 Member States, out of which there were 3 Member States with a full (IT, PL, GR) and 9 Member States with partial (BG, CY, CZ, DE, ES, FR, LU, MT, PT) set of historical data. These data also served as the baseline for calculating the rates for the remaining Member States. Activities considered in the analysis were the following:

- consultancy service for preparing the necessary technical studies / reports as well as monitoring the implementation of the interventions (project management / supervision works),
- energy audits for buildings,
- installation of biomass energy system,
- installation of hot water system with the use of RES,
- installation of new high efficiency or upgrade of existing heating / cooling systems (including based on RES),
- installation of renewable electricity unit,
- replacement of window frames / glass / moving of fixed shading systems,
- upgrade of thermal insulation (walls, roofs, ceiling, etc.).

The overall picture of the base data used in the calculations of SCOs can be seen in Table 7. For the remaining 15 Member States which did not provide historical data of sufficient quality, extrapolation measures were applied to derive proxy rates at activity level.

Table 7. Assessment of historical data availability in sub-area 1B

MEMBER STATE	LEVEL OF GRANULARITY	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8
BG	Project	E	E	E	E	H	E	E	E
CY	Call	E	E	E	H	H	E	E	E

MEMBER STATE	LEVEL OF GRANULARITY	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8
CZ	Project	E	E	E	E	E	E	E	H
DE	Project	H	E	E	E	E	E	E	E
ES	Project	E	E	H	E	H	E	E	E
FR	Project	E	H	E	E	H	E	H	H
GR	Call	H	H	H	H	H	H	H	H
IT	Project	H	H	H	H	H	H	H	H
LU	Call	E	E	E	E	E	E	E	H
MT	Project	E	E	E	E	E	H	E	E
PL	Call / project	H	H	H	E	H	H	H	H
PT	Project	H	H	E	E	E	H	H	H

Note: the activities for which proxy rates based on historical data were calculated are marked with 'H'. 'E' denotes gaps in the data that had to be filled with an extrapolated approximation of the analysed activities based on the available sample.

Source: prepared by the study team.

Calculation method

The calculation process was facilitated with the following key steps:

Step 1 – calculation of proxy rates at activity level for the Member States which provided the necessary data to calculate this SCO. In the case of sub-area B, it was possible to calculate proxy rates for each eligible activity for three Member States, namely GR, IT and PL. For the concerned Member States these proxy rates were calculated as the average ratio of total verified costs incurred to implement the activity in question (e.g. installation of renewable electricity unit or replacement of window frames / glass / moving of fixed shading systems) and the total annual decrease of CO_2 emissions achieved in reported ERDF/CF projects[25]. The following activities are covered by these rates:

- consultancy service for preparing the necessary technical studies / reports as well as monitoring the implementation of the interventions (project management / supervision works),
- energy audits for buildings,
- installation of renewable electricity unit,
- installation of biomass energy system,
- installation of hot water system with the use of RES,
- installation of new high efficiency or upgrade of existing heating / cooling systems (including based on RES),

[25] Any outlier values among established proxy rates were excluded consistently with the approach presented in Section 1.4.

- replacement of window frames / glass / moving of fixed shading systems,
- upgrade of thermal insulation (walls, roofs, ceiling, etc.).

For nine other Member States (BG, CY, CZ, DE, ES, FR, LU, MT, PT), proxy rates were established for an incomplete set of activities. The extent of these calculations was subject to historical data availability presented in Table 7. For example, in the case of BG, proxy rates were established only for activity 5 – installation of new high efficiency or upgrade of existing heating / cooling systems.

Step 2 – adjustment of established proxy rates to account for inflation. Since proxy rates were drawn from historical data on interventions implemented in the period 2014-2020, estimates obtained in Step 1 had to be updated to align them with current (2022) prices. To this end, proxy rates were indexed according to average cumulative inflation of construction costs (for more details on the 'construction cost index' used see section 1.1.5) in the period 2014-2022.

Step 3 – statistical inference (extrapolation) of missing proxy rates. For the Member States that provided incomplete historical data (i.e. BG, CY, CZ, DE, ES, FR, LU, MT, PT) or were unable to supply the study with any relevant historical data (all remaining EU Member States), proxy rates were established using linear regression model. The regression draws on the following:

- independent (predictor) variables:
    - 'cost index' combining PLI (i.e. index on machinery and equipment costs) and LCI (index on labour cost);
    - 'result index' based on the overall energy efficiency scores (combined index for households) assigned to each EU Member State taken from the EU Energy Efficiency Scoreboard[26].
- dependent (response) variable – the established proxy rates (i.e. rates calculated in Step 1 and adjusted for inflation in Step 2).

This multivariate extrapolation model works in a similar way to a simple bivariate linear regression. The key difference is that we examine the relationship between several different variables as we seek to determine how separate cost and result indices affect the extrapolated value.

Step 4 – summation of proxy rates established in Step 1 (GR, IT, PL) or in Steps 1 & 3 (all other EU Member States) to derive a single unit cost rate per Member State. The proxy rates established for each Member State at activity level are summed to establish a single rate applicable to the whole operation.

Rates

Table 8 below indicates the calculated SCO rates proposed by the study team for sub-area 1B.

[26] https://www.odyssee-mure.eu/data-tools/scoring-efficiency-countries.html

Table 8. Proposed SCO rates in sub-area 1B

MEMBER STATE	SCO RATE, EUR/TON CO_2	MEMBER STATE	SCO RATE, EUR/TON CO_2
AT	14 391	**IE**	13 374
BE	15 381	**IT**	12 151
BG	5 439	**LT**	5 958
CY	9 076	**LU**	18 005
CZ	9 731	**LV**	7 177
DE	14 147	**MT**	8 582
DK	17 662	**NL**	14 978
EE	6 959	**PL**	5 036
ES	8 950	**PT**	10 410
FI	12 556	**RO**	6 948
FR	14 292	**SE**	14 181
GR	8 124	**SI**	9 213
HR	7 173	**SK**	7 499
HU	4 954		

Summary table

Definition of the SCO	This SCO covers the cost of interventions aimed directly at reducing energy consumption and increasing the production of renewable energy by implementing energy saving measures in housing sector buildings.
Eligible activities	• Consultancy service for preparing the necessary technical studies / reports as well as monitoring the implementation of the interventions (project management / supervision works), • Energy audits for buildings, • Installation of biomass energy system, • Installation of hot water system with the use of RES, • Installation of new high efficiency or upgrade of existing heating / cooling systems (including based on RES), • Installation of renewable electricity unit, • Replacement of window frames / glass / moving of fixed shading systems, • Upgrade of thermal insulation (walls, roofs, ceiling, etc.).
Indicator name	Tons of CO_2 equivalent

Measurement unit for the indicator	Number of tons of CO_2 equivalent, estimated as total annual decline at the end of the period. The estimate is based on the amount of primary energy saved and/or produced by the supported facilities in the given year (either one year following project completion or the calendar year after project completion). Saved energy should replace the production of non-renewable energy. Produced renewable energy should be GHG neutral and replace the production of non-renewable energy. The impact of non-renewable energy on greenhouse gases is estimated as total national GHG emission per unit of non-renewable energy produced.	
Base calculation formula	$\boldsymbol{SCO_{1B}} = \frac{\boldsymbol{Ctotal}}{\boldsymbol{ttCO2}}$, where $ttCO_2$ is the total decrease of the annual GHG emissions, in tons of CO_2 C_{total} is total costs of relevant activities, in EUR	
Eligible costs	All eligible costs of the operation.	
Arrangements for the audit trail	*Proof that the results delivered by projects are verifiable and real:* - Energy Performance Certificates (EPCs) completed before and after the implementation of energy efficiency measures, or equivalent	
Key risks/limitations and measures to prevent perverse incentives	*Risk / limitation 1*: 'Locked' interventions / path dependence, i.e. it is assumed that Member States historically implementing small- / large-scale interventions will continue with implementation of small- / large-scale interventions.	Mitigation measure: Member States are allowed to freely select the activities they intend to facilitate – they will be reimbursed through the same single SCO rate.
	Risk / limitation 2: SCO estimates are feasible only for Member States that provided the study with appropriate and sufficient historical data.	Mitigation measure: statistical inference allows unit cost values for all Member States to be established based on cost and result indices. Furthermore, a concerted effort was done to increase the sample size in sub-area 1B by merging data from housing and non-residential sectors.

	Risk / limitation 3: slicing of operation may result in overcompensation of the real costs incurred while implementing supported interventions.	*Mitigation measure*: slicing would also result in lower primary energy savings / lower decrease in estimated energy consumption, i.e. poorer intervention results; furthermore, slicing possibility is important for SCO's attractiveness and flexibility.
Method for regular adjustment of the rates	SCO values can be adjusted regularly on the basis of the following indicator(s): - Construction cost index (or producer prices), new residential buildings, Percentage change compared to same period in previous year	

2.2. Area 2: SCOs for Research & Innovation activities

Solutions for SCOs in the area of Research and Innovation are key for SMEs within EU Member States to become / remain competitive by increasing companies' productivity, accessing new, higher added value markets and ultimately leading to sustainable employment creation in a context of fierce global competition. In this respect, the fulfilment of specific objectives set by 'Smarter Europe' such as innovative & smart economic transformation, enhancing research and innovation capacities, promoting the uptake of advanced technologies and developing skills for smart specialisation, industrial transition and entrepreneurship is pivotal. The development of EU-level SCOs in the area of Research and Innovation is divided into three sub-areas:

- Knowledge / technology transfer activities of SMEs (**sub-area 2A**);
- Innovation vouchers for SMEs for Research & Development implementation (**sub-area 2B**);
- Research Development & Innovation research projects (**sub-area 2C**).

Following the assessment of the quality of data collected from Member States and alternative sources, the study team has examined potential SCO alternatives which would be feasible to develop in two of the three sub-areas of Area 2 – please see Table 9 for the alternatives which were considered.

Table 9. Alternatives considered for further SCO development under Area 2

Knowledge / Technology Transfer Activities of SMEs (sub-area 2A)	Innovation Vouchers for SMEs for R&D Implementation (sub-area 2B)
Alternative A: Cost per one person month of intersectoral mobility of an R&D researcher working in SMEs This SCO would reflect the average cost of one month in intersectoral mobility between research	**Alternative A: Cost of one innovation voucher issued to an SME for completing innovation / digitisation activities**

Knowledge / Technology Transfer Activities of SMEs (sub-area 2A)	Innovation Vouchers for SMEs for R&D Implementation (sub-area 2B)
institutions and SMEs. It could be used for the reimbursement of all eligible entries based on a single monthly rate. The researcher should come from an accredited research institution. The measurement of the indicator would concern the total researcher months that partook in intersectoral mobility activities.	This lump sum to cover the cost of one innovation voucher issued to an SME for completing innovation / digitisation activities. SMEs should obtain services from research organisations and other service providers which are accredited by the National Accreditation Authority in the respective Member State. Here, the research organisation / institution is the service provider while the SME is the beneficiary. For the lump sum, all eligible costs or part of eligible costs of an operation are calculated in accordance with predefined terms of agreement on activities and / or outputs.
Alternative B: Cost per one gross new working position (that did not exist before) to directly perform R&D activities in the SME This SCO would cover the cost of one gross new working position (that did not exist before) to directly perform R&D activities, in full-time equivalents. This SCO should be used to fund exchanges of research and innovation staff between academic and non-academic organisations such as SMEs.	**Alternative B: Cost to support the introduction of new to the market products (CO28)** This SCO would cover the cost of introducing a 'new to the market' product by the SME. The indicator measures if an enterprise receives support to develop a 'new to the market' product in any of its markets. Includes process innovation as long as the process contributes to the development of the product. Projects without the aim of actually developing a product are excluded. If an enterprise introduces several products or receives support for several projects, it is still counted as one enterprise. In the case of cooperation projects, the indicator measures all participating enterprises.
Alternative C: Number of enterprises cooperating with research institutions (CO26) This SCO would cover the cost of one successful cooperation between an SME and research institution. The indicator is measured as the number of enterprises that cooperate with research institutions in R&D projects. At least one enterprise and one research institution participate in the project. One or more of the cooperating parties (research institution or enterprise) may receive the support but it must be conditional to the cooperation. The cooperation may be new or existing. The cooperation should last at least for the duration of the project. In essence, this indicator measures the networking activity and is a proxy for possible technological transfer and knowledge exchange[27].	**Alternative C: Cost to support the introduction of new to the firm products (CO29)** This SCO would cover the cost of introducing a 'new to the firm' product by the SME. The indicator is measured if an enterprise is supported to develop a 'new to the firm' product. Includes process innovation as long as the process contributes to the development of the product. Projects without the aim of actually developing a product are excluded. If an enterprise introduces several products or receives support for several projects, it is still counted as one enterprise. In the case of cooperation projects, the indicator measures all participating enterprises to which the product is new.

[27] t33 srl, SWECO consortium, Development of a system of common indicators for European Regional Development Fund and Cohesion Fund interventions after 2020, p. 35

For sub-area 2A, the study team considered an alternative related to common ERDF/CF indicator 'Number of enterprises cooperating with research institutions' (CO26) which was one of the more commonly mapped indicators from our data collection exercise. However, it is difficult to account for what is a possible successful cooperation between SMEs and research institutions – whether it is something that ends up in co-creation of goods or services, improvements in the business processes within the SME or other potential positive outcomes. Therefore, this Alternative was discarded fairly early in the development cycle.

Alternative A in sub-area 2A was based on the Staff Exchanges action from Horizon Europe. An added value proposed by this Alternative is that it would facilitate synergies between the Directorate-General for Research and Innovation (DG RTD) and Horizon Europe towards ERDF/CF by opening up more opportunities for Cohesion Widening countries that are relatively disadvantaged under Horizon Europe. From the policy perspective, the Alternative was proposed in order to help fulfil objectives set out by 'Smarter Europe' such as increasing partnership between private public research institutions and SMEs. However, Alternative A relied on very limited data (one rate which is applicable to all Member States). Additionally, re-using already existing unit cost rates from other union policies was seen as not favourable – instead, data collected during this study were prioritised which meant that Alternative B was selected for further analysis in sub-area 2A.

For sub-area 2B, the study team also collected data for other indicators relevant to this sub-area, namely those related to the number of enterprises supported to introduce new to the market products (CO28) and number of enterprises supported to introduce new to the firm products (CO29). While in essence these indicators should directly reflect one of the key purpose of innovation vouchers, it must be acknowledged that it is difficult to establish tangible typologies of products which would be eligible for reimbursement. For instance, defining a new-to-market or new-to-firm product requires the development of typologies for each sector and almost make it a tier-list of products which are eligible for reimbursement. Additional checks would be necessary to assess whether the product is indeed new within the market or the firm, further complicating the prospective audit trail.

In the case of sub-area 2C, while most Member States have provided historical data for this sub-area, the data collected were very heterogeneous in terms of supported activities, cost categories and outputs. As such, the data were not comparable across the Member States. An EU-level SCO merged with other sub-areas was considered. The study team explored the possibility of utilising the collected historical data by merging it with historical data from sub-areas 2A and 2B. Upon reviewing the available data, the study team discovered that merging data with other sub-areas was generally not feasible. The data provided in 2C covered a very large number of activities and outputs but did not have many overlaps with other sub-areas. It yielded limited results, such as additional project information for DK and LV in the case of sub-area 2B. However, merging such data on a larger scale would have increased the risk of inaccurate values since Member States implemented different activities and incurred different costs in these sub-areas.

The calculation approaches are similar to those used in calculations of SCOs for the two sub-areas of Area 1:

- Approach 1 first establishes amounts at operation level implemented by a Member State which is then used as the basis for further extrapolations – this is applicable for the SCO developed for sub-area 2B;

- Approach 2 first establishes amounts at cost item level which are then used as the basis for further extrapolations. The sum of the amounts at cost item level then correspond to the rate set at operation level. This is applicable for the SCO developed for sub-area 2A.

2.2.1. Sub-area 2A: Knowledge Technology Transfer Activities of SMEs

Europe needs a strong and creative human resource base, mobile across countries and sectors, with the right skills to innovate and to convert knowledge and ideas into products and services for economic and social benefit. In this respect, enhancing research and innovation capacities is key to promoting a 'Smarter Europe' – one of the key objectives for the European Commission in the context of Cohesion Policy. To fulfil this objective, ERDF/CF must focus on promoting knowledge and technology transfer activities aimed at encouraging cooperation and building connections between businesses and research entities including universities, research centres or knowledge-intensive companies in order to increase their innovation potential.

One of the ways to facilitate knowledge and technology transfer is through **temporary or permanent intersectoral mobility of researchers**. Such interventions increase the absorptive capacity for R&D in firms, strengthen academia-industry collaboration, expand intersectoral networks and build trust between the actors involved. In the context of projects funded by the ERDF and CF, intersectoral mobility is often encouraged as a way to increase the impact of research and innovation activities. For example, researchers may be encouraged to work with industry partners to develop new products or services, or with government agencies to address specific societal challenges.

Efforts to foster such intersectoral mobility are evident in most of the Member States, and they seem to have a positive impact on researchers' skill development and employability as well as R&D intensity of companies. One of the main barriers to implementing these interventions, however, is high administrative burden to participating firms[28]. A wider application of EU-level SCOs in concerned interventions supported by ERDF/CF could alleviate this barrier.

To contribute towards this goal, the study team proposes:

- a unit cost for the full-time equivalent per month of a gross new working position (that did not exist before) to directly perform R&D activities in the SME.

Definition of the SCO

The proposed unit cost covers the cost for the full-time equivalent per month of a gross new working position (that did not exist before) to directly perform R&D activities in the SMEs. It is applicable to interventions involving exchanges of research and innovation staff between academic research performing organisations and SMEs. Both inter- and intra-state international mobility are covered by this SCO.

The new research position must be a consequence of project implementation or completion, be filled (vacant positions are not counted) and increase the total number of research jobs in the receiving organisation (i.e. the SME). Only employed personnel are counted. Support staff (i.e. jobs not directly involved in R&D activities) are not counted. Jobs can be full-time or part-time. Part-time jobs are to be

[28] Hristov, H., Slavcheva, M., Jonkers, K., Szkuta, K. (2016): Intersectoral mobility and knowledge transfer. Preliminary evidence of the impact of intersectoral mobility policy instruments. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC102534 (Last accessed on 28.05.2021)

converted to FTEs per month. The jobs created as a result of different projects should be added up (provided that all projects receive ERDF/CF support); this is not regarded as multiple counting. Both new and already existing entities can be supported.

Assessment of data

The proposed unit cost is primarily based on historical data from national projects and calls for projects supported by ERDF/CF. In total, eight Member States (BE, HR, HU, FR, IT, PL, LU, SI) provided information that covers all data points required for calculations, i.e. verified data on project expenditure in the area of knowledge transfer activities, information on specific cost items[29] and the number of new research positions created as a result of implemented projects. A notable caveat of the historical data provided by PL and SI, is that their expenditure data were available only at a higher level of aggregation: authorities in these Member States provided data on total verified costs of the operation without a breakdown per cost item. To mitigate this, missing activity-level rates were interpolated by using the data on cost items from Member States which are available and relative shares of cost items eligible under intersectoral researcher mobility from MSCA Staff Exchanges.

The overall picture of the base data used to inform calculations can be seen in Table 10. The remaining 18 Member States were unable to provide the requested historical data or their data were of insufficient quality. Therefore, proxy rates at cost item level had to be extrapolated for these countries (see the next section for further details).

Table 10. Assessment of historical data availability in sub-area 2A

MEMBER STATE	COST ITEMS		
	CI_1	CI_2	CI_3
BE	E	H	H
HR	E	E	E
FR	H	H	H
HU	H	E	E
IT	H	E	E
LU	H	H	E
PL	E	E	E
SI	E	E	E

[29] Data on the following cost items were used to establish the proposed rates: staff costs of the incoming researcher (cost item 1), research, networking and training costs (cost item 2), and management and indirect costs (cost item 3).

Note: the activities for which proxy rates based on historical data were calculated are marked with 'H'. 'E' denotes gaps in the data that had to be filled with an extrapolated approximation of the analysed activities based on the available sample.

Source: prepared by the study team.

The development of this SCO also makes use of two complementary data sources:

- Information from **Marie Skłodowska-Curie Actions (MSCA): Staff exchanges action.** The information collected from this alternative source was used to inform the extrapolation and interpolation exercise serving as proxy for standardised historical data missing unavailable from the Member States. This source contains information on cost items related to intersectoral mobility of researchers, such as staff costs; research, networking, training costs and management costs indirect costs. The relative share (in %) of these cost items in the total unit cost was used as a data point in both the extrapolation and interpolation[30] processes.
- Data from the study '**Monitoring data on ERDF and Cohesion Fund operations, and on the monitoring systems operated in the 2014-2020 period'**. The study, among other things, collected data on total costs and results achieved in ERDF/CF projects, including projects in the area of research and innovation. It also collected relevant information on common ERDF indicators, such as CO24 (gross new working position (that did not exist before) to directly perform R&D activities in the SME). Here, 14 Member States (BE, CZ, DE, ES, FR, GR, HR, IE, IT, LV, PL, RO, SI, SK) have data on the total costs of the project and the number of implemented outputs for CO24 indicator). This source was used as a triangulation source with the final SCO rates based on historical data collected during this study.

Calculation method

Step 1 – calculation of monthly rates in each project call estimated at cost item level for the 8 Member States that provided historical data (BE, HR, HU, FR, IT, PL, LU, SI)**.**

Here, we use the total verified costs of a project per each cost item and the number of new gross research positions (in annual FTEs) created as a consequence of project implementation. This results in calculations of annual rates for the gross working position in each project / call estimated at cost item level. Afterwards this figure is divided by 12 to arrive at a monthly rate for the gross working position in each project/call estimated at cost item level. This is facilitated for all 8 Member States in the historical sample (BE, HR, HU, FR, IT, PL, LU, SI).

Step 2 – cleaning of available historical data provided by 8 Member States (BE, HR, HU, FR, IT, PL, LU, SI) Data for the following projects were not included in further analysis based on the following qualitative criteria:

- Ongoing projects;
- Terminated projects;
- Projects involving state aid;
- Projects that did not include implemented outputs;
- Projects that include no expenditure;
- Projects for which the operation did not fit the analysed sub-area;

[30] Interpolation refers to statistical inference which is conducted within the sample. Extrapolation refers to statistical inference which is conducted outside the sample.

- Projects involving Interreg programme.

Step 3 – identification and exclusion of the outliers based on quantitative criteria for the 8 Member States (BE, HR, HU, FR, IT, PL, LU, SI) **at cost item level**. Outlier analysis is done in two sub-steps:

- First, the calculated rates are subject to the interquartile analysis (see section 1.1.3 for more details on this method);
- Then, the study team undertook an outlier analysis based on expert judgement in order to remove quantitative outliers within the historical sample of Member States in order to comply with the socio-economic logic.

Step 4 – calculation of average monthly rates at cost items level for the 8 Member States with historical data (BE, HR, HU, FR, IT, PL, LU, SI)**.** Here, we calculate the average SCO of all project / call level rates prepared during step 1 which were retained data cleaning and outlier analysis presented in Steps 2 and 3.

Step 5 – statistical inference (interpolation) of country average rates for missing cost items for the 8 Member States with historical data (BE, HR, HU, FR, IT, PL, LU, SI)**.** Here, the study team utilises the relative share (in %) of cost items under MSCA Staff Exchanges to fill in the gaps. Based on MSCA Staff Exchanges, the weights of the relative cost items are as follows:

- **Cost item 1**: Staff costs of the incoming researcher – 50 %
- **Cost item 2:** Research, networking and training costs – 28 %
- **Cost item 3:** Management and indirect costs – 22 %

Step 6 – adjustment of established rates to account for inflation. Since rates were drawn from historical data on interventions implemented in the period 2014-2020, estimates obtained in Steps 4 and 5 had to be updated to align them with current (2023) prices. To this end, proxy rates at cost item level were indexed according to average cumulative inflation of labour costs for professional and research activities (for more details on this index, please see section 1.1.5) in the period 2014-2022.

Step 7 – statistical inference (extrapolation) of rates or the remaining 19 Member States without any historical data. Rates for the entire cost of the operation were calculated based on a linear regression. The regression draws on the following:

- independent (predictor) variable – the extrapolation index using LCI (index on labour costs for professional and research activities);
- dependent (response) variable – the established rates at operation level (i.e. rates calculated in Step 2).

Step 8 – summation of proxy rates established in Steps 4, 5 and 6 (BE, HR, HU, FR, IT, PL, LU, SI) **and in Step 7** (all other EU Member States) **to derive a single unit cost rate per Member State.** The proxy rates established for each Member State at cost item level are summed to establish a single rate applicable to the whole operation.

Rates

Table 11. Proposed SCO rates in sub-area 2A

MEMBER STATE	SCO RATE (€), MONTHLY FTE FOR NEW RESEARCH POSITION
Austria	7 045

MEMBER STATE	SCO RATE (€), MONTHLY FTE FOR NEW RESEARCH POSITION
Belgium	6 581
Bulgaria	4 658
Croatia	4 395
Cyprus	5 111
Czechia	5 469
Denmark	7 688
Estonia	5 312
Finland	6 659
France	7 179
Germany	7 209
Greece	6 036
Hungary	5 105
Ireland	6 938
Italy	5 364
Latvia	5 063
Lithuania	4 909
Luxembourg	9 956
Malta	6 004
Netherlands	7 459
Poland	5 761
Portugal	5 702
Romania	4 410
Slovakia	5 982
Slovenia	5 895
Spain	6 009
Sweden	7 521

Note: Green coloured values denote cost approximation based on historical data.

Source: prepared by the study team.

Summary table

Definition of the SCO	This SCO would cover the cost of one gross new working position (that did not exist before) to directly perform R&D activities, in full-time equivalents.
Eligible activities	All activities linked to intersectoral intra-state and intersectoral international mobility of between researchers and SMEs. This includes post-doctoral researcher placements in the SME and placements for industrial PhDs and traineeships at the SME.
Indicator name	Gross new working position (that did not exist before) to directly perform R&D activities
Measurement unit for the indicator	Number of new research positions, in full-time equivalents. The new research position must be a consequence of project implementation or completion, be filled (vacant positions are not counted) and increase the total number of research jobs in the receiving organisation (i.e. the SME). Only employed personnel are counted. Support staff (i.e. jobs not directly involved in R&D activities) are not counted. Jobs can be full-time or part-time. Part-time jobs are to be converted to FTEs per month. The jobs created as a result of different projects should be added up (provided that all projects receive ERDF / CF support); this is not regarded as multiple counting. Both new and already existing entities can be supported.
Base calculation formula	$\boldsymbol{SCO_{2A}} = \frac{\boldsymbol{Ctotal}}{\boldsymbol{ttFTEs}}$, where ttFTEs is the number of research positions created as a result of intersectoral mobility activities, in FTEs C_{total} is total costs of relevant operations, in EUR
Eligible costs	All eligible costs of the operation.
Arrangements for the audit trail	*Proof of eligibility of researchers* Academic documentation proving the eligibility of the researchers. The following eligibility rules are set: • Researchers at any career stage, from PhD candidates to post-doctoral researchers, as well as administrative, technical or managerial staff involved in research and innovation activities; • Researchers must be engaged in, or linked to, research and innovation activities at their sending organisation for at least one month prior to the secondment. *Proof that eligible activities have taken place* Work contract for mobility agreements between sending organisation (researcher) and receiving organisation (SME). These agreements outline the terms and conditions of the mobility arrangement between the researcher and the host institution or organisation. They should include details such as the purpose of the mobility, the expected outcomes and the indicative length of the secondment. Both temporary or permanent work contracts are permitted under the SCO.

	Proof that the results delivered by projects are verifiable and real Enterprise HR documents from the receiving organisation which would provide the number of new FTEs created during the implementation of the project.	
Key risks/limitations and measures to prevent perverse incentives	*Risk / limitation 1:* There may be challenges in using a unit cost for researchers because of the way FTEs are calculated in SMEs.	The proposed EU-level SCO is based on a common ERDF/CF indicator. Hence, the methodology for FTE counting should be known to the Member States. The final definition of the SCO should reduce the ambiguity. The description states that full-time, part-time and seasonal researchers should be accrued towards the total amount of FTEs created during project implementation.
	Risk / limitation 2: SCO estimates are feasible only to Member States that provided the study with appropriate and sufficient historical data.	Statistical inference allows unit cost values to be established for all Member States based on cost indices. Furthermore, resources gathered from similar operations within MSCA allows values within the historical sample to be extrapolated.
	Risk / limitation 3: Opportunities for intersectoral mobility of researchers is already available under Horizon Europe (MSCA Staff Exchanges)	Under Horizon Europe, those Member States with a less research-intensive environment find it difficult to compete for research grants. The main added value of this alternative is that it facilitates synergies between RTD and Horizon towards ERDF/CF by opening up more opportunities for Cohesion / Widening countries that are relatively disadvantaged under Horizon Europe.
Method for regular adjustment of the rates	SCO values can be adjusted regularly on the basis of the following indicators: Labour cost index in professional, scientific and technical activities (Eurostat, LC_LCI_R2_A). Percentage change compared to previous year.	

2.2.2. Sub-area 2B: Innovation Vouchers for SMEs for R&D Implementation

Innovation vouchers are small grants provided to SMEs by regional or national governments to purchase services from knowledge providers. They are aimed at assisting companies to invest in innovative solutions and services or to acquire machinery that will facilitate innovation. Under an innovation voucher programme, SMEs can apply for a voucher that can be used to pay for services provided by approved knowledge providers such as universities, research institutions, or other private sector organisations. The services may include research and development, technical assistance, or other

forms of specialised expertise that can help SMEs to improve their products, processes, or services. This type of voucher focuses broadly on innovation and not specifically on digitisation and environmental technology. Additional objectives of innovation vouchers include promoting science-industry collaboration, stimulating knowledge transfer and fostering the formation of long-term networks between SMEs and public and private research partners. Innovation vouchers should be demand driven with very few exceptions. Cohesion Policy should offer SMEs the voucher to reimburse innovation activities more openly and should avoid locking in the operations to only fit specific types of innovation (such as creating start-up projects in environmental technology or digital products). In short, applying innovation vouchers to any kind of possible innovation context should be featured to ensure buy-in from a wider pool of potential beneficiaries.

We propose the following EU-level SCO solution in this area:

- Lump sum to cover the cost of one innovation voucher issued to an SME for completing innovation / digitisation activities.

Definition of the SCO

This SCO would cover the cost of one innovation voucher issued to an SME for completing innovation / digitisation activities. SMEs should obtain services from research organisations and other service providers which are accredited by the National Accreditation Authority in the respective Member State.

Here, the research organisation / institution is the service provider while the SME is the beneficiary. For the lump sum, all eligible costs or part of the eligible costs of an operation are calculated in accordance with predefined terms of agreement on activities and/or outputs. To claim reimbursement, Managing Authorities are required to provide proof as part of their audit trail that predefined activities have taken place.

The following activities / cost items are to be covered by this SCO:

- provision of consultancy services provided to SMEs by universities, research centres or knowledge-intensive companies;
- development of the SME's digital capabilities;
- costs of scientific and technical equipment and materials;
- costs of ICT instruments.

It is important to note that the historical data sample collected from the Member States includes information on vouchers for digitisation and innovation vouchers in general. The thematic areas covered under the vouchers are bottom up and therefore not only 'environmental technology or digital products'. Accordingly, other types of innovation voucher will not be exempted from the eligible operations by the proposed SCO.

Assessment of data

The proposed SCO is based on historical data collected from the Member States on ERDF/CF calls and projects that supported relevant measures in this sub-area. Overall, there are 11 Member States (Cyprus, Czechia, Croatia, Estonia, France, Hungary, Italy, Latvia, Poland, Portugal, Malta) which have sufficient data to calculate this SCO.

The sample of projects for innovative start-up projects in environmental technology or digital products would have been very narrow, therefore the sample has been expanded towards creating and improving innovation products through all types of innovation activities. In the case of innovation vouchers, even though the whole variety of relevant ERDF/CF have been analytically untangled, categorised and structured (into types of services and by the type of costs), there are underlying differences as to how Member States perceive and approach actual Research and Innovation (R&I) activities that are covered under innovation vouchers. Sometimes a single service might mean more or less the same thing in different Member States (in terms of activities carried out), but the amount of resources dedicated to its provision might differ significantly. Taking this into account, an outlier analysis has been conducted to arrive at a standard sample, both in terms of activities facilitated and costs incurred which would help facilitate the extrapolation process for Member States without sufficient historical data. This sample consists of 6 Member States where a sufficient level of disaggregation and accompanying qualitative information was available (Czechia, Croatia, France, Italy, Poland, Portugal).

Cyprus, Malta, Estonia, Hungary and Latvia have provided aggregated level data on a single call for innovation vouchers. As a result, it is not possible to account for outliers in these cases. For the subsequent extrapolation process for Member States without any historical data, the data that are within the base sample have to be both comparable in the type of operations and the costs incurred in order to make the extrapolation model work based on the assumption of socio-economic logic. Furthermore, in most of these Member States, a minimum and maximum threshold for the prospective innovation voucher is set up, thus indicating that the aggregated call data contain a wide range of sizes of the innovation voucher. This complicates the process of making statistical inferences for other Member States based on such calculations.

Taking into account the assessment of available data in this area, the study team proposes two scenarios for arriving at lump sum rates for this sub-area. The difference of these scenarios is elaborated upon in the subsequent section.

Calculation method

Scenario 1: Lump sum rates established for 11 Member States based on the available historical data

1. **Choice of the numerator (costs)**. The numerator is the total verified cost of the operation that facilitates activities specific to the analysed Member State.
2. **Definition of the numerator (costs).** For each Member State that provided data for their set of supported activities, the amount used as the numerator refers to costs of all types of activities funded and eligible under interventions implemented in that country.
3. **Definition of the denominator (result)**. The amount used as the denominator refers to the most widely used, relevant and feasible indicator according to the historical data provided to the study team.

In this scenario, operations historically implemented by Member States are covered in their entirety. Their scope is mostly consistent across Member States in the historical sample, as they cover the core activities expected to be facilitated in an innovation voucher (for example, consultancy services procured from research institutions). Extrapolations are not feasible as the base data at operation level are specific to the analysed Member State, for some of which the aggregated data at call level were not subjected to outlier analysis.

Scenario 2: Lump sum rates are established for 27 Member States based on the available historical data and extrapolations

In this scenario, Steps 1-3 are the same as the previous scenario. However, extrapolation is used for Member States without historical data. The process is facilitated at operation level by using base data from Member States with all relevant activities which are then used to predict the rates at operation level for Member States without sufficient historical data. Extrapolations are feasible as the base data at operation level are standardised and all quantitative outliers have been removed due to sufficient granularity available in the historical data sample.

The two scenarios were developed with consideration given to the ongoing discussions with the European Commission and the apparent tentativeness to rely upon statistical methods to deduct EU-level SCO rates. A detailed step-by-step approach of the calculation process based on both scenarios is provided in Table 12.

Table 12. Calculation process for the development of SCOs for sub-area 2B

SCENARIO 1	SCENARIO 2
Step 1. Calculation of the total SCO amount at project / call level	
The lump sum amount is calculated on the basis of the following data: total verified costs of a project and the number of innovation vouchers. This is facilitated for all 11 Member States of the initial historical sample (CY, CZ, EE, FR, IT, LV, PL, PT, HR, HU, MT) by using the following formula: $SCO_{2B} = \frac{Ctotal}{ttvouchers}$, where $tt_{vouchers}$ is the number of innovation vouchers issued to SMEs, in units C_{total} is total costs of relevant operations in the project, in EUR	
Step 2. Cleaning of available historical data	
Data for the following projects are not included in further analysis based on the following qualitative criteria: - Ongoing projects; - Terminated projects; - Projects involving state aid; - Projects that did not include implemented outputs; - Projects that include verified expenditure; - Projects involving an Interreg programme.	
	Member States for which data do not comply with the standard definition (for example, Estonia which funded development vouchers in addition to innovation vouchers) and for which data are insufficiently granular to clean are removed from further analysis.
Step 3. Identification and exclusion of the outliers based on quantitative criteria	
Applicable to the 11 Member States (CY, CZ, EE, FR, IT, LV, PL, PT, HR, HU, MT) which provided all the necessary data to calculate the SCOs.	Applicable to the 6 Member States (CZ, FR, IT, PL, PT, HR) in the historical data sample. - First, the calculated rates are subject to the interquartile analysis

SCENARIO 1	SCENARIO 2
The calculated rates are subject to the interquartile analysis (see section 1.1.3 for more details on this method)	- Then, the study team undertook an outlier analysis based on expert judgement to remove quantitative outliers within the historical sample of Member States to comply with the socio-economic logic.
Step 4. Calculation of the total SCO amount at operation level	
This step entails calculating the total SCO for the 11 Member States which provided all the necessary data to calculate this SCO (CY, CZ, EE, FR, IT, LV, PL, PT, HR, HU, MT) at the operation level. Here, we calculate the average SCO of all project/call level rates prepared during step 1 which were retained in the data cleaning and outlier analysis presented in Steps 2 and 3.	This step entails calculating the total SCO for the 11 Member States which provided all the necessary data to calculate this SCO (CY, CZ, EE, FR, IT, LV, PL, PT, HR, HU, MT) at the operation level. Here, we calculate the average SCO of all project/call level rates prepared during step 1 which were retained in the data cleaning and outlier analysis presented in Steps 2 and 3.
Step 5. Adjustment of established amounts to account for inflation	
Since rates were drawn from historical data on interventions implemented in the period 2014-2020, estimates obtained in Step 4 had to be updated to align them with current (2023) prices. To this end, proxy rates were indexed according to average cumulative inflation of labour costs for professional and research activities and Harmonised Index of Consumer Prices in industrial goods, services and communication and (for more details on this index, please see Section Error! Reference source not found.) in the period 2014-2022.	
Step 6. Statistical inference (extrapolation) of lump sum rates for other Member States	
This step is not relevant in the case of Scenario 1, as extrapolation measures are not taken.	For the remaining 21 Member States which are not covered by the historical data sample, lump sum rates were established using a linear regression model. The regression draws on the following: • independent (predictor) variables: o 'labour cost index' based on the LCI (index on labour cost on professional services); o 'equipment index' based on the PLI (i.e. index on machinery and equipment costs) • dependent (response) variable – the established proxy rates (i.e. amounts calculated in Step 4 and adjusted for inflation in Step 5).

Source: prepared by the study team.

Rates

MEMBER STATE	SCENARIO 1. RATES BASED ON HISTORICAL DATA ONLY (€)	SCENARIO 2. RATES BASED ON HISTORICAL + EXTRAPOLATIONS (€)
Austria	N/A	12 689
Belgium	N/A	14 038
Bulgaria	N/A	6 908
Cyprus	4 995	7 921
Croatia	9 455	9 455
Czechia	8 053	8 053
Denmark	N/A	14 207
Estonia	18 649	8 477
Finland	N/A	11 690
France	13 061	13 061
Germany	N/A	13 044
Greece	N/A	9 765
Hungary	20 945	7 866
Ireland	N/A	12 203
Italy	11 577	11 577
Latvia	14 707	7 880
Lithuania	N/A	7 523
Luxembourg	N/A	15 077
Malta	9 115	9 858
Netherlands	N/A	13 513
Poland	8 136	8 136
Portugal	9 380	9 380
Romania	N/A	6 507
Slovakia	N/A	8 569
Slovenia	N/A	9 989
Spain	N/A	10 034
Sweden	N/A	13 680

Note: Green coloured values denote cost approximation based on historical data at the level of operations.

Source: prepared by the study team.

Summary table

Definition of the SCO	This SCO would cover the cost of one innovation voucher issued to an SME for completing innovation / digitisation activities. SMEs should obtain services from research organisations and other service providers which are accredited by the National Accreditation Authority in the respective Member State.
Eligible activities	• Provision of consultancy services provided to SMEs by universities, research centres or knowledge-intensive companies • Consulting services for development of technical applications, technology transfer and technical know-how, techno-economic studies; • Development of digital capabilities of the SME • Etc.
Target group for the beneficiary	Small (from 10 to 49 employees) and medium (from 50 to 249 employees) enterprises
Indicator name	Innovation voucher issued to SMEs to complete innovation / digitisation activities
Measurement unit for the indicator	Number of innovation vouchers issues to SMEs which have completed innovation / digitisation activities. The measurement of this indicator should closely follow the definition of the SCO and the monitoring framework of the common ERDF/CF indicator 'Number of enterprises receiving support in forms of non-refundable direct financial support conditional only to completion of project (grants)'.
Base calculation formula	$\boldsymbol{SCO_{2B} = \frac{Ctotal}{ttvouchers}}$, where $tt_{vouchers}$ is the number of innovation vouchers issued to SMEs, in units C_{total} is total costs of relevant operations, in EUR
Eligible costs	All eligible costs of the operation.
Arrangements for the audit trail	*Proof of eligibility of the beneficiary* • HR documents of the SME, such as annual reports, confirming the size of the company is within the definition of an SME; *Proof of accreditation of the service provider* • Accreditation of the private or public sector knowledge provider based on the National Accreditation Authority in the respective Member State; *Proof that eligible activities have taken place* Examples of documents which should include the requested information: • Programme guidelines established at the beginning of the voucher set-up process;

<table>
<tr><td></td><td colspan="2">

- Documentation of the knowledge provider's involvement, including a description of the services provided;
- Service contract between research institution and SME;
- Progress reports or other project-related documentation;
- Documentation of any changes or deviations from the original project plan.

Proof that the results delivered by projects are verifiable and real

Examples of documents which should include the requested information:

- Reports on activities facilitated in the innovation voucher;
- Technical specifications;
- Technology roadmaps;
- White paper;
- Draft product;
- Process prototypes;
- Results of specific analysis.

</td></tr>
<tr><td rowspan="3">Key risks/limitations and measures to prevent perverse incentives</td><td>Risk / limitation 1: 'Locked' interventions / path dependence, i.e. it is assumed that Member States historically implementing small- / large-scale interventions will continue to implement small- / large-scale interventions.</td><td>Member States have discretion in selecting the activities they intend to facilitate – they will be reimbursed through the same single SCO rate.</td></tr>
<tr><td>Risk / limitation 2: SCO estimates are feasible only for Member States that provided the study with appropriate and sufficient historical data.</td><td>Statistical inference allows lump sum values to be established for all Member States based on statistical indices (see Scenario 2).</td></tr>
<tr><td>Risk / limitation 3: Beneficiaries may try to misrepresent expenses, such as by claiming expenses for activities that were not actually undertaken or claiming expenses that are not allowed under the terms and conditions of the voucher.</td><td>The documentation in the audit trail will require that eligible activities are clearly described in order to claim reimbursement.

The audit trail leaves flexibility to undertake activities which are eligible under the classification of innovation core activities (Com.Reg 995/2012) – activities outside of this classification will be deemed ineligible.</td></tr>
<tr><td>Method for regular adjustment of the rates</td><td colspan="2">SCO values can be adjusted regularly on the basis of the following indicators:

Labour cost index in professional, scientific and technical activities (Eurostat, LC_LCI_R2_A). Percentage change compared to previous year.</td></tr>
</table>

	Harmonised index of consumer prices (HICP) in industrial goods, services and communication (Eurostat, PRC_HICP_AIND). Annual average rate of change.

2.2.3. Sub-area 2C: Research Development & Innovation Research Projects

The core objective of Research Development & Innovation research projects is to facilitate and enhance collaboration between SMEs and public / private research institutions. New innovations are often built on new and varied sources of information and shared knowledge, and stem from collaboration efforts. Since SMEs are some of the primary drivers of innovation, they can benefit greatly from such inter-sectoral linkages. Such collaboration may result in various outputs, not limited to research projects, new products to the market and joint academic publications. Initially, based on the data availability, quality and granularity, the study team considered two scenarios in sub-area 2C:

- Scenario A: an EU-level SCO based on historical data;
- Scenario B: an EU-level SCO merged with other sub-areas.

After carefully assessing both scenarios, the study team concluded that neither scenarios could be developed due to the data limitations in the collected historical data sample. The initial desk research and piloting demonstrated that the Member States implement a wide variety of interventions in this sub-area, both thematically and in scope. Unlike in other sub-areas, we could not pre-fill the data collection form with activities since we could not identify the most common supported activities before launching historical data collection in all Member States. The historical data collection confirmed our initial understanding – even though most Member States submitted the historical data for sub-area 2C, it was very heterogenous and, as such, incomparable. It was evident from the sample that the Member States implemented very different activities across and within countries, recorded different outputs, cost categories and cost breakdown. The sections below provide a detailed overview of the initially proposed scenarios, their advantages and the data limitations and challenges that precluded the study team from developing EU-level SCO for sub-area 2C.

Scenario A

An SCO that was considered for Scenario A was defined as **a lump sum for the purpose of reimbursing one Research and Innovation project implemented in collaboration between private / public research institution and an SME**. The research projects covered under this SCO included two main cost items – costs related to industrial research and costs related to experimental development. It also included a number of enterprises that cooperate with research institutions in R&D projects, with at least one enterprise and one research institution participating in the project. The condition established was that one or more of the cooperating parties (research institution or enterprise) may receive the support, but it must be conditional on the cooperation. The cooperation may have been either new or existing but should have lasted at least for the duration of the project.

The choice to base this provisional lump sum on industrial research and experimental development was informed by the historical data sample – these activities were the most commonly occurring among Member States (reported in 11 Member States from the sample). The main outputs that were considered to serve as the main indicator were the following:

- Number of enterprises cooperating with research institutions (CO26)
- Private investment matching public support (CO27)

The advantage of such a lump sum is that it reflects the collaboration between SMEs and research institutions and narrows down supported activities in an otherwise significantly varied sample. However, despite the potential relevance of this SCO, this Scenario has been discarded due to numerous caveats in the historical data which did not allow the study team to calculate accurate and comparable SCO values.

As demonstrated by the data quality assessment, while the vast majority of Member States (25) provided historical data for sub-area 2C on RDI Research projects, these data were very heterogeneous across all data points, including supported activities, cost categories and outputs. Member States recorded over 70 different outputs in this sub-area, with many of them not tracking data on the common indicators. The study team also observed a very large variation among the activities, outlined in Annex 3. Most of the supported activities were unique entries, ranging from…

… broad categories:

- development of new products and solutions in the collaboration between enterprises and public research institutions (DK);
- projects contributing to the transition to a low-carbon economy (NL);
- support for enterprises planning to start or develop R&D activity (PL)

… to highly specific projects, such as:

- development of a vestibular implant for patients with failure of the vestibular system (AT);
- modernisation or upgrading of infrastructure, including deliveries of parts of research infrastructures or research equipment to research infrastructures abroad – materially and technically modernise large research infrastructures (CZ);
- development of a mobile 3D scanning room for passive high-speed scanning (DE).

This uniqueness complicated defining a SCO because it failed to properly reflect all the different activities Member States implement and even if values could have been extrapolated from a small sample, there was a high likelihood that such an SCO would not be relevant for many Member States. In addition, the data were insufficiently granular in many cases, with 12 Member States not providing a total cost breakdown at activity level.

The study team attempted to mitigate this heterogeneity by narrowing down the historical data sample by the most common outputs and activities. However, the sample size of countries that implemented industrial research / experimental development and tracked the outputs mentioned above on research collaboration was limited to only 6 Member States. As such, the actual scope and results of such collaborations were difficult to establish based on the available historical data.

Another output that was considered for this lump sum was **Private investment matching the public funding (CO27)**, which was the most common output among Member States (17). This indicator captures private investment made by enterprises towards innovation activities and is measured in EUR matching public support in innovation or R&D projects. However, data analysis demonstrated that a) the share of this private investment varies dramatically among Member States and b) this is not a reliable indicator to prove that the collaboration between research organisations and SMEs was occurring since it only covers the private investment of the SME. With all of these limitations in mind, the study team also anticipated a difficult audit trail since a broad definition of this lump sum could result in perverse incentives.

Scenario B

An EU-level SCO merged with other sub-areas was also considered since the data in sub-area 2C are too varied for developing an EU-level SCO. The study team explored the possibility of utilising the collected historical data by merging it with historical data from sub-areas 2A and 2B. Upon reviewing the available data, the study team discovered that Scenario B was largely not feasible. The data provided in sub-area 2C covered a very large number of activities and outputs but did not have many overlaps with other sub-areas. It yielded limited results, such as additional project information for Denmark and Latvia in the case of sub-area 2B. However, merging such data on a larger scale would have **increased the risk of inaccurate values** since Member States implemented different activities and incurred different costs in these sub-areas.

As discussed above, since the study team still managed to collect a large sample of data, the option of merging sub-area 2C with sub-area 2A: Knowledge / technology transfer activities of SMEs was considered because the initial data review revealed that there are some overlapping activities and cost categories within the historical data sample in those sub-areas. Specifically, the study team explored the possibility of merging data from Alternative B in sub-area 2A: Unit cost for one month of gross new working position (that did not exist before) to directly perform R&D activities in the SME.

To check if data are comparable, the study team narrowed down the historical data sample in sub-area 2C to only include projects and calls that monitored ERDF common indicator **CO24: Number of new researchers in supported entities**. The new sample included historical data on projects and calls from 12 Member States (BE, CY, CZ, DE, FR, GR, HR, IT, LV, PL, RO, SI). Following a more thorough data review, it was discovered that available data are still insufficiently granular in some cases, with some Member States not providing data on the cost categories covered by the SCO in sub-area 2A Alternative B, namely Staff costs, Research / training costs, Management and indirect costs and Overheads. More specifically, Belgium, Greece, Cyprus, Latvia and Romania had sufficiently detailed cost breakdowns by category, while other Member States did not:

- In Slovenia, the only cost category that the data were provided for was Other costs (Costs of outsourcing, Flat rate financing determined by applying a percentage to one or more specified cost categories, Standard scales of unit costs).
- In Poland, Italy and France, the available cost breakdown by cost category consisted mainly of Staff costs and Costs of scientific and technical equipment and materials, as well as Other costs in PL and Presentations in FR. Only some projects in IT contain this cost breakdown, but many did not.
- Germany provided a detailed cost breakdown by category for some projects, while other projects contained only staff costs.
- In Croatia and Czechia, the cost breakdown was not available.

The data on activities also varied significantly across Member States and within Member States:

- In Slovenia, the activities mainly included: Research and development projects: industrial research (TRL 3-4) and experimental development (TRL 5-6), aimed at research and development of new technological solutions and new products, services and processes.
- In Poland, some of the main activities were indicated as targeted projects of SMEs including R&D works with implementation, Projects involving industrial research and development or development work, Infrastructure and equipment for laboratories or research and development departments in enterprises and other.

- In Romania, some of the activities included Research and development activities (industrial research and/or experimental development), Procurement of R&D services (industrial research and/or development experimental development), Procurement of innovation advisory services relating to: technological assistance; technology transfer; acquisition, protection and commercialisation of industrial property rights; use of standards, Procurement of innovation support services related to: trials and testing in laboratories; quality marking, testing and certification; market studies and other.
- In Belgium, the supported activities contained Health care improvements (1), TIC (2).
- In Greece, the supported activities included industrial research, experimental development, feasibility studies, SMEs for participation in fairs, Innovation aid for SMEs.
- In Italy, the supported activities varied across the data sample, primarily specified as thematic research areas, such as a) Security and monitoring of the territory, networking / Smart city, environment and ecosystem, consolidation / relaunch of the existing industry, b) Consolidation / relaunch of the existing industry, c) Sustainable buildings, green buildings, and other.

2.3. Area 3: SCOs for SME Growth & Competitiveness

The nature of the operation implemented under Area 3 limited the potential for developing alternative calculation approaches. Additionally, since a significant majority of Member States provided data on the same indicators, it did not encourage the creation of diverse options, thus the study team referred to lump sums which would be applicable to the whole operation in question.

For sub-area 3A, a further approach was explored since the study team identified the distance from the home country as a crucial variable impacting the cost of participating in international events abroad. To address this, location-specific information on the events was asked for in the data collection form with the aim of attempting to develop two different lump sums: one for international events in EU countries and another for events outside of the EU.

Unfortunately, not all Member States were able to provide location-specific data for all projects. For instance, some projects funded participation in multiple events or had several SMEs participating in different international events, making it difficult to disaggregate the information. As a matter of fact, out of the six MS that provided location-specific data (ES, FR, HR, IT, PL, and PT), IT and PL funded exclusively participation in international events within the EU and, in some instances, ES and HR reported aggregated data for multiple events, specifying the name of all the locations reached, but not providing a cost amount for each event.

The analysis conducted using this limited set of data revealed no correlation between the cost of participation in an event and the distance from the MS in question. This finding was also confirmed when examining SCO schemes submitted by CZ, where no correlation was observed.

Table 13. Member States which provided information on the location of the international event for sub-area 3A

MEMBER STATE	PROVIDED INFO ON EU DESTINATION	PROVIDED INFO ON EXTRA EU+PROXIMITY DESTINATION
CZ	NO	NO
ES	YES	YES
FR	YES	YES
HR	YES	YES
IT	YES	NO
PL	YES	NO
PT	YES	YES
SI	NO	NO
TOTAL	6	4

Source: prepared by the study team.

2.3.1. Sub-area 3A: Networking Activities of SMEs

International trade is a critical driver of the EU economy, supporting more than 90 million jobs through exports. Despite their significance, SMEs do not contribute to international trade to the same extent as larger companies, accounting for only 30 % of total exports (by value) to non-EU countries[31]. Furthermore, the increasing internationalisation of business relations poses numerous risks and challenges for SMEs. To mitigate these uncertainties, it is vital for SMEs to establish and maintain strong network relations.

Participating in professional fairs and exhibitions is a valuable tool for SMEs to identify new markets and opportunities, establish links with strategic partners, and enhance growth. This approach allows them to remain competitive in a globalised economy.

In the context of projects funded by the ERDF and CF the following activities were funded:

- Participation in trade fairs;
- Participation in international scientific conferences;
- Participation in partnership exchanges.

To promote the internationalisation of SMEs and simplify their participation in networking events, we propose implementing the following EU-level SCO solution:

[31] European Court of Auditors (2022): Special Report: SME internationalisation instruments –A large number of support actions but not fully coherent or coordinated. Available at: https://op.europa.eu/webpub/eca/special-reports/sme-internationalisation-instruments-07-2022/en/ (Last accessed on 02.05.2023)

- Lump sum to cover the **cost of one SME attending a single international event** (such as a trade fair, international conference, or partnership exchange).

Definition of the SCO

The proposed output-based SCO will cover the expenses of one SME attending a single international event, regardless of whether it is an EU or extra-EU event. The intended beneficiaries of this scheme are the SMEs themselves. To receive reimbursement, Managing Authorities are required to provide evidence, in their audit trail, that the SME participated in the event.

Assessment of data

The base data for this study were obtained from Managing Authorities and Intermediate Bodies in a standardised and structured data collection form. The data collected from Member States are based on verified expenditures from ERDF/CF. For sub-area 3A, 8 Member States (CZ, ES, FR, HR, IT, PL, PT, SI) provided data on completed projects. The data included the total verified expenditure, the number of SMEs supported by each project / call, and the number of events attended by the SMEs.

The data provided by these MS refer to projects covering this set of eligible costs:

- travel and accommodation;
- transportation of materials;
- costs of the stands (renting space and construction);
- promotion (e.g. production of booklets for the exhibition);
- registration to the fair / event;
- staff costs;
- 'external' specialised services (e.g. translation costs).

As the study team considered the distance of the event's destination as a possible cost factor, their original plan was to create two separate cost options for these operations: a fixed amount for events held within the EU and one for those held outside the EU. However, detailed information on event destinations was only available from a limited number of Member States that funded both EU and non-EU events (ES, FR, HR, PT). Furthermore, in some MS (ES and HR), data were presented at a higher level of aggregation than the individual event, meaning that several events in different locations were funded under a single project, making it impossible to determine the cost of each event. After conducting a statistical analysis using the limited data available, no significant correlation was found between the distance of the country and the cost of the operation. As a result, it was not feasible to establish two distinct SCOs for events held within the EU and those held outside of it.

Calculation method

Step 1 involved **cleaning the available historical data provided by CZ, ES, FR, HR, IT, PL, PT, SI based on qualitative criteria**. Projects that were irrelevant or did not contain all the necessary data entries were excluded from further analysis.

Step 2 involved **identifying and removing outliers from the data provided by the eight Member States** (CZ, ES, FR, HR, IT, PL, PT, SI) that provided all the necessary information. This was accomplished by calculating the average ratio between the total verified costs and the total number of events attended by an individual SME. Any values falling below the 10th percentile or above the 90th percentile of this average were considered outliers and therefore excluded. In the case of Member States

with fewer than four records (such as CZ and SI), it was not possible to analyse the outliers. As such, these Member States required the SCO to be extrapolated through statistical sources (as outlined in Step 3).

Table 14. Networking activities of SMEs (Sub-Area 3A): identification and exclusion of the outliers

MEMBER STATE	RELEVANT DATA ON COMPLETED PROJECTS WITH INFO ON N. OF EVENTS PER SME	N. OF OUTLIERS IDENTIFIED
CZ	3	n/a
ES	105	22
FR	4	2
HR	37	8
IT	6	2
PL	9	2
PT	691	138
SI	2	n/a

Source: prepared by the study team.

Step 3 involved the **calculation of the total SCO for the six Member States** (ES, FR, HR, IT, PL, PT) that provided all the necessary data. We calculated the average ratio between the total verified costs and the total number of events attended by an individual SME. This calculation was based on the database that had been cleared of any outliers.

Step 4 involved **adjusting the established rates to account for inflation**. Since the rates were based on historical data for the period of 2014-2020, the estimates obtained in Step 3 needed to be updated to reflect current prices in 2023. To achieve this, proxy rates were indexed based on the average cumulative inflation of the Harmonised Indices of Consumer Prices from 2014 to 2022.

Step 5 involved **extrapolating rates for the remaining 21 Member States.** To do so, the rates for the total cost of the interventions were determined through linear regression. The labour cost levels for services to the business economy in 2020 were used as the independent (predictor) variable.

Rates

Table 15. Proposed SCO rates for sub-area 3A

MEMBER STATE	TOTAL (€), PER SME ATTENDING ONE INTERNATIONAL EVENT
AT	13 596
BE	14 045
BG	10 816

MEMBER STATE	TOTAL (€), PER SME ATTENDING ONE INTERNATIONAL EVENT
CY	11 628
CZ	11 514
DE	13 443
DK	14 618
EE	11 475
ES	12 049
FI	13 395
FR	14 933
GR	11 857
HR	10 357
HU	11 198
IE	13 023
IT	11 174
LT	11 160
LU	14 560
LV	11 237
MT	11 666
NL	13 443
PL	12 118
PT	12 405
RO	10 969
SE	13 959
SI	12 077
SK	11 447

Summary table

Definition of the SCO	This output-based SCO would cover the cost of one SME attending one international event.
Eligible activities	• Participation to trade fairs • Participation to international scientific conferences • Participation to partnership exchanges

Target group for the beneficiary	Small (from 10 to 49 employees) and medium (from 50 to 249 employees) enterprises	
Indicator name	Number of SMEs attending one international event	
Measurement unit for the indicator	Number of SMEs attending one international event in units. The measurement of this indicator should closely follow the definition of the SCO.	
Base calculation formula	$\boldsymbol{SCO_{3A}} = \frac{\boldsymbol{Ctotal}}{\boldsymbol{tSME*tEvent}}$, where *tSME* is the total number of SMEs supported *tEvent* is the total number of event attended by a single SME C_{total} is total costs of relevant activities, in EUR	
Eligible costs	All eligible costs of the operation.	
Arrangements for the audit trail	*Proof that eligible activities have taken place* • Registration to the fairs. • Documents providing evidence of actual attendance to the international event such as: photographic evidence, exhibitors catalogue, etc.	
Key risks/limitations and measures to prevent perverse incentives	*Risk / limitation 1:* Beneficiaries may aim to minimise their expenditure towards fulfilling the condition while undertaking a low-value project.	The selection procedure should aim to award only projects with clear added value.
	Risk / limitation 2: SCO estimates are feasible only to Member States that provided the study with appropriate and sufficient historical data.	Statistical inference allows to establish unit cost values for all Member States based on cost indices.
Method for regular adjustment of the rates	SCO values can be adjusted regularly on the basis of the following indicator: Harmonised Indices of Consumer Prices (HICPs). Percentage change compared to previous year.	

2.3.2. Sub-area 3B: Consultancy / advisory services to elaborate an internationalisation strategy

SMEs face more challenges compared to their larger counterparts in fully utilising the opportunities provided by the Single Market, competing in the global arena, navigating financial crises, attracting skilled personnel, and securing investments. It is acknowledged that SMEs often lack the internal resources and know-how needed to conduct research that can aid them in making informed decisions while seeking investment opportunities and evaluating their potential for growth and competitiveness. This limitation leads to a significant dependence on external consulting services.

Providing entrepreneurs with the required insights in a timely manner through consultancy services can help them initiate necessary actions to ensure their future growth and survival. Therefore, it is important to provide easier access to external consultancy services to address the expertise gap within SMEs. Research suggests that internationalisation consultancy can significantly reduce the barriers faced by SMEs during the internationalisation process, especially those related to knowledge and networks of internationalisation and management[32]. By utilising the knowledge and experience of internationalisation consultants, SMEs can overcome their limitations and minimise the risks they face.

To facilitate easier access to consultancy services for the development of an internationalisation strategy, we propose implementing the following EU-level SCO solution:

- Lump sum to cover the **costs of an SME seeking consultancy or advisory services to develop an internationalisation strategy**.

Definition of the SCO

This output-based SCO aims to cover the average cost incurred by one SME for seeking consultancy / advisory services to develop an internationalisation strategy. The main beneficiaries of this scheme are SMEs. To claim reimbursement, Managing Authorities need to provide evidence in their audit trail that the consultancy / advisory service has been utilised by the SME.

Assessment of data

The base data for this study was obtained from Managing Authorities and Intermediate Bodies in a standardised and structured data collection form. The data collected from Member States was based on verified expenditures from ERDF/CF. For sub-area 3B, 9 Member States (BE, CZ, ES, HU, IT, PL, PT, SE, SI) provided relevant data on completed projects, specifying both the total amount of verified expenditures, the number of SMEs supported by each project / call and the number of consultancy advisory services supported.

The data provided by these MS refer to projects covering different categories of eligible costs:

- direct costs other than staff (e.g. external consultancy services, travel, trademarks, acquisition of information, equipment, etc.);
- staff costs;

[32]Pöyhtäri, J.P. (2019): The role of internationalisation consultancy in SME internationalisation. Available at: https://jyx.jyu.fi/bitstream/handle/123456789/65251/1/URN%3ANBN%3Afi%3Ajyu-201908163854.pdf. Last access: 2 May 2023.

- indirect costs.

Calculation method

Step 1 involved **cleaning the available historical data provided by BE, CZ, ES, HU, IT, PL, PT, SE, SI based on qualitative criteria**. Projects that were irrelevant or did not contain all the necessary data entries were excluded from further analysis.

Step 2 involved **identifying and removing outliers from the data provided by the nine Member States** (BE, CZ, ES, HU, IT, PL, PT, SE, SI) that have provided all the necessary information. This was accomplished by calculating the average ratio between the total verified costs and the total number of SMEs having elaborated an internationalisation strategy. Any values falling below the 10th percentile or above the 90th percentile of this average are considered outliers and therefore excluded. In the case of Member States with fewer than four records (such as CZ, IT, SI, SE), it was not possible to analyse the outliers. As such, these Member States require the SCO to be extrapolated through statistical sources (as outlined in Step 3).

Table 16. Consultancy/advisory services to elaborate an internationalisation strategy (sub-area 3A): identification and exclusion of the outliers

MEMBER STATE	RELEVANT DATA ON COMPLETED PROJECTS WITH INFO ON N. OF SERVICES PER SME	N. OF OUTLIERS IDENTIFIED
BE	9	2
CZ	2	n/a
ES	34	4
HU	5	2
IT	2	n/a
PL	7	2
PT	1188	238
SI	2	n/a
SE	2	n/a

Source: prepared by the study team.

Step 3 involved the **calculation of the total SCO for the five Member States** (BE, ES, HU, PL, PT) that have provided all the necessary data. We calculated the average ratio between the total verified costs and the total number of SMEs having elaborated an internationalisation strategy. This calculation was based on the database that has been cleared of any outliers.

Step 4 involves **adjusting the established rates to account for inflation**. Since the rates were based on historical data from the period of 2014-2020, the estimates obtained in Step 3 needed to be updated to reflect current prices in 2023. To achieve this, proxy rates were indexed based on the average cumulative inflation of the Harmonised Indices of Consumer Prices from 2014 to 2022.

Step 5 involved **extrapolating rates for the remaining 22 Member States.** To do so, the rates for the total cost of the interventions were determined through linear regression. The labour cost levels for services to the business economy in 2020 were used as the independent (predictor) variable.

Rates

MEMBER STATE	TOTAL (€), PER SME ATTENDING ONE INTERNATIONAL EVENT
AT	8 921
BE	9 125
BG	7 636
CY	8 011
CZ	7 958
DE	8 850
DK	9 393
EE	7 941
ES	8 403
FI	8 828
FR	9 000
GR	8 117
HR	7 821
HU	7 516
IE	8 656
IT	8 620
LT	7 795
LU	9 366
LV	7 830
MT	8 029
NL	8 850
PL	8 196
PT	7 835
RO	7 707
SE	9 088
SI	8 219
SK	7 927

Summary table

Definition of the SCO	This output-based SCO would reflect the average cost incurred by an SME for consultancy/advisory services to develop an internationalisation strategy.	
Eligible activities	Elaboration of an internationalisation strategy for an SME through a consultancy activity.	
Target group for the beneficiary	Small (from 10 to 49 employees) and medium (from 50 to 249 employees) enterprises.	
Indicator name	Number of SMEs that have elaborated an internationalisation strategy.	
Measurement unit for the indicator	The total number of SMEs that have elaborated an internationalisation strategy in units. The measurement of this indicator should closely follow the definition of the SCO.	
Base calculation formula	$\boldsymbol{SCO_{3B}} = \frac{\boldsymbol{Ctotal}}{\boldsymbol{tSME * tstrategy}}$, where *tSME* is the total number of SMEs supported *tstrategy* is the total number of internationalisation strategies elaborated by a single SME C_{total} is total costs of relevant activities, in EUR	
Eligible costs	All eligible costs of the operation.	
Arrangements for the audit trail	*Proof that eligible activities have taken place* Final report of the consultancy service carried out (activities performed, results obtained…).	
Key risks/limitations and measures to prevent perverse incentives	*Risk / limitation 1:* Beneficiaries may aim to minimise their expenditure towards fulfilling the condition while undertaking a low-value project.	The selection procedure should aim to award only projects with clear added value.
	Risk / limitation 2: SCO estimates are feasible only for Member States that provided the study with appropriate and sufficient historical data.	Statistical inference allows unit cost values to be established for all Member States based on cost indices.

Method for regular adjustment of the rates	SCO values can be adjusted regularly on the basis of the following indicator: Harmonised Indices of Consumer Prices. Percentage change compared to previous year.

2.4. Feasibility checks

2.4.1. FC1: Promoting sustainable multimodal urban mobility

In accordance with the policy objectives set out in Article 5(1) of Regulation (EU) 2021/1060, the ERDF/CF shall support, among others, the objective of contributing to 'a greener, low-carbon transitioning towards a net zero carbon economy and resilient Europe by promoting clean and fair energy transition, green and blue investment, the circular economy, climate change mitigation and adaptation, risk prevention and management, and sustainable urban mobility' (Policy Objective 2).

In this feasibility check, we focus on one of the eight specific objectives of Policy Objective 2, which is **promoting sustainable multimodal urban mobility, as part of the transition to a net zero carbon economy** (RSO2.8).

The section is structured as follows. First, we present the main findings, detailing the operations considered for the result-based tools, as well as potential indicators and data sources that could be used to establish the amounts linked to achieving the results. Second, we present an overview of the potential FNLC in the selected area, showing the most promising alternatives.

2.4.1.1 Operations considered for result-based tools

The first step of the analysis conducted by the research team was to review, classify and define operations considered for result-based tools. By examining the available information on 109 programmes planned for the period of 2021-2027 across 21 Member States, funded by either the ERDF or the CF (according to the Dataset '2021-2027 Finances details' of the European Commission Cohesion Open Data Platform)[33], we observed that programmes categorised under the sustainable urban mobility sub-area encompass a total of **24 intervention fields**. Below we list the most common ones, i.e. fields covered by programmes in three or more Member States:

- clean urban transport infrastructure, present in 21 Member States;
- cycling infrastructure, present in 19 Member States;
- clean urban transport rolling stock, present in 15 Member States;
- alternative fuels infrastructure, present in 15 Member States;
- digitalisation of transport when dedicated in part to greenhouse gas emissions reduction: urban transport, present in 12 Member States;
- digitalisation of urban transport, present in 12 Member States;
- air quality and noise reduction measures, present in 8 Member States.

[33] Available at: https://cohesiondata.ec.europa.eu/2021-2027-Categorisation/2021-2027-Finances-details-categorisation-multi-fu/hgyj-gyin. Last access: 6 Apr 2023.

In Table 17, we illustrate potential interventions in the area by presenting three examples of programmes related to the sub-area of sustainable urban mobility from three different countries (Spain, Portugal, and Belgium).

Table 17. Examples of supported operations / projects in the area of sustainable urban mobility

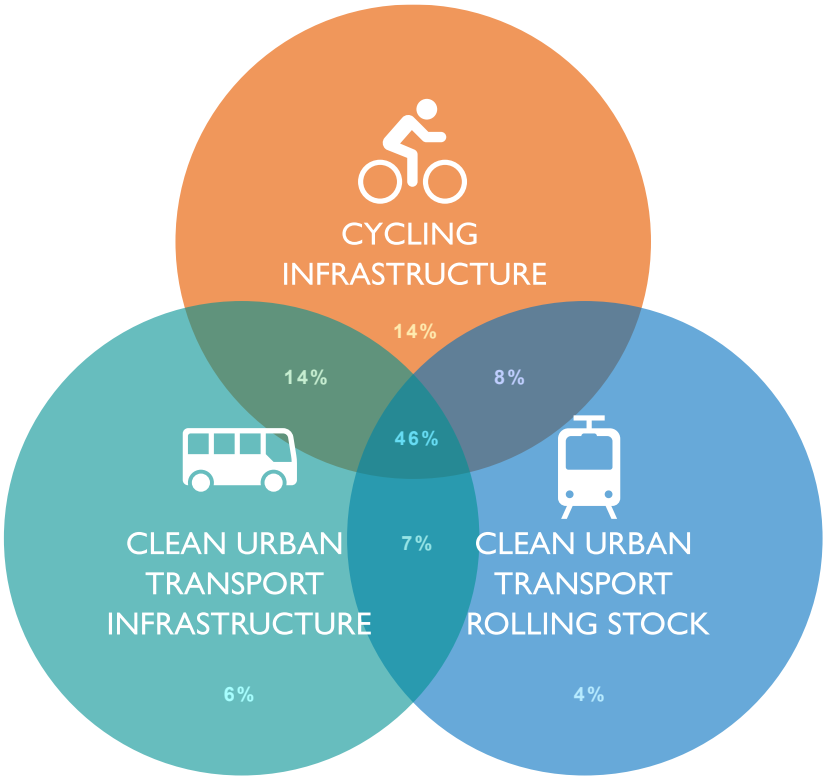
PROGRAMME	SUPPORTED OPERATIONS / PROJECTS	INTERVENTION FIELDS
Canarias (Spain)	• Facilitating internal and external access to collective transport stations, improving the possibilities of transporting bicycles on urban and interurban public transport, installing bicycle rental or public bicycle services, and launching campaigns to promote the combined use of bicycles and public transport. • Conserving and improving existing public transport infrastructure to efficiently meet mobility demand, as well as optimising the use of the infrastructure through demand management measures. • Promoting energy efficiency in public transport infrastructure and facilities. • Developing pilot programmes for the study and implementation of demand management measures, the development of an integrated information and management system for urban / interurban public transport, improving its connectivity with other modes of transport and adopting homogeneous ticket systems between different urban areas, standardising the collection and treatment of basic transport data, or developing urban transport systems with reserved platforms, among others.	• Air quality and noise reduction measures • Clean urban transport infrastructure • Clean urban transport rolling stock • Cycling infrastructure • Digitalisation of urban transport • Digitalisation of urban transport – GHG emission reduction • Alternative fuels infrastructure
Algarve Regional Programme (Portugal)	• Connection in a dedicated public transport system between Faro-Aeroporto-Universidade do Algarve-Parque das Cidade-Loulé-Olhão, supporting the largest population concentration in the south of the country. • Sustainable Urban Logistics Plans and other studies supporting the planned interventions. • Creation of logistics spaces and systems for restriction and control of loading and unloading. • Promotion of multimodal logistics interfaces. • Creation / requalification of regional cycling structure and isolated pedestrian and cycling areas in each urban centre. • Management systems for circulation and parking that prioritise soft modes and public transport. • Development of smart mobility solutions and integrated information platforms. • Flexibilisation of transport systems by adapting services to less densely populated areas.	• Clean urban transport infrastructure • Clean urban transport rolling stock • Cycling infrastructure • Digitalisation of urban transport • Digitalisation of urban transport – GHG emission reduction
Flanders (Belgium)	• Further roll-out of mobi points as a contribution to the modal shift and development of alternative / sustainable modes of mobility, e.g. by providing adapted transfer infrastructure, bicycle parking facilities, charging stations, among others. • Pilot and demo projects that promote multimodality. • Further roll-out of bicycle highways.	• Clean urban transport infrastructure • Cycling infrastructure • Digitalisation of urban transport – GHG emission reduction

PROGRAMME	SUPPORTED OPERATIONS / PROJECTS	INTERVENTION FIELDS
	• Pilot projects on Intelligent Transport Systems: Integrating information and communication technologies in road transport with other modes of transport (smart data-driven traffic management). • Multimodal infrastructure projects specifically aimed at the transition from trucks to more sustainable infrastructure such as rail and inland shipping. • Local distribution projects such as delivery with smaller, electric vehicles; more efficient loading and unloading, delivery by water, among others. • Projects that improve the preconditions for green mobility (e.g. electric, hydrogen-based on renewable energy), aimed at making public transport more accessible. • Removing the barriers that stand in the way of the transition to sustainable modes of transport. • Pilot projects on the Internet of Things, e.g. devices / sensors to improve route planning in the context of mobility, increase the efficiency of public transport, optimise traffic light schedules, variable speed limits, etc. • Innovative projects that convert big data into tailor-made smart data. • Projects that improve both the connection between the mobility networks and modes internally in Flanders and the connection of the Flemish mobility networks with those in the neighbouring regions at home and abroad.	

Source: Dataset '2021-2027 Finances details', complemented by official programme documentation.

After reviewing the programmes listed in the table above, it becomes evident that projects in this area may have a broad scope, including operations in multiple fields of intervention simultaneously. However, despite the heterogeneity of intervention fields within the selected sub-area, we also see a significant overlap between the operations supported in the analysed programmes. For example, looking at the list of 109 current programmes under ERDF/CF funds, we observe that almost half of them cover, at the same time, projects related to the three main intervention fields listed previously, i.e. **clean urban transport infrastructure** (present in 73 % of programmes in this area), **cycling infrastructure** (82 % of programmes) and **urban transport rolling stock** (65 % of programmes)(**Error! Reference source not found.**).

Figure 2. Overlap of intervention fields in the sub-area of sustainable urban mobility



Source: Prepared by the study team, based on the dataset '2021-2027 Finances details'.

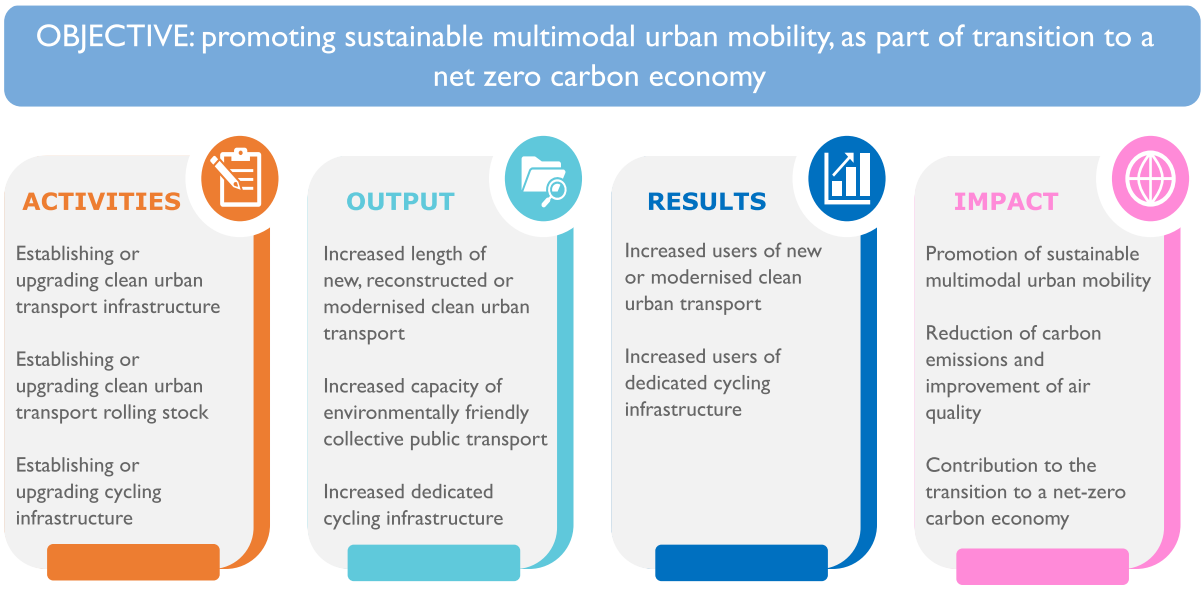
Considering the weight of these three intervention fields, the next sections of the present feasibility check will focus on potential FNLC(s) for investment in **cycling infrastructure**, **clean urban transport rolling stock** and **clean urban transport infrastructure**.

2.4.1.2 Result indicators considered for result-based tools

In this section, we elaborate on potential result indicators considered for the development of FNLC solutions. **Error! Reference source not found.** illustrates the intervention logic for the urban mobility field, showcasing the expected outcomes and results of funded operations in the investment area under examination and focusing on operations related to clean urban transport infrastructure (including rolling stock), as well as cycling infrastructure. The elaboration of outputs, results, and impacts listed

in the figure is inspired by the European Parliament and Council's Regulation (EU) 2021/1058, which defines common indicators to assess each specific objective for the ERDF and the CF[34].

Figure 3. Sustainable urban mobility intervention logic



Source: Prepared by the study team based on Regulation (EU) 2021/1058.

When identifying indicators to serve as a base for developing FNLC solutions, a valuable resource is the set of common indicators used by the European Regional Development Fund and the Cohesion Fund. These indicators are deemed relevant as they are grounded in the primary strategies of the European Union, and also allow for comparisons across different programmes and Member States.

The main source of the most recent information on common ERDF/CF result indicators is national agents, such as programme managing authorities. However, initial information about the indicators that are being tracked in the current period can be found in the dataset '2021-2027 Achievement Details'. The latter is available on the European Commission Cohesion Open Data Platform[35]. The dataset contains data on the indicators for measuring the performance of adopted 2021-2027 programmes, including information on both common and specific output and result measures. It currently provides information on the initially planned indicator values. However, from 2023 onwards, it is intended to also incorporate time-series information on targets, as well as cumulative amounts reported for decided and implemented values.

Based on the above-mentioned dataset, we identified the following result-based indicators being tracked during the 2021-2027 period by projects funded by ERDF/CF in sustainable urban mobility:

- annual users of dedicated cycling infrastructure (RCR64);
- annual users of new or modernised public transport (RCR62);
- annual users of new or modernised tram and metro lines (RCR63);

[34] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02021R1058-20210630&qid=1681300139712&from=en. Last access: 13 Apr 2023.
[35] Available at https://cohesiondata.ec.europa.eu/2021-2027-Indicators/2021-2027-Achievement-Details-multi-funds-/xi3a-zddk. Last access: 12 Apr 2023.

- estimated greenhouse emissions (RCR29);
- jobs created in supported entities (RCR01);
- population benefiting from measures for air quality (RCR50);
- private investments matching public support (of which: grants, financial instruments) (RCR02);
- small and medium-sized enterprises introducing product or process innovation (RCR03);
- users of new and upgraded public digital services, products and processes (RCR11).

Table 18 details the number of Member States tracking each indicator mentioned above. We can observe that the most used common ERDF/CF indicators in the current period for programmes on sustainable urban mobility are: **annual users of dedicated cycling infrastructure** (RCR64), which is being tracked by 17 Member States; **annual users of new or modernised public transport** (RCR62), which is tracked by 15 Member States; **annual users of new or modernised tram and metro lines** (RCR63), tracked by 10 Member States; and **estimated greenhouse emissions** (RCR29), tracked by 13 Member States. Three of these indicators (see Table 19 for further details) are directly related to operations discussed in the previous section, i.e. clean urban transport infrastructure (related to indicator RCR62), clean urban transport rolling stock (related to RCR63) and cycling infrastructure (related to RCR64).

Table 18. Common ERDF/CF indicators in the area of sustainable urban mobility

	RCR64	RCR62	RCR63	RCR29	RCR01	RCR50	RCR02	RCR03	RCR11
BE	X								
CY		X							
CZ	X	X	X	X			X		
DE	X	X	X	X	X				
EE	X		X						
EL	X	X		X					X
ES	X	X	X	X					
FR	X	X		X		X			
HR	X	X	X	X					
HU	X	X		X					
IT	X	X	X	X		X			X
LT	X	X		X					
LV	X								
MT				X					
PL	X	X	X	X					
PT	X	X	X	X					
RO	X	X	X	X					
SE								X	
SI	X	X							
SK	X	X	X						
Total	17	15	10	13	1	2	1	1	2

Source: Prepared by the study team, using the dataset '2021-2027 Achievement Details'.

Table 19. Overview of selected indicators in the area of sustainable urban mobility

INDICATOR CODE	INDICATOR NAME	MEASUREMENT UNIT	DEFINITION AND CONCEPTS	TIME MEASUREMENT ACHIEVED
RCR62	Annual users of new or modernised public transport	users/year	Annual users of new or modernised public transport financed by supported projects. Public transport covers urban and suburban, such as bus, trolley bus, water bus lines (which are not tram, metro – see RCR63). Modernisation of public transport refers to significant improvements in terms of infrastructure, and access and quality of service.	One year after the completion of output in the supported project.
RCR63	Annual users of new or modernised tram and metro lines	users/year	Annual users of new or modernised tram and metro lines financed by supported projects. The indicator also covers urban and suburban rail lines. Modernisation of these transport services refers to significant improvements in terms of infrastructure, and access and quality of service. Urban and suburban rail lines refer to networks that are functionally separate from the rest of the railway system and intended only for the operation of local, urban or suburban passenger services.	One year after the completion of output in the supported project.
RCR64	Annual users of dedicated cycling infrastructure	users/year	Annual users of dedicated cycling infrastructure financed by supported projects. Dedicated cycling infrastructure includes cycling facilities separated from roads for vehicular traffic or other parts of the same road by structural means (kerbs, barriers), cycling streets, cycling tunnels, etc.	One year after the completion of output in the supported project.

Source: Metadata of common ERDF/CF/JTF indicators[36].

[36] Available at: https://cohesiondata.ec.europa.eu/2021-2027-Indicators/2021-2027-ERDF-CF-JTF-Common-Indicators/4t73-mihb. Last access: 13 Apr 2023.

Based on desk research, we provide our assessment of each of the selected result-based indicators based on the criteria detailed in Table 20. Our assessment is presented in Table 21.

Table 20. Criteria for feasibility assessment

CRITERIA	DESCRIPTION
Relevance	Relevance of the results indicator towards main EU strategies, based on desk research and/or consultation with Member States.
Robustness	Relates to the available data, its completeness and comprehensiveness. This presumes that all data points needed for calculations and establishment of a particular FNLC are sufficiently covered in the data sample, whereas the latter provides a reasonable coverage of Member States. Incomplete data (i.e. provisional / estimated data or data gaps) are as dangerous as inaccurate data. Gaps in data lead to a partial view of the overall picture. Without a complete picture, FNLC may be calculated through uninformed actions.
Practicality & perversity	Relates to the administrative burden of the prospective arrangements for the audit trail and the documentation required to verify that results have been achieved and/or conditions have been met. Administrative burden level depends on the scope, detail and accessibility of evidence required to validate or invalidate the achievement of results. It also relates to the possibility of undesirable effects of the FNLC, risks of perverse incentives or unintended negative effects of applying the proposed FNLC solution (such as creaming / cherry-picking in the selection of participants[37] or parking[38]).

Source: Prepared by the study team.

Table 21. Assessment of selected indicators in the area of sustainable urban mobility

CRITERIA	DESCRIPTION
Relevance	These common ERDF/CF indicators are overall relevant, as they are rooted in the main EU strategies, being directly related to the area of sustainable urban mobility. More precisely: • **Annual users of new or modernised public transport** is related to the intervention field of clean urban transport infrastructure. • **Annual users of new or modernised tram and metro lines** is related to the intervention field of clean urban transport rolling stock. • **Annual users of dedicated cycling infrastructure** is related to the intervention field of cycling infrastructure.
Robustness	Based on desk research and information available on programmes being implemented in the 2021-27 period considering 20 Member States providing

[37] The act of creaming and cherry-picking involves choosing participants who are the easiest to help, to ensure that providers can meet the desired outcomes.
[38] Parking is a practice where providers attempt to minimise costs by providing minimal assistance to those with the lowest anticipated outcomes, while concentrating their resources on clients who have better prospects.

CRITERIA	DESCRIPTION
	information on indicators in the area of sustainable urban mobility, the result-based indicators on: • **Annual users of new or modernised public transport** is tracked by 15 Member States in the current period, indicating high comprehensiveness of the indicator. • **Annual users of new or modernised tram and metro lines** is tracked by 10 Member States in the current period, indicating moderate comprehensiveness of the indicator. • **Annual users of dedicated cycling infrastructure** is tracked by 17 Member States in the current period, indicating high comprehensiveness of the indicator. At the moment, the study team does not have access to the collected data from countries in order to verify its completeness / quality. The information will be fact-checked after further consultations with the Member States.
Practicality & perversity	An FNLC based on **annual users of new or modernised public transport** or **annual users of new or modernised tram and metro lines** should not be administratively burdensome, as access to information regarding the number of users should be readily available upon request from institutions responsible for ticket sales and access control, such as data on purchases and use of gates / turnstiles. However, in the case of the **annual users of dedicated cycling infrastructure**, there is a challenge associated with accurately monitoring the number of new users of cycling infrastructure in a way that is audit-friendly. This challenge can be mitigated if the project is accompanied by implementing an automated way to count cyclists (such as by implementing radars). This solution, however, may increase the cost of interventions in this area. Perverse incentives such as creaming and cherry-picking are reduced for the three indicators, but still present. Beneficiaries might, for instance, choose to implement projects in more populated areas where there are already other types of sustainable transport available, in order to receive a larger outcome-based payment, therefore neglecting certain areas. For instance, in the case of cycling infrastructure, beneficiaries may focus on areas where there are already a high number of cyclists, only to receive a larger outcome-based payment, therefore neglecting areas where cycling infrastructure could be more needed (e.g. areas with low coverage of buses and trains). In the case of public transport, beneficiaries may also offer services at lower fares only to increase temporarily the number of users. Requesting information on available modes of sustainable transport in the area, as well as their prices, can help reduce this type of perverse incentive. Additionally, there is also a risk that beneficiaries focus more on increasing the number of users than on the quality of the service provided. In that regard, the implementation of satisfaction surveys can help monitor the quality of the service and decrease the risk. Although all the three indicators measure overall usage without considering differences in transport mode users, the risk of parking is still present if infrastructure construction regulations do not require accommodations for individuals with disabilities. To mitigate this risk, a reimbursement condition based on infrastructure adaptations for individuals with disabilities could be added. It is important to note that the mitigation measures mentioned above are merely advisory and thus do not require inclusion in the audit trail within a potential EU-

CRITERIA	DESCRIPTION
	level FNLC scheme. However, these measures could potentially be implemented at the programme level in due course.

Source: Prepared by the study team.

2.4.1.3 Amounts linked to achievement of results

Concerning establishing financial amounts for the selected indicators, the study team revised four potential data sources.

The first (and the most feasible) is the publication '**Handbook on the external costs of transport**'[39], the result of a study commissioned by the European Commission. It provides an overview of the methodologies and input values which can be used to estimate all main external costs of transport. External costs (or externalities), in this report, are understood as the result of actions of one individual or group on another individual or group that generate an impact that is not accounted for or compensated by the responsible party. The external transport costs reflect the difference between social costs, which include all expenses related to the provision and use of transport infrastructure, and the private costs directly incurred by the transport user.

The study provides figures for total, average and marginal external transport costs in all EU countries. Financial figures are expressed in Euro price levels of 2016, with average and marginal amounts expressed in Euro-cent per PKM (Passengers-Kilometres)[40]. Calculations of external costs consider all main externalities of transport: accidents; air pollution; climate change; noise; congestion; well-to-tank emissions; habitat damage; other external cost categories (e.g. soil and water pollution). In this handbook, transport infrastructure costs are not considered, as they are part of another study (which will also be discussed below).

Among other modes, the study considers road (passenger car, motorcycle, bus, coach, light commercial vehicles and heavy goods vehicles) and rail transport (high-speed passenger train, passenger train electric, passenger train diesel, freight train electric and freight train diesel). Thus, values in this report can be a potential source of financial information related to indicators: **Annual users of new or modernised public transport** and **Annual users of new or modernised tram and metro lines**.

One advantage of this study is that, while the first Handbook was published in 2008, it has been updated twice ever since (once in 2014 and again in 2019). However, it is not clear if new versions of the report will be published in future years. Another advantage is its level of detail. The handbook has a detailed explanation of the methodology used for each cost category, and also provides an Excel Annex with all values used for the calculations included in the report. This high level of detail makes reproducibility easier should the study not be updated. The main disadvantage of this study, however, is that values for different modes of public transport are not divided into those with lower or higher emissions. For instance, even though they differentiate between electric and diesel passenger trains, the same differentiation does not happen with buses and coaches. Thus, final calculations may overestimate the external costs if we are interested in only the more sustainable types of passenger mobility. Still, from all the data sources evaluated by the study team, this study was identified as the

[39] Available at: https://op.europa.eu/en/publication-detail/-/publication/9781f65f-8448-11ea-bf12-01aa75ed71a1. Last access: 14 Apr 2023.
[40] PKM is a unit of measurement representing the transport of one passenger over one kilometre.

one with the most potential to be used for estimating financial values for indicators related to public transport.

A complementary source to the study above is the publication '**Overview of transport infrastructure expenditures and costs**'[41], also commissioned by the EC. The study presents the estimates of total, average and marginal infrastructure costs for several modes of transport, including road (passenger car, motorcycle, bus, coach, van and heavy goods vehicle) and rail (high-speed passenger train, passenger train electric, passenger train diesel, freight train electric and freight train diesel), in all EU countries.

In the study, transport infrastructure is understood as the physical and organisational network which allows movements between different locations. Road transport infrastructure considers costs such as land, roadworks prior to paving, pavement and ancillary works, engineering structures, traffic signs and signalling and telecommunications installations, lighting installations, toll collection installations, buildings, energy, vehicles, etc., used by the infrastructure department, traffic management and cleaning icy / snowy roads. Rail transport infrastructure considers costs such as ground area, track and track bed, platforms, engineering structures, level crossings, superstructure, access ways, safety, signalling and telecommunications and lighting installations. Average costs are expressed as the costs per transport performance unit (e.g. Euro per PKM) based on total annualised costs (considering both depreciation and financing costs).

Although valuable, it is important to point out some limitations of using the latter study. The first drawback is that there may be country differences in the values used to calculate costs, explained by potential differences in the scope of the data for each country. For instance, expenditures on a certain category may not (or only partly) be included in the available data, reducing the comparability of these data between countries. The other limitation is the lack of frequent updates to the report. In addition, the study uses several statistical techniques to estimate missing data (such as extrapolation and interpolation), so final values may not be completely accurate. Last, it is important to note that the study focuses only on expenditures and costs, using information not only from international aggregated sources, such as the Organization for Economic Co-operation and Development (OECD) and Eurostat, but also using historical data on expenditures collected from national sources. Therefore, although it can be used as a potential source of data for triangulation, it is not recommended as a unique reference for the development of a FNLC solution.

We also considered the guidebook '**Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications**'[42], developed by the Victoria Transport Policy Institute, which provides detailed information on transportation economic impacts (such as benefits and costs), analysing how costs and benefits vary for different transportation modes and conditions. Besides the monetised estimates for each type of cost (e.g. travel time, parking, congestion, safety / health, air pollution, noise etc), in US$ per passenger-mile, for 11 travel modes, it has an estimation of the average external cost savings (reductions in vehicle costs, congestion, parking, roadway costs, etc.) due to a shift from the use of average car travel to another mode (such as compact fuel-efficient car, electric car, bicycle, electric bus/trolley etc). However, after further analysis, the study team considered this data source unsuitable due to its severe limitations, listed below.

First, even though it provides figures more related to sustainable mobility than the other studies identified by the study team (disaggregating the costs of 11 different modes of transport and covering

[41] Available at: https://op.europa.eu/en/publication-detail/-/publication/7ab899d1-a45e-11e9-9d01-01aa75ed71a1. Last access: 14 Apr 2023.
[42] Available at: https://www.vtpi.org/tca. Last access: 14 Apr 2023.

23 cost categories), the values currently provided in this report are outdated, with the last update of final calculations dating back to 2009. Second, cost categories are based on data not only from European countries but also those from other regions of the world, such as North America and Oceania, with final values being provided at the aggregate level and not always based on the same list of countries. The study team believes that if this study is not updated with more recent figures, taking into account the technological changes that happened in the previous decade and providing more disaggregation for European countries, using this data source would be unfeasible.

Last, another potential source of financial information is the report '**The EU cycling economy**'[43], produced by the European Cyclists' Federation and published in 2016. The report is an update of its first version published in 2013, and it estimates the economic benefits of cycling in European countries. The report calculates benefits based on an extensive list of factors, such as climate, environment, environmental asset development, energy, resources, direct health benefits, road safety / reduced accidents, health economic benefits, EU bike industry, bicycle and parts sales and repairs, bicycle tourism, road safety, urban design, smarter cycling, quality of time spent cycling, shopping by bike, child welfare, quality of space, social affairs, mobility, road infrastructure and diversity of (cycling-) cultures. Estimated benefits of cycling are given in billion euro based on a value of 134 billion kilometres cycled per year for the EU-28. One advantage is that the report specifies the data sources used to estimate each factor, which facilitates reproducibility. It also specifies which values are calculated based on concrete evidence, which are based on the best available data and which are based on estimations using the best available indicators.

Although valuable, this study has some significant limitations. One is that calculations are based on the latest available data, which can be from different years, so techniques to harmonise the data are required. Second, values are presented only at the aggregated level, so statistical techniques to estimate data points for each Member State are also needed. Third, values are presented in total euro, so information on the number of cyclists will be necessary in order to estimate unit values based on this report. Given the amount of statistical techniques necessary to determine different amounts for each Member State based on this study, we believe using this data source as the main source of financial values would significantly reduce the accuracy of the results, making its use less viable. Table 22 provides an overview of the potential data sources discussed in this section.

[43] Available at: https://www.ecf.com/system/files/THE_EU_CYCLING_ECONOMY.pdf. Last access: 18 Apr 2023.

Table 22. Overview of potential data sources to establish financial amounts in the area of sustainable urban mobility

POTENTIAL DATA SOURCE(S)	RELATED INDICATOR(S)	ADVANTAGES	LIMITATIONS	METHODS TO ADJUST THE AMOUNTS
'Handbook on the external costs of transport'	Annual users of new or modernised public transport. Annual users of new or modernised tram and metro lines.	Presents external costs in euro-PKM for several modes of transport, including road and rail. Provides estimates for all EU countries. Consider all main externalities of transport. Highly detailed.	No disaggregation between modes of transport with lower or higher emissions. It is unclear if there will be future updates to the reports.	Figures in those reports are presented in Euro. Should there be no recent update, values from the latest reports can be updated using relevant price index figures from Eurostat (*unit value for Member State X * index for Member State X*), such as the Harmonised Index of Consumer Prices (annual average rate of change) and/or the Labour Cost Index (percentage change compared to previous year) in the relevant areas used to estimate transport costs in each data source (such as transport, health, and electricity / gas / fuels).
'Overview of transport infrastructure expenditures and costs'	Annual users of new or modernised public transport. Annual users of new or modernised tram and metro lines.	Presents infrastructure costs in euro-PKM for several modes of transport, including road and rail. Provides estimates for all EU countries. Potential source for triangulation.	Lack of frequent updates. No disaggregation between modes of transport with lower or higher emissions. Potential country differences in the values used to calculate costs. Potential inaccuracy of values, due to the extensive use of statistical techniques to estimate missing data. Focus only on expenditures and costs.	
'The EU cycling economy'	Annual users of dedicated cycling infrastructure.	Estimates the economic benefits of cycling in European countries in billion euro based on a value of 134 billion kilometres cycled per year for the EU-28. Calculations are based on an extensive list of factors.	Unclear if there will be future updates to the report. Values used in this report are not necessarily from the same year. Values are presented only at the aggregated level.	

POTENTIAL DATA SOURCE(S)	RELATED INDICATOR(S)	ADVANTAGES	LIMITATIONS	METHODS TO ADJUST THE AMOUNTS
		Specifies the data sources for estimating each factor, which facilitates reproducibility.	Statistical techniques and additional data search will be required in order to estimate values for each cyclist based on this report.	
'Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications'	Annual users of new or modernised public transport. Annual users of new or modernised tram and metro lines. Annual users of dedicated cycling infrastructure.	Presents monetised estimates in dollar-passenger-mile for each type of transportation cost. High number of cost categories covered. Easier disaggregation between modes of transport with lower or higher emissions.	Outdated values. Final values presented in the aggregate level, also covering countries outside the EU.	Figures in this report are presented in US dollars, so final values should be adjusted to Euro using exchange rates. Although values in Euro can be updated to present values using relevant price index figures from Eurostat (as detailed above), it is possible that these price indices may not fully capture the impact of recent technology developments on prices, as these developments may have occurred after the last report was published.

Source: Prepared by the study team.

2.4.1.4 Feasibility assessment

As established in earlier sections, the potential to develop a FNLC solution(s) was assessed in three intervention fields related to sustainable urban mobility sub-area: **clean urban transport infrastructure**, **cycling infrastructure** and **clean urban transport rolling stock**. A total of 15 or more Member States support operations in at least one of these three fields, covering 98 % of programmes in the examined area with available information.

We evaluated several potential result-based indicators being tracked by Member States under these interventions, with the most relevant ones being **annual users of dedicated cycling infrastructure** (RCR64), **annual users of new or modernised public transport** (RCR62), and **annual users of new or modernised tram and metro lines** (RCR63).

Table 23 summarises the potential FNLC solutions identified by the research team for these indicators. For each solution, we also provide a description of operation types, results to be achieved, indicator name, measurement unit, verification mechanism, key risks and potential data sources to establish financial amounts.

Table 23. Summary of potential FNLC solutions in the area of sustainable urban mobility

COMPONENT	DESCRIPTION		
	CLEAN URBAN TRANSPORT INFRASTRUCTURE	CLEAN URBAN TRANSPORT ROLLING STOCK	CYCLING INFRASTRUCTURE
Potential FNLC approach	Target-based approach based on the number of new users of new or modernised public transport.	Target-based approach based on the number of new users of new or modernised tram and metro lines.	Target-based approach based on the number of new users of dedicated cycling infrastructure.
Description of the operation type	Operations targeting the creation or modernisation of public transport, i.e. bus, trolley bus, water bus lines but NOT tram and metro. Modernisation refers to significant improvements in infrastructure, access and quality of service.	Operations targeting the creation or modernisation of tram and metro lines, including urban and suburban rail lines (i.e. networks that are functionally separate from the rest of the railway system and intended only for the operation of local, urban or suburban passenger services). Modernisation refers to significant improvements in infrastructure, access and quality of service.	Operations targeting the creation of dedicated cycling infrastructure, i.e. cycling facilities separated from roads for vehicular traffic or other parts of the same road by structural means (kerbs, barriers), cycling streets, cycling tunnels, etc.
Description of results to be achieved with a timeline	The release of funds is linked to the following outcome being achieved: verified number of new users of [new or modernised public transport / new or modernised tram and metro lines / dedicated cycling infrastructure] as a result of supported projects. As an example, the release of funds could be contingent upon reaching a specific number of users within a designated timeframe. For instance, achieving an increase of X users by 2025 and Y users by 2028. Alternatively, targets can also be set as percentages, e.g. increase in X% in the number of users (compared to the baseline values) by 2025 and in Y% by 2028.		

COMPONENT	DESCRIPTION		
	CLEAN URBAN TRANSPORT INFRASTRUCTURE	CLEAN URBAN TRANSPORT ROLLING STOCK	CYCLING INFRASTRUCTURE
	It is worth noting that although certain milestones could be established, the study team currently does not have any specific recommendations regarding the most optimum milestones and timeframe that would balance the simplification and financial sustainability aspects of the proposed FNLC solution. Our intention is to engage in discussions with Member States during the upcoming workshop in order to evaluate the possibility of developing more concrete and tangible proposals.		
Indicator name	Number of new users of new or modernised public transport. If measured as percentage: Increase of users of new or modernised public transport.	Number of new users of new or modernised tram and metro lines. If measured as percentage: Increase of users of new or modernised tram and metro lines.	Number of new users of dedicated cycling infrastructure. If measured as percentage: Increase of users of dedicated cycling infrastructure.
Measurement unit	Number of new users (persons) = Number of users (current) – Number of users (baseline) Increase of new users (%) = [Number of new users Number of users (baseline)] * 100		
Verification mechanism	Document justifying how the target(s) was satisfactorily fulfilled. E.g. proof of transport use, such as data on ticket purchases, and/or use of gates / turnstiles.		Document justifying how the target(s) was satisfactorily fulfilled. E.g. proof of transport use, such as data from bicycle radars.
Key risks and measures to prevent them	Beneficiaries may opt to execute projects in densely populated regions where other sustainable transportation options are already available, to receive a higher outcome-based payment, potentially disregarding other areas. They may also offer services at lower fares with the intention of temporarily increasing the number of users. To counteract such unintended consequences, requesting information regarding available modes of sustainable transport and their respective prices in the area can be useful. Another possible concern is that beneficiaries may prioritise increasing the number of users over providing high-quality services. To address this, satisfaction surveys can be implemented to monitor service quality and minimise such risks. The risk of parking is present if infrastructure construction regulations do not require accommodations for individuals with disabilities. To alleviate this, a condition that offers reimbursement based on infrastructure adaptations for individuals with disabilities can be added. The aforementioned mitigation measures serve as advisory recommendations and, as such, may not necessarily need to be documented in the audit trail for a potential EU-Level FNLC scheme. However, they could potentially be implemented at the programme level in due course.		
Potential data sources to establish financial amounts	From all the data sources evaluated by the study team, the study " 'Handbook on the external costs of transport' was identified as the one with the most potential to be used for estimating financial values for indicators related to urban transport, as it provides figures for external transport costs in all EU countries, expressed in Euro-pkm. A complementary source that can potentially be used for triangulation is the study 'Overview of transport infrastructure expenditures and costs', which presents estimation on infrastructure costs and expenditures for all European countries.		The report 'The EU cycling economy' estimates the economic benefits of cycling in European countries. Using this source, however, has several limitations, such as requiring extensive use of statistical techniques to estimate data points for each Member State (reducing the accuracy of

COMPONENT	DESCRIPTION		
	CLEAN URBAN TRANSPORT INFRASTRUCTURE	CLEAN URBAN TRANSPORT ROLLING STOCK	CYCLING INFRASTRUCTURE
	We also considered the guidebook 'Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications'. However, after further assessment, its use was deemed less feasible, given the amount of statistical techniques necessary to determine different amounts for each Member State.		the estimated values) and requiring additional data sources, making its use less viable.

Source: Prepared by the study team.

2.4.2. FC2: Skills for smart specialisation and transition

2.4.2.1 Operations considered for result-based tools

In accordance with the policy objectives set out in Article 5(1) of Regulation (EU) 2021/1060, the ERDF/CF shall support, among others, the objective of contributing to 'a more competitive and smarter Europe by promoting innovative and smart economic transformation and regional ICT connectivity' (Policy Objective 1).

In this feasibility check, we focus on one of the five specific objectives of Policy Objective 1, which is **Skills for smart specialisation and transition** (RSO1.4). From this point onwards, our assessment is limited to this investment area.

The first step of the analysis conducted by the research team was to review, classify and define operations considered for result-based tools. By examining the available information on 67 programmes planned for the period of 2021-2027 across 21 Member States, funded by the ERDF (according to the Dataset '2021-2027 Finances details' of the European Commission Cohesion Open Data Platform[44]), we observed that skills for smart specialisation and transition sub-area encompass a total of **16 intervention fields**. The most frequently encountered intervention field is '**Skills development for smart specialisation, industrial transition, entrepreneurship, and adaptability of enterprises to change**'. This field is addressed by programmes in 20 Member States. The remaining intervention fields have been adopted by three or fewer Member States and are therefore not covered by this feasibility check.

Table 24. Examples of supported operations / projects in the area of skills for smart specialisation and transition

PROGRAMME	SUPPORTED OPERATIONS / PROJECTS	INTERVENTION FIELDS
Programme for the European Union funds' investments in	• To develop the skills of employees needed by SMEs, allowing them to adapt to technological changes in the economy and industrial transformation.	• Skills development for smart specialisation, industrial transition, entrepreneurship and

[44] Available at: https://cohesiondata.ec.europa.eu/2021-2027-Categorisation/2021-2027-Finances-details-categorisation-multi-fu/hgyj-gyin. Last access: 16 May 2023.

PROGRAMME	SUPPORTED OPERATIONS / PROJECTS	INTERVENTION FIELDS
2021-2027 (Lithuania)	• To drive the transition to a knowledge-based and higher value added economy and address the challenges of industrial transformation planned investments in human resources focused on specific training of various forms and levels (upgrading and retraining), special attention for the development and improvement of digital skills of SME employees. • Strengthening scientific management and knowledge commercialisation capacities in research and study institutions: implementation of scientific management and knowledge commercialisation capacities.	adaptability of enterprises to change. • Research and innovation processes, technology transfer and cooperation between enterprises, research centres and universities, focusing on the low-carbon economy, resilience and adaptation to climate change.
NP Research, innovation and competitiveness for green and digital transition 2021-2027 (Italy)	• Development of a skilled workforce that is able to seize the opportunities arising from the dual green and digital transition within companies. • Development of skills in applied research with industrial characterisation. • Strengthening of skills for the active functioning of the innovation ecosystem.	• Skills development for smart specialisation, industrial transition, entrepreneurship and adaptability of enterprises to change. • Digitising SMEs or large enterprises (including e-Commerce, e-Business and networked business processes, digital innovation hubs, living labs, web entrepreneurs and ICT start-ups, B2B) compliant with greenhouse gas emission reduction or energy efficiency criteria.
Lisbon Regional Programme (Portugal)	• Develop the regional innovation ecosystem implement strategies, programmes, and initiatives to foster innovation, creating an ecosystem that supports collaboration, knowledge exchange, and the development of new ideas and technologies. • Strengthen the linkages between higher education institutions and industry to ensure that education programmes align with the needs of the digital economy. Promote the integration of digital technologies in various sectors, including education, healthcare, manufacturing, and services, by providing training programmes, incentives, and infrastructure support. • Assist industries in transitioning towards more advanced and sustainable models by providing resources, expertise, and incentives. Encourage the adoption of technologies that improve productivity, reduce environmental impact, and foster innovation.	• Development of skills for smart specialisation, industrial transition, entrepreneurship and the ability of companies to adapt to change. • Technology transfer and cooperation between enterprises, research centres and higher education sector. • SME business development and internationalisation, including productive investments.

PROGRAMME	SUPPORTED OPERATIONS / PROJECTS	INTERVENTION FIELDS
	Facilitate the development of industry clusters and networks to encourage collaboration and knowledge sharing among businesses. • Establish platforms and mechanisms to facilitate collaboration between businesses, academia, research institutions, and government entities. Encourage the sharing of knowledge, expertise, and resources to foster innovation and drive economic growth.	

Source: Dataset '2021-2027 Finances details', complemented by official programme documentation.

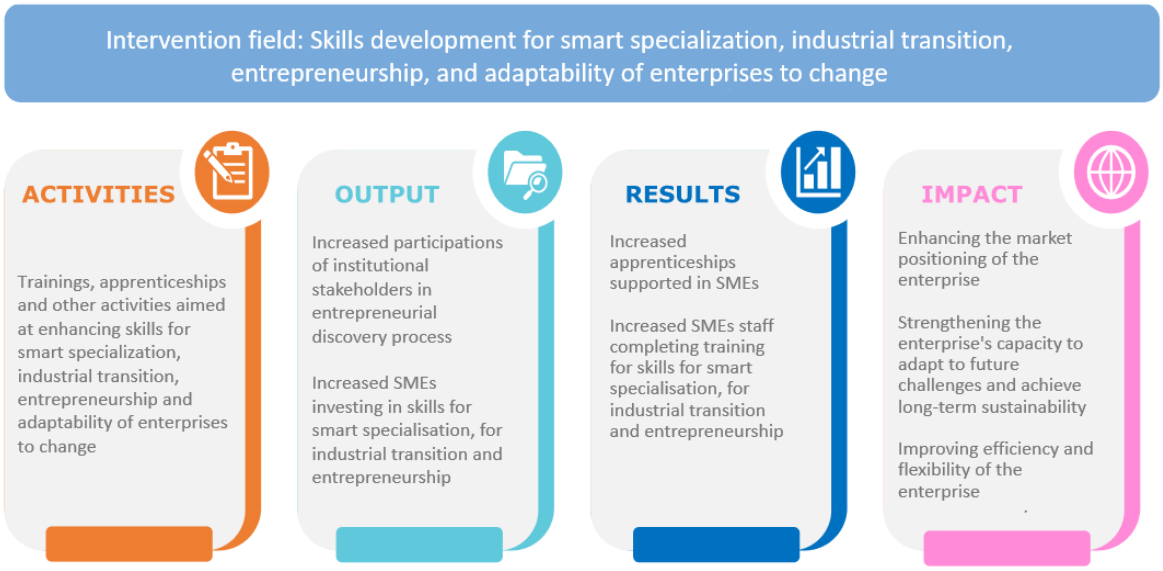
2.4.2.2 Result indicators considered for result-based tools

In this section, we discuss the potential result indicators considered for the development of FNLC solutions. After analysing the programmes within the specific intervention field and taking into account the European Parliament and Council's Regulation (EU) 2021/1060, it becomes evident that the activities conducted in this context primarily focus on training and apprenticeships. These activities aim to enhance the competencies of workers in various fields, such as smart specialisation, green transition, industrial transition, digital transition, upskilling, reskilling, collaboration and networking, and technology transfer. The objective is to cultivate a skilled workforce capable of capitalising on the opportunities arising from the dual green and digital transition within companies.

Figure 4 illustrates the intervention logic for the smart specialisation field, showcasing the expected outcomes and results of funded operations in the investment area under examination and focusing on operations related to skills for smart specialisation, industrial transition, entrepreneurship and adaptability of enterprises to change. The elaboration of outputs, results, and impacts listed in the figure is inspired by the European Parliament and Council's Regulation (EU) 2021/1058, which defines common indicators to assess each specific objective for the ERDF and the CF[45].

[45] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02021R1058-20210630&qid=1681300139712&from=en. Last access: 13 Apr 2023.

Figure 4. Skills development for smart specialisation, industrial transition, entrepreneurship, and adaptability of enterprises to change intervention logic



Source: Prepared by the study team based on Regulation (EU) 2021/1058.

When identifying indicators to serve as a possible basis for developing FNLC solutions, a valuable resource is the set of common indicators used by the European Regional Development Fund and the Cohesion Fund. These indicators are deemed relevant as they are grounded in the primary strategies of the European Union, also allowing for comparisons across different programmes and Member States.

The main source of the most recent information on common ERDF/CF result indicators is national agents, such as programme managing authorities. However, initial information about the indicators that are being tracked in the current period can be found in the dataset '2021-2027 Achievement Details'. The latter is available on the European Commission Cohesion Open Data Platform[46]. The dataset contains data on the indicators for measuring the performance of adopted 2021-2027 programmes, including information on both common and specific output and result measures. It currently provides information on the initially planned indicator values. However, from 2023 onwards, it is intended to also incorporate time-series information on targets, as well as cumulative amounts reported for decided and implemented values.

Based on the dataset mentioned above, we have identified the following result-based indicators that are being tracked by projects funded by ERDF/CF during the period of 2021-2027. These indicators were identified by filtering for programmes that financed projects under the specific objective RSO1.4, which focuses on skills for smart specialisation and transition.

1. Jobs created in supported entities (RCR 01);
2. Private investments matching public support (RCR 02);
3. Small and medium-sized enterprises (SMEs) introducing product or process innovation (RCR 03);

[46] Available at https://cohesiondata.ec.europa.eu/2021-2027-Indicators/2021-2027-Achievement-Details-multi-funds-/xi3a-zddk. Last access: 12 Apr 2023.

4. SMEs introducing marketing or organisational innovation (RCR 04);
5. Patent applications submitted (RCR 06);
6. New enterprises surviving in the market (RCR 17);
7. SMEs using incubator services after incubator creation (RCR 18);
8. Apprenticeships supported in SMEs (RCR 97);
9. SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship (RCR 98).

These nine indicators were assessed based on the following criteria:

Table 25. Criteria for feasibility assessment

CRITERIA	DESCRIPTION
Relevance	Relevance of the results indicator towards main EU strategies, based on desk research and consultation with Member States.
Robustness	Relates to the available data, its **completeness** and **comprehensiveness**. This presumes that all data points needed for calculations and establishing a particular FNLC are sufficiently covered in the data sample, whereas the latter provides a reasonable coverage of Member States. Incomplete data (i.e. provisional / estimated data or data gaps) are as dangerous as inaccurate data. Gaps in data lead to a partial view of the overall picture. Without a complete picture, FNLC may be calculated through uninformed actions.
Practicality & perversity	Relates to the administrative burden of the prospective arrangements for the audit trail and the documentation required to verify that results have been achieved and/or conditions have been met. Administrative burden level depends on the scope, detail and accessibility of evidence required to validate or invalidate the achievement of results. It also relates to the possibility of undesirable effects of the FNLC, risks of perverse incentives or unintended negative effects of applying the proposed FNLC solution (such as creaming / cherry-picking in the selection of participants or parking).

Source: prepared by the study team.

Regarding **relevance**, the two indicators that are most pertinent to operations typically funded in the field of 'skills for smart specialisation and transition' (as shown in Table 25) are:

- Apprenticeships supported in SMEs (RCR 97);
- SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship (RCR 98);

Regarding **robustness**, we analysed the use of the nine indicators at the individual Member State level. As evident from the following table, the two indicators that are most commonly employed are:

- SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship (RCR 98), which is being used by 14 Member States;
- Private investments matching public support (RCR 02) which is used by 7 Member States.

Table 26. Common ERDF/CF indicators in the area of skills for smart specialisation and transition

	RCR01	RCR02	RCR03	RCR04	RCR06	RCR17	RCR18	RCR97	RCR98
BE		x							x
CY									x
CZ	x	x					x		
DE									x
EE	x	x							x
EL							x		x
ES							x		
FR						x			x
HR									x
HU		x		x				x	x
IT			x		x				x
LT		x							x
LV		x						x	
MT		x							x
PL									x
PT									x
RO									x
SE								x	
SI		x							x
SK									x
Total	2	7	1	1	1	1	3	3	14

Source: Prepared by the study team, using the dataset '2021-2027 Achievement Detail'

Based on the analysis of the relevance and robustness, the indicator *SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship* (RCR 98) appears to be the most suitable to represent a possible basis for developing FNLC. The following table summarises the key characteristics of this indicator.

Table 27. Overview of selected indicator in the area of skills for smart specialisation and transition

INDICATOR CODE	INDICATOR NAME	MEASUREMENT UNIT	DEFINITION AND CONCEPTS	TIME MEASUREMENT ACHIEVED
RCR98	SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship (by type of skill: technical, management, entrepreneurship, green, other).	participants	Number of participants from SMEs (including micro enterprises) who complete training / activity for skills development for smart specialisation, for industrial transition and entrepreneurship. The types of skills include the following categories: - Technical skills: skills required for problem solving, design, operation, rethinking and maintenance of machinery or technological structures, IT professional skills; - Management skills: skills relating to business planning, complying with regulations and quality control, human resources planning, and allocation of resources; - Entrepreneurial skills: specific skills for start-up companies such as risk acceptance / management, strategic thinking and confidence, the ability to make personal networks, and the ability to deal with challenges and requirements of different nature; - Green skills: specific skills to modify products, services or operations due to climate change adjustments, environmental protection, circular economy, resource efficiency and requirements or regulations; - Other skills: skills other than the four types described above.	Upon completion of activity for skills development.

Source: Metadata of common ERDF/CF/JTF indicators[47].

With regard to the third criterion listed in Table 25, namely **practicality & perversity** it is important to underline that an FNLC-based *SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship* (RCR 98) should not be administratively burdensome, as access to information regarding the number of participants should be readily available upon request from Managing Authorities.

Perverse incentives such as creaming and cherry-picking should not be applicable to this indicator, as the achievement of the target is solely determined by the completion of activities for skills development. Nevertheless, there is a possibility that firms may be motivated to rapidly train a large number of employees, neglecting the effectiveness and relevance of the training. This can result in hastily executed

[47] Available at: https://cohesiondata.ec.europa.eu/2021-2027-Indicators/2021-2027-ERDF-CF-JTF-Common-Indicators/4t73-mihb. Last access: 16 May 2023.

or superficial training programmes that fail to adequately address the specific needs of the employees or equip them with the essential skills for improved job performance. The emphasis on quantity may overshadow the significance of delivering high-quality and impactful training.

2.4.2.3 Amounts linked to achievement of results

To establish financial amounts for the selected indicator, '**RCR98 – SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship'** the '**Continuing Vocational Training Survey (CVTS)**' carried out by Eurostat in a co-ordinated form in all the EU Member States was identified as potential suitable source of data.

The CVTS provides comparable data on 'vocational training within EU enterprises that have at least 10 or more employees and belong to specific economic activity groups'[1]. So far, six waves of the CVTS have been conducted in the following years: 1993, 1999, 2005, 2010, 2015, and 2020.

It is worth noting that the expression 'Continuing Vocational Training' (CVT) refers to training initiatives or actions that aim primarily to acquire new skills or enhance existing ones. These activities require financial contribution from the enterprises, covering at least a portion of the expenses, for their employees. Individuals who hold apprenticeship or training contracts should not be considered for Continuing Vocational Training and it is crucial that the training initiatives or activities in question are pre-planned, organised, or supported with the specific objective of learning[2]. Microenterprises were not included in the survey.

The survey covers various topics on the matter, including the provision of CVT courses and other forms of CVT (training / non-training enterprises), CVT strategies, participants in CVT courses, costs of CVT courses, time spent in CVT courses, characteristics of CVT courses, and assessment of CVT activities.

Based on the data collected through the survey, two databases were created, which could be used as reliable proxies to estimate the cost incurred by enterprises for training an individual:

- '**Cost of CVT courses by type and size class – cost per participant**'[48];
- '**Cost of CVT courses by type and size class – cost per person employed in enterprises providing CVT courses'**[49]**.**

The first database is the '**Cost of CVT courses by type and size class – cost per participant**'. This database provides an annual average cost per MS per participant for continued vocational training. It employs the same unit of measurement as the common result indicator, specifically the number of training participants. As a result, it can serve as a reliable proxy for the development of a scheme based on the **RCR98 indicator**.

The second database is the '**Cost of CVT courses by type and size class – cost per person employed in all enterprises.** It is worth noting that this database is not fully consistent with the definition of the indicator RCR98 presented in Table 27. It indeed presents data on the number of employees receiving training over a year, while RCR98 is based on the number of participants receiving training. In the indicator's logic, if a person participates in multiple training sessions, each participation is counted

[48] Database TRNG_CVT_19S, https://ec.europa.eu/eurostat/databrowser/view/TRNG_CVT_19S/default/table?lang=en&category=educ.educ_part.trng_cvt.trng_cvt_03

[49] Database TRNG_CVT_18S, https://ec.europa.eu/eurostat/databrowser/product/view/TRNG_CVT_18S?lang=en&category=educ.educ_part.trng_cvt.trng_cvt_03

separately, while in the database an employee participating in one or more training sessions is always counted as one. Therefore, this database can be used for the development of a different scheme based on the number of employees receiving trainings annually.

Box 4. Participant vs Employed

Participant

It refers to a unique instance of an individual worker's participation in a training course. If a worker participates in multiple courses, each instance of his / her participation is counted separately. This means that the participant count includes multiple entries for the same worker if they engage in multiple courses throughout the specified period (e.g. a year). Therefore, the participant count reflects the total number of participations by workers, including multiple instances by the same individuals.

Employed

Number of employees of a company who can have participated in one or more CVTs. According to this definition, if the same worker participates in multiple courses within a specified period, they are counted as one participant rather than being counted multiple times. This approach ensures that each employee is only counted once, regardless of the number of CVT courses they attend during the designated period.

Both databases cover the years 2005, 2010, 2015, and 2020, and the enterprises are categorised according to their size:

- From 10 to 49 persons employed;
- From 50 to 249 persons employed;
- 250 persons employed or more.

However, the data lack specific information regarding the types of courses and trainings included. Consequently, it is challenging to determine if all the training activities recorded in the data align with the activities covered by the desired result indicator. Access to microdata collected through the survey, which could be made available upon request, has the potential to address this limitation by providing more comprehensive details. In fact, the survey asked enterprises to identify the three most significant skills covered by the funded courses, including general IT skills, IT professional skills, management skills, team working skills, customer handling skills, problem-solving skills, office administration skills, foreign language skills, technical or job-specific skills, oral or written communication skills, numeracy or literacy skills, and other skills. If the data are available a selection can be made by focusing on IT and management skills to identify the training programmes that contributed the most to smart specialisation, industrial transition, and entrepreneurship.

It is worth mentioning that the databases offer information on various aspects related to the cost of CVT courses, including total course cost, direct costs, labour costs of participants, and net contributions to training funds.

Finally, both databases have two complementary databases available for consultation, which can provide additional details[50]. The data cover the years 2010, 2015, and 2020, and the enterprises providing CVT were classified using aggregation of NACE codes. In particular the enterprises are classified according to the following categories:

- Industry, excluding construction (NACE sections: B-E);
- Construction (NACE section F);
- Wholesale and retail trade, transport, accommodation, and food service activities (NACE sections: G-I);
- Information and communication; financial and insurance activities (NACE sections J and K);
- Real estate activities; professional, scientific and technical activities; administrative and support service activities; arts, entertainment and recreation; other service activities (NACE sections L-N, R and S).

However, the two databases do not provide classifications based on the size of the enterprises, which means that it is not feasible to determine the specific costs associated with SMEs. Instead, these databases can be used as an approximation or proxy to gain insights into the variations in training costs across different industries. This enables a more comprehensive analysis at the sector level, providing a broader understanding of the trends and patterns related to training expenses.

Table 28. Overview of potential data sources to establish financial amounts in the area of skills for smart specialisation and transition

POTENTIAL DATA SOURCE(S)	RELATED INDICATOR(S)	ADVANTAGES	LIMITATIONS
Cost of CVT courses by type and size class - cost per participant	SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship (RCR98).	Provide the average cost of an SME employee attending a training; Provides estimates for all EU countries; Possible to have access to microdata for further details; Detailed information on the costs are provided (e.g. direct cost, labour cost…).	No microenterprises included in the data; Do not allow access to info on the typology of training funded; Data are based on a survey carried out on a five-year basis and therefore not promptly updated.

[50] Database TRNG_CVT_19N2, https://ec.europa.eu/eurostat/databrowser/view/TRNG_CVT_19N2/default/table?lang=en&category=educ.educ_part.trng_cvt.trng_cvt_03v
Database TRNG_CVT_18N2, https://ec.europa.eu/eurostat/databrowser/view/TRNG_CVT_18N2/default/table?lang=en&category=educ.educ_part.trng_cvt.trng_cvt_03

POTENTIAL DATA SOURCE(S)	RELATED INDICATOR(S)	ADVANTAGES	LIMITATIONS
Cost of CVT courses by type and size class — cost per person employed in enterprises providing CVT courses	n. of employees being trained over a year.	Provide the average annual cost for an SME to train an employee; Provides estimates for all EU countries; Possible to have access to microdata for further details; Detailed information on the costs is provided (e.g. direct cost, labour cost…).	No microenterprises included in the data; Do not allow access to info on the typology of training funded; Data are based on a survey carried out on a five-year basis and therefore not punctually updated; It adopts a different unit of measurement than the common indicator RCR98.

2.4.2.4 Feasibility assessment

As established in earlier sections, the potential to develop an FNLC solution(s) was assessed in one intervention field related to sustainable smart specialisation sub-area: developing skills for smart specialisation, industrial transition and entrepreneurship. A total of 14 Member States support operations in the field, covering 98 % of programmes in the examined area.

Based on a preliminary analysis of the most frequently adopted indicators by the OPs under the sub-area of skills for smart specialisation and transition, along with the results of the desk research to identify potential data sources, two main options were identified.

The first option relies on the common result indicator '**RCR98 – SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship'** focusing on the expenses associated with an employee's participation to a training activity.

The second option relies instead on data provided by the database **Cost of CVT courses by type and size class cost per person employed in all enterprises** . Specifically, this option examines the average cost incurred by an SME to train an employee in one year. Based on these data, a scheme reimbursing on the basis of each employee trained in the given period of time could be potentially built. In this approach, the average cost incurred by an SME to train an employee within a one-year period is examined. By analysing these data, it becomes possible to establish a scheme that offers reimbursement based on the number of employees trained during a specific timeframe.

These approaches allow for a potential incentivisation mechanism, where SMEs are encouraged to invest in training their workforce by offering them financial support proportional to the number of employees they train.

The table below summarises the potential FNLC solutions identified by the research team for the development of skills for smart specialisation, industrial transition. For each solution, we provide the results to be achieved, indicator name, measurement unit, verification mechanism, key risks and potential data sources to establish financial amounts.

Table 29. Summary of potential FNLC solutions in the area of skills for smart specialisation and transition

	OPTION 1	OPTION 2
COMPONENT	**Developing skills for smart specialisation, industrial transition and entrepreneurship**	
Potential data sources	EUROSTAT database 'Cost of CVT courses by type and size class – cost per participant'.	EUROSTAT database 'Cost of CVT courses by type and size class – cost per person employed in enterprises providing CVT courses'.
Potential FNLC approach	Target-based approach based on the number of participants completing training.	Target-based approach based on the number of employees completing one or more trainings in one year.
Description of the operation type	Operation targeting the development of skills for smart specialisation, industrial transition, and entrepreneurship through the provision of training. It focuses on creating a skilled workforce that can seize opportunities from the green and digital transitions within businesses.	
Description of results to be achieved with a timeline	The release of funds is based on numbers of participants in training courses (for skills for smart specialisation, for industrial transition and entrepreneurship).	The release of funds is based on numbers of employees in training courses (for skills for smart specialisation, for industrial transition and entrepreneurship).
Indicator name	SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship (RCR98).	N. of employees trained.
Measurement unit	The measurement unit is 'participant'.	The measurement unit is 'employee'.
Verification mechanism	Documentation providing evidence of the number of participants, such as proof of course attendance. Documentation providing evidence of the employment status of the participants.	Documentation providing evidence of the number of employees trained, such as proof of course attendance. Documentation providing evidence of the employment status of the participants.
Key risks and measures to prevent them	Beneficiaries may choose to offer training courses of low	In the case under analysis, the main concern is the potential

	quality or courses that are not entirely relevant to the scope of the intervention field, with the intention of increasing the number of participations rather than the quality of the training. To mitigate such unintended consequences, it is beneficial to request information on the topics covered in the training. This helps in assessing the relevance and alignment of the training with the intervention field. By obtaining information about the training topics, it becomes possible to evaluate whether the courses align with the intended objectives and are in accordance with the desired outcomes of the intervention.	perverse incentive of providing a smaller number of trainings than what could be provided with the sum received from the programme. This incentive may arise when organisations choose to offer fewer training opportunities than their allocated budget allows, potentially limiting the reach and impact of the programme. To mitigate such unintended consequences, it is beneficial to request information on the number and duration of trainings. This helps in assessing the relevance and alignment of the training with the intervention field. By obtaining information about the training topics, it becomes possible to evaluate whether the courses align with the intended objectives and are in accordance with the desired outcomes of the intervention.

2.4.3. FC3: Climate change adaptation and risk prevention

In line with Article 5(1) of Regulation (EU) 2021/1060, the ERDF/CF will provide support for various objectives, including the aim to contribute to 'a greener, low-carbon transitioning towards a net zero carbon economy and resilient Europe by promoting clean and fair energy transition, green and blue investment, the circular economy, climate change mitigation and adaptation, risk prevention and management, and sustainable urban mobility' (Policy Objective 2).

This feasibility assessment focuses on one specific objective within Policy Objective 2, which is **promoting climate change adaptation, disaster risk prevention and resilience, taking into account ecosystem-based approaches** (RSO2.4).

The section is organised as follows. Firstly, we present the primary findings, providing detailed information on the operations under consideration for the result-based tools, along with potential indicators and data sources that could be utilised to determine the funding associated with achieving the desired results. Secondly, we provide an overview of the potential alternatives for the selected area, highlighting the most promising options.

2.4.3.1 Operations considered for result-based tools

The initial stage of the analysis carried out by the research team involved reviewing, classifying, and defining operations that were considered for result-based tools. To accomplish this, we examined the available information on 119 programmes scheduled for the period 2021-2027, spanning 21 Member States, funded by either the ERDF or the CF (according to the Dataset '2021-2027 Finances details' of the European Commission Cohesion Open Data Platform)[51]. Having conducted this review, it was observed that programmes falling under the sub-area of climate change adaptation and risk prevention were classified into 22 different intervention fields. Table 30 shows a list of the most common ones.

[51] Available at: https://cohesiondata.ec.europa.eu/2021-2027-Categorisation/2021-2027-Finances-details-categorisation-multi-fu/hgyj-gyin. Last access: 6 Apr 2023.

Table 30. Intervention fields in the area of climate change adaptation and risk prevention

	Adaptation to climate change measures and prevention and management of climate-related risks: floods and landslides	Adaptation to climate change measures and prevention and management of climate-related risks: fires	Adaptation to climate change measures and prevention and management of climate-related risks: others, e.g. storms and drought	Risk prevention and management of non-climate-related natural risks and risks linked to human activities	Water management and water resource conservation	Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure	Support to entities that provide services contributing to the low-carbon economy and to resilience to climate change, including awareness-raising measures	Other measures to reduce greenhouse gas emissions in the area of preservation and restoration of natural areas with high potential for carbon absorption and storage
BE			X		X			
BG	X	X						
CY	X	X						
CZ	X	X	X	X				
DE	X	X	X					X
EE	X	X	X		X	X		
EL	X	X	X	X				
ES	X	X	X	X	X	X	X	X
FI	X		X		X	X	X	
FR	X	X	X	X	X	X	X	X
HR	X	X	X	X		X		
HU	X	X	X	X	X			
IT	X	X	X	X				
LT	X	X	X	X				
LV	X	X	X					
PL	X	X	X	X		X	X	
PT	X	X	X	X	X		X	
RO	X	X	X	X	X			
SE	X	X	X	X				
SI	X	X	X					
SK	X	X	X	X				
Total	20	19	19	13	8	6	5	3

Source: Prepared by the study team, based on the dataset '2021-2027 Finances details'.

Note: Only fields covered by programmes in three or more Member States are included in the table.

In Box 5, we illustrate a potential intervention in climate change adaptation and risk prevention by presenting an example of a regional programme in Spain that covers five different intervention fields.

Box 5. Programme Galicia ERDF 2021-2027 (Spain)

The ERDF funds support investments in priority areas through regional and interregional programmes, which include investments in various areas, such as business competitiveness, sustainability, connectivity and social inclusion. Among these areas, one topic is the funding of initiatives aimed at adapting to climate change and implementing measures to enhance preparedness and response to manage high-priority risks such as floods, droughts, and fires. Below are some examples of operations covered within this domain in Programme Galicia:

- Actions to preserve water resources, their ecosystems and preparation, protection and response to floods, such as actions against the deterioration of the riverbanks and their ecosystems, actions to prepare, protect and respond to floods, protection and prevention of deterioration of wetlands and flood plains and restoration of fluvial continuity;
- Actions that contribute to mitigating this risk of more intense rainfall through the execution of works guaranteeing the safety of slopes and walls that prevent landslides;
- Preventive actions to reduce the risk derived from extreme weather events associated with climate change, reinforcing the preparation and response actions necessary to address the management of these risks comprehensively, such as providing the operational and technological equipment, facilities and infrastructures destined for the anticipation, prevention, planning and immediate response to natural risks, climatic phenomena and derived from human action;
- Measures aimed at increasing resilience to climate change, such as improving the early warning tools that currently exist for risks derived from climate change (e.g. climate observation systems and their effects, improvements in numerical models and data processing systems), development of sectoral risk assessment tools, collaboration with the local administration in the development and implementation of the adaptation measures, encouraging the dissemination of knowledge by promoting synergies of actions as well as promoting the training and awareness of Galician society in the face of the challenges of climate change through training and other types of initiatives;
- Acquisition of different integrated vehicles equipped with the necessary elements to carry out prevention actions against forest fires, as well as their employment as support vehicles for defence/extinction efforts.

Intervention fields covered by projects within the programme:

1. Adaptation to climate change measures and prevention and management of climate related risks: fires;
2. Adaptation to climate change measures and prevention and management of climate related risks: floods and landslides;
3. Adaptation to climate change measures and prevention and management of climate related risks: others, e.g. storms and drought;
4. Risk prevention and management of non climate related natural risks and risks linked to human activities;
5. Support to entities that provide services contributing to the low carbon economy and to resilience to climate change, including awareness-raising measures.

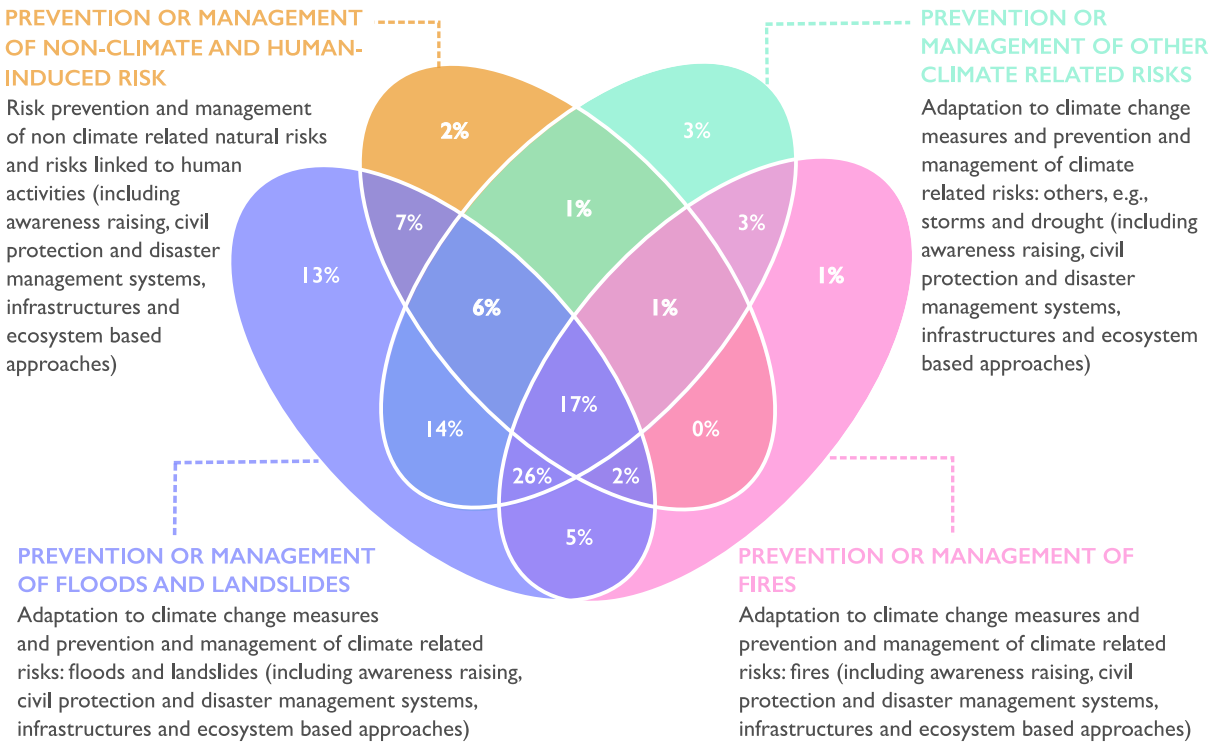
Source: Dataset '2021-2027 Finances details', complemented by official programme documentation[52].

[52] Available at: https://www.fondoseuropeos.hacienda.gob.es/sitios/dgfc/es-ES/ipr/fcp2020/P2127/PF/Documents/Programa_de_Galicia_FEDER_2021-2027.pdf and https://ec.europa.eu/regional_policy/in-your-country/programmes/2021-2027/es/2021es16rfpr014_en. Last access: 8 May 2023.

Having reviewed the compilation of intervention fields found in the list of 119 ongoing programmes mentioned above funded by the ERDF/CF, it becomes clear that projects in this domain can have a wide-ranging scope, encompassing operations across multiple fields of intervention simultaneously (as can be observed in the Spanish example). However, despite the diversity of intervention fields within the selected sub-area, a notable degree of overlap is also observed among the supported operations in the analysed programmes.

For example, when examining the overlap of the top intervention fields within the realm of climate change adaptation and risk prevention (Figure 5), it becomes evident that the most prevalent one is the **prevention and management of floods and landslides**, featured in 90 % of the programmes. Following closely, the second most prominent field is the **prevention and management of other climate-related risks**, such as storms and droughts, encompassing 71 % of the programmes. Ranking third, projects associated with the **prevention or management of fires** are included in 55 % of the programmes. Finally, the **prevention or management of non-climate and human-induced risks** is present in approximately one third of the programmes.

Figure 5. Overlap of intervention fields in the sub-area of climate change adaptation and risk prevention (Venn diagram)



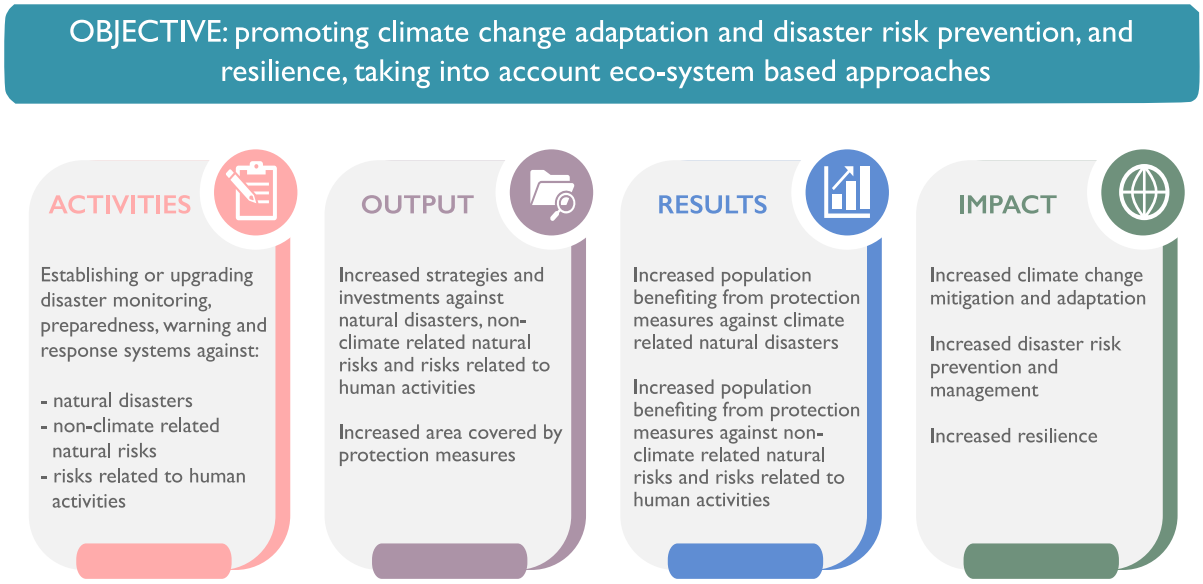
Source: Prepared by the study team, based on the dataset '2021-2027 Finances details'.

Considering the weight of these four intervention fields, the next sections of the present feasibility check will focus on potential FNLC(s) for investment in the **prevention or management of floods and landslides, fires, other climate-related risks and non-climate and human-induced risk.**

2.4.3.2 Result indicators considered for result-based tools

In this section, we provide a detailed explanation of the potential indicators that have been taken into account for the development of FNLC solutions. To illustrate the intervention logic for climate change adaptation and risk prevention, Figure 6 presents the outcomes and results of funded operations within the specific area of investment under examination. The focus is primarily on operations relating to the prevention or management of floods, landslides, fires, and other climate-related risks, as well as non-climate and human-induced risks. The outputs, results, and impacts depicted in the figure draw inspiration from Regulation (EU) 2021/1058 of the European Parliament and Council, which establishes common indicators for assessing each specific objective for the ERDF and the CF[53].

Figure 6. Climate change adaptation and risk prevention intervention logic



Source: Prepared by the study team based on Regulation (EU) 2021/1058.

The common indicators utilised by ERDF and the CF serve as valuable resources when selecting indicators for developing FNLC solutions. These indicators are particularly useful because they are aligned with the core strategies of the European Union, enabling comparisons across various programmes and Member States. By relying on these indicators, a consistent and standardised approach can be taken.

The primary source of up-to-date information regarding the common ERDF/CF result indicators is national agents, such as programme Managing Authorities. However, an initial glance at the indicators being tracked in the current period can be obtained from the dataset '2021-2027 Achievement Details', available on the European Commission Cohesion Open Data Platform[54]. This dataset contains information on the indicators used to measure the performance of adopted programmes for the period 2021-2027, such as common and specific output and result measures. Currently, the dataset provides information on the planned indicator values. However, starting from 2023, it is planned to incorporate

[53] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02021R1058-20210630&qid=1681300139712&from=en. Last access: 13 Apr 2023.
[54] Available at https://cohesiondata.ec.europa.eu/2021-2027-Indicators/2021-2027-Achievement-Details-multi-funds-/xi3a-zddk. Last access: 12 Apr 2023.

time-series information on targets, as well as cumulative amounts reported for decided and implemented values.

Based on the above-mentioned dataset, we identified the following result-based indicators being tracked during the 2021-2027 period by projects funded by ERDF/CF in climate change adaptation and risk prevention:

- Estimated greenhouse emissions (RCR29);
- Jobs created in supported entities (RCR01);
- Population benefiting from flood protection measures (RCR35);
- Population benefiting from protection measures against climate-related natural disaster (other than flood and wildfires) (RCR37);
- Population benefiting from protection measures against non-climate-related natural risks and risks related to human activities (RCR96);
- Population benefiting from wildfire protection measures (RCR36);
- Population having access to new or improved green infrastructure (RCR95);
- Users of new and upgraded public digital services, products and processes (RCR11);
- Visitors of cultural and tourism sites supported (RCR77);

Table 31 shows the number of Member States tracking each indicator mentioned above. It can be seen that the most used common indicators in the current period for programmes related to climate change adaptation and risk prevention are: **population benefiting from flood protection measures** (RCR35), which is being tracked by 20 Member States; **population benefiting from protection measures against climate-related natural disaster (other than flood and wildfires)** (RCR37), which is tracked by 16 Member States; **population benefiting from wildfire protection measures** (RCR36), tracked by 14 Member States; and **population benefiting from protection measures against non-climate-related natural risks and risks related to human activities** (RCR96), tracked by 9 Member States. Table 32 shows an overview of these indicators.

Table 31. Common ERDF/CF indicators in the area of climate change adaptation and risk prevention

	RCR35	RCR37	RCR36	RCR96	RCR95	RCR01	RCR11	RCR29	RCR77
BE	X	X							
BG	X		X						
CY	X		X						
CZ	X	X							
DE	X	X				X			
EE	X		X	X					
EL	X	X	X	X					
ES	X	X	X	X	X				
FI						X			
FR	X	X		X					
HR	X	X	X	X					
HU	X	X			X				
IT	X	X	X	X			X		X
LT	X	X	X	X					

	RCR35	RCR37	RCR36	RCR96	RCR95	RCR01	RCR11	RCR29	RCR77
LV	X				X		X	X	
PL	X	X	X	X	X				
PT	X	X	X	X					
RO	X	X	X						
SE	X	X	X						
SI	X	X	X						
SK	X	X	X						
TOTAL	20	16	14	9	4	2	2	1	1

Source: Prepared by the study team, using the dataset "2021-2027 Achievement Details".

Table 32. Overview of most common indicators in the area of climate change adaptation and risk prevention

CODE	INDICATOR NAME	MEASUREMENT UNIT	DEFINITION AND CONCEPTS	TIME MEASUREMENT ACHIEVED
RCR35	Population benefiting from flood protection measures	persons	Population living in areas where protection infrastructure (including also green infrastructure for adaptation to climate change) is built or significantly upgraded in order to reduce vulnerability to flood risks. The indicator counts the resident population at risk of flooding.	Upon completion of output in the supported project
RCR36	Population benefiting from wildfire protection measures	persons	Population living in areas exposed to wildfire risks and where vulnerability to wildfires decreases as a result of the supported projects. The indicator covers protection measures which are clearly localised in high-risk areas and which directly address wildfires risks, as opposed to more general measures implemented at national or regional level.	Upon completion of output in the supported project
RCR37	Population benefiting from protection measures against climate-related natural disaster (other than flood and wildfires)	persons	Population living in areas exposed to climate-related natural risks, other than floods and wildfires (storms, droughts, heatwaves), and where vulnerability to such risks decreases as a result of the supported projects. The indicator covers protection measures, areas at risk and which directly address the specific risks, as opposed to more general measures implemented at national or regional level.	Upon completion of output in the supported project
RCR96	Population benefiting from protection measures against non-climate-related natural risks and risks related to human activities	persons	Population living in areas exposed to non-climate-related natural risks and risks related to human activities, and where vulnerability to such risks decreases as a result of the supported projects. The indicator covers protection measures which are clearly localised in high-risk areas and which directly address the specific risks, as opposed to more general measures implemented at national or regional level.	Upon completion of output in the supported project

Source: Metadata of common ERDF/CF/JTF indicators[55].

[55] Available at: https://cohesiondata.ec.europa.eu/2021-2027-Indicators/2021-2027-ERDF-CF-JTF-Common-Indicators/4t73-mihb. Last access: 13 Apr 2023.

After conducting desk research, we evaluated each of the chosen result-based indicators according to the criteria outlined in Table 33. Our assessment of these indicators can be found in Table 34.

Table 33. Criteria for feasibility assessment

CRITERIA	DESCRIPTION
Relevance	Relevance of the results indicator towards main EU strategies, based on desk research and/or consultation with Member States.
Robustness	Relates to the available data, its completeness and comprehensiveness. This presumes that all data points needed for calculations and establishment of a particular FNLC are sufficiently covered in the data sample, whereas the latter provides a reasonable coverage of Member States. Incomplete data (i.e. provisional / estimated data or data gaps) are as dangerous as inaccurate data. Gaps in data lead to a partial view of the overall picture. Without a complete picture, FNLC may be calculated through uninformed actions.
Practicality & perversity	Relates to the administrative burden of the prospective arrangements for the audit trail and the documentation required to verify that results have been achieved and/or conditions were met. Administrative burden level depends on the scope, detail and accessibility of evidence required to validate or invalidate the achievement of results. It also relates to the possibility of undesirable effects of the FNLC, risks of perverse incentives or unintended negative effects of applying the proposed FNLC solution (such as creaming / cherry-picking in the selection of participants or parking).

Source: Prepared by the study team.

Table 34. Assessment of selected indicators in the area of climate change adaptation and risk prevention

CRITERIA	DESCRIPTION
Relevance	These common ERDF/CF indicators are overall relevant, as they are rooted in the main EU strategies, being directly related to the area of climate change adaptation and risk prevention. More precisely: • **population benefiting from flood protection measures** is related to the intervention field of prevention and management of floods and landslides; • **population benefiting from wildfire protection measures** is related to the intervention field of prevention or management of fires; • **population benefiting from protection measures against climate-related natural disaster (other than flood and wildfires)** is related to the intervention field of prevention and management of other climate-related risks;

CRITERIA	DESCRIPTION
	• **population benefiting from protection measures against non-climate-related natural risks and risks related to human activities** is related to the intervention field of prevention or management of non-climate and human-induced risks.
Robustness	Based on desk research and information available on programmes being implemented in the 2021-27 period and on information on indicators in the area of climate change adaptation and risk prevention provided by 21 Member States the result-based indicators on: • **population benefiting from flood protection measures** is tracked by 20 Member States in the current period, indicating high comprehensiveness of the indicator; • **population benefiting from wildfire protection measures** is tracked by 14 Member States in the current period, indicating high comprehensiveness of the indicator; • **population benefiting from protection measures against climate-related natural disaster (other than flood and wildfires)** is tracked by 16 Member States in the current period, indicating high comprehensiveness of the indicator; • **population benefiting from protection measures against non-climate-related natural risks and risks related to human activities** is tracked by 9 Member States in the current period, indicating moderate comprehensiveness of the indicator. At the moment, the study team does not have access to the collected data from countries in order to verify its completeness / quality. The information will be fact-checked after further consultations with the Member States.
Practicality & perversity	An FNLC based on population benefiting from protection measures should not be administratively burdensome, as data on population living in areas benefited by the projects should be easily accessible through statistical agencies and/or local authorities. Perverse incentives such as creaming and cherry-picking are reduced for the four indicators, but still present. Beneficiaries might, for instance, choose to implement projects in more populated areas to receive a larger outcome-based payment, therefore neglecting less populated areas that could potentially be more prone to disasters. There is also a risk that beneficiaries focus more on increasing the coverage of the project (i.e. increasing population covered) than the quality of the service provided. Additionally, the pressure to deliver results may also cause the beneficiaries to downplay certain risks or exclude them from the project scope, potentially leaving gaps in the effectiveness of the operations. To address these aforementioned perverse incentives, conducting a thorough evaluation of potential risks and establishing quality assurance mechanisms can be useful. These measures are, however, advisory and thus do not require inclusion in the audit trail within a potential EU-Level FNLC scheme but could be potentially implemented at the programme level in due course.

Source: Prepared by the study team.

2.4.3.3 Amounts linked to achievement of results

Concerning establishing financial amounts for the selected indicators, the study team revised three potential data sources.

One possible way to assign financial values to the indicators presented earlier is by using a disaster damage database. Using these databases allows us to estimate the economic viability of investments made to reduce losses (Mazhin et al., 2021)[56]. One example of such data source is the **Emergency Events Database (EM-DAT)**[57], a global source of information on natural and technological disasters, which covers over 20 000 disasters worldwide that occurred since 1900. The dataset is maintained by the Centre for Research on the Epidemiology of Disasters at the School of Public Health of the Université Catholique de Louvain in Belgium. It is considered the primary source of epidemiological information about disasters, combining, in a uniform format, information from various sources, including UN agencies, non-governmental organisations, insurance companies, research institutes, and press agencies (Mazhin et al., 2021).

The EM-DAT can be useful in assigning financial values to the indicators discussed previously as it provides geographical, temporal, human and economic information on disasters at the country level. Among other variables, it records data on the date of the disaster, the number of deaths and people affected by the disaster, as well as the estimated economic impacts, e.g. the value of all damages and economic losses directly or indirectly related to the disaster (in US dollars). It also distinguishes between disaster groups (natural and technological) and disaster types, such as drought, earthquake, epidemic, extreme temperature, flood, glacial lake outburst, industrial accident, landslide, miscellaneous accident, storm, transport accident, volcanic activity and wildfire.

The dataset is frequently referenced, as it is an active and well-known data source for the assessment of disaster management (Mazhin et al., 2021), being also the only disaster database with global coverage that is publicly accessible (Jones et al., 2022)[58]. One of its main advantages is that it is internally updated daily, with publicly accessible information updated every 3 months (after validation and cross-checking of the data).

However, despite having information on recorded disasters in most EU countries, it has a significant limitation – data gaps – thus requiring the use of statistical techniques to manage the missing data and avoid biases in estimations (Jones et al., 2022). Another disadvantage is that the disaster threshold imposed by the dataset ignores the potential effects of high-frequency and low-intensity types of disasters (Mazhin et al., 2021). That is because in order to be recorded, disasters must meet at least one of the following criteria: 1) at least 10 fatalities; 2) at least 100 affected individuals; 3) a declaration of a state of emergency; or 4) a request for international assistance. Additionally, a downside of using a disaster damage database to determine financial values based on avoidance costs is the random occurrence of disasters, which necessitates the selection of equivalent events for the purpose of comparison between countries. Even considering its limitations, this dataset has the potential to be used as a source to establish financial amounts, especially if it is used in combination with other sources of data on natural disasters[59].

Another potential source to establish financial amounts identified by the study team is the indicator '**climate-related economic losses by type of event**' (cli_iad_loss)[60], disseminated by the Eurostat using

[56] Mazhin, S. A., Farrokhi, M., Noroozi, M., Roudini, J., Hosseini, S. A., Motlagh, M. E., ... & Khankeh, H. (2021). Worldwide disaster loss and damage databases: A systematic review. *Journal of education and health promotion*, *10*. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8552254/pdf/JEHP-10-329.pdf

[57] Available at: https://public.emdat.be. Last access: 3 Mai 2023.

[58] Jones, R. L., Guha-Sapir, D., & Tubeuf, S. (2022). Human and economic impacts of natural disasters: can we trust the global data?. *Scientific data*, *9*(1), 572. https://www.nature.com/articles/s41597-022-01667-x

[59] Alternative databases that could be considered as sources to complement the data from the EM-DAT are the Natural Catastrophe Services (NatCatSERVICE) and the SIGMA (Swiss Re). However, given that these databases are not publicly available, the study team did not have access to the data in order to evaluate its quality.

[60] Available at: https://ec.europa.eu/eurostat/databrowser/view/CLI_IAD_LOSS__custom_6201561/default/table?lang=en. Last access: 15 Mai 2023.

information from the European Environment Agency (EEA). It measures the economic losses from weather and climate-related events, such as meteorological (storms), hydrological (floods, mass movements) and climatological (heatwaves, cold waves, droughts, forest fires). Total losses are shown as million euros and in euros per inhabitant, while losses by type of hazard (i.e. meteorological, hydrological, and climatological) are displayed as million euro for the EU-27. In addition to the annual figures, a time-series based on 30-year moving average is also presented. The indicator is based on data from CATDAT of RiskLayer, a proprietary historical catastrophe loss database, which is not publicly accessible and was provided to the EEA under an institutional agreement.

An advantage of this dataset is that data are updated every year and adjusted to account for inflation (currently, values are presented in 2020 constant prices). In addition, the dataset is very comprehensive, with information on most EU countries. However, the drawback of using this dataset remains the same as previously mentioned regarding the EM-DAT. It is challenging to establish a direct correlation between the interventions carried out within the ERDF/CF projects and the seemingly random occurrence of disasters. Additionally, the Eurostat dataset lacks comprehensive information on events that would facilitate the identification of comparable disasters and the ability to analyse events of the same type separately and by different countries. Consequently, while we consider this dataset useful as a supplementary source for weather and climate-related indicators, without having access to their source data (i.e. the CATDAT by RiskLayer) we cannot rely on it as the only information source for determining financial amounts associated with the indicators outlined in the previous section.

As an alternative to financial data retrieved from disaster databases, financial amounts could also be established by either extrapolating data from specific Member States to other countries or using their strategy as inspiration. In that regard, one experience from Croatia can be cited, (see Box 6.). The experience from Croatia is selected as it is related to the most prevalent intervention field within the realm of climate change adaptation and risk prevention for ERDF/CF funds, i.e. prevention and management of floods and landslides, featured in 90 % of the analysed programmes. It also relates to the most common indicator being tracked in the area under examination, i.e. population benefiting from flood protection measures (RCR35), which is being tracked by 20 Member States.

Box 6. Croatia's National Recovery and Resilience Plan

Croatia's National Recovery and Resilience Plan (NRRP) was submitted to the European Commission on May 2021 under the Recovery and Resilience Facility (RRF) funds. The plan, estimated to cost more than EUR 6000 million, has two main objectives: 1) reflect the need to ensure Croatia's socio-economic recovery and long-term development post-Covid-19; 2) rebuild the areas damaged by the two earthquakes that happened in 2020. The plan's overall structure consists of five components and one initiative, each to be executed through a mix of 222 measures expected to be implemented through the successful completion of 166 milestones and 206 targets[61],[62].

Within its investments, the plan covers a **Disaster Risk Reduction Programme** that aims to enhance measures for protecting against floods, specifically focusing on nature-based solutions. This involves revitalising watercourses, connecting abandoned sleeves and creating secondary wetland habitats, as well as removing invasive species. The programme comprises two main sub-measures. The first is a flood risk reduction programme, which concentrates on mitigating flood risks in the largest Croatian rivers of the Danube River basin. It involves constructing defensive embankments incorporating broad inundation areas along watercourses, aligning with nature-based solutions and the principle of 'give space to rivers'. The second component focuses on revitalising freshwater systems, including the restoration and preservation of the Mirna River area, Vransko Lake, and Trakoscan Lake. Additionally, it aims to remove invasive species within the protected Neretva Delta region[63].

The Disaster Risk Reduction Programme has a **budget of EUR 157.7 million** and, among its targets, aims to have at least **20 000 residents benefiting from improved flood protection measures by 2026**, i.e. a budget of EUR **7 885 per benefited resident**[64].

Table 35 provides an overview of the potential data sources discussed in this section.

[61] Available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733580/EPRS_BRI(2022)733580_EN.pdf. Last access: 15 May 2023.

[62] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021SC0197&from=EN. Last access: 15 May 2023.

[63] Available at: https://commission.europa.eu/system/files/2021-07/com-2021-401_annexe_en.pdf. Last access: 15 May 2023.

[64] The value of euros per benefited resident is calculated by dividing the total budget for the Disaster Risk Reduction Programme (€ 157.7 million by the selected target (20 000 benefited residents). However, it is important to note that, to receive the total amount in the Croatian case, other targets should also be met in addition to the number of residents benefiting from improved flood protection measures. They are: achieving at least 20 works contracts concluded for projects in the flood protection sector; at least 13 km of flood protective structures built in order to protect against the harmful effects of water; at least 2 km of restored watercourses including revitalisation of abandoned sleeves, permanent river and sleeve contact and investment in related infrastructure; at least 65 km of flood protective structures built in order to protect against the harmful effects of water; at least 16 km of restored watercourses including revitalisation of abandoned sleeves, permanent river and sleeve contact and investment in related infrastructure; and at least 77 km of flood protective structures built in order to protect against the harmful effects of water.

Table 35. Overview of potential data sources to establish financial amounts in the area of climate change adaptation and risk prevention

POTENTIAL DATA SOURCE(S)	RELATED INDICATOR(S)	ADVANTAGES	LIMITATIONS	METHODS TO ADJUST THE AMOUNTS
Emergency Events Database (EM-DAT)	Population benefiting from flood protection measures; Population benefiting from wildfire protection measures; Population benefiting from protection measures against climate-related natural disaster (other than flood and wildfires); Population benefiting from protection measures against non-climate-related natural risks and risks related to human activities.	Very frequent updates; Information at the country level; Uniform and comparable data; Publicly available.	Data gaps; Necessity to select comparable events in order to account for the seemingly random occurrence of disasters.	For each disaster, the registered figure corresponds to the damage value at the moment of the event. The database, however, also presents values adjusted to current values in US dollars (in thousands) calculated using a consumer price index. These values should be converted to euro by applying the prevailing exchange rates.
Climate-related economic losses by type of event (Eurostat, cli_iad_loss)	Population benefiting from flood protection measures; Population benefiting from wildfire protection measures; Population benefiting from protection measures against climate-related natural disaster (other than flood and wildfires);	Yearly updates; Information at the country level.	Disaggregation at the country level is only possible when looking at total economic losses caused by all types of disasters (meteorological + hydrological, + climatological); Lack of information that would allow selecting comparable events to account for the seemingly random occurrence of disasters.	Data are updated every year and is adjusted to account for inflation (currently, values are presented in 2020 constant prices). All monetary figures are presented in Euro.

POTENTIAL DATA SOURCE(S)	RELATED INDICATOR(S)	ADVANTAGES	LIMITATIONS	METHODS TO ADJUST THE AMOUNTS
Croatia's National Recovery and Resilience Plan	Population benefiting from flood protection measures.	Financial values are calculated based on concrete experience with result-based financing.	Only one data point; Necessity to extrapolate data for all Member States based on information from one country.	After extrapolation of values to other Member States, they can be updated using relevant price index figures from Eurostat (unit value for Member State X * index for Member State X), such as the Harmonised Index of Consumer Prices (annual average rate of change) and/or the Labour Cost Index (percentage change compared to previous year) in the relevant areas.

Source: Prepared by the study team.

2.4.3.4 Feasibility assessment

As established in earlier sections, the potential to develop an FNLC solution(s) was assessed in the intervention fields related to prevention and management of climate and non-climate-related risks, such as floods and landslides, fires, storms and droughts, as well as human-induced risks. Together, these four intervention fields are present in all projects related to climate change adaptation and risk prevention, with the prevention and management of floods and landslides the most common, present in 90 % of the programmes evaluated by the study team.

Table 36 summarises the potential FNLC solutions identified by the research team for the area under examination. For each solution, we also provide a description of operation types, results to be achieved, indicator name, measurement unit, verification mechanism, key risks and potential data sources to establish financial amounts.

Table 36. Summary of potential FNLC solutions in the area of climate change adaptation and risk prevention

COMPONENT	DESCRIPTION			
	PREVENTION / MANAGEMENT OF FLOODS AND LANDSLIDES	**PREVENTION / MANAGEMENT OF FIRES**	**PREVENTION / MANAGEMENT OF OTHER CLIMATE-RELATED RISKS**	**PREVENTION / MANAGEMENT OF NON-CLIMATE AND HUMAN-INDUCED RISKS**
Potential FNLC approach	Target-based approach based on the number of people benefiting from flood protection measures.	Target-based approach based on the number of people benefiting from wildfire protection measures.	Target-based approach based on the number of people benefiting from protection measures against climate-related natural disaster (other than flood and wildfires).	Target-based approach based on the number of people benefiting from protection measures against non-climate-related natural risks and risks related to human activities.
Description of the operation type	Operations targeting areas where protection infrastructure (including also green infrastructure for adaptation to climate change) is built or significantly upgraded in order to reduce vulnerability to flood risks as a result of the supported projects.	Operations targeting areas exposed to wildfire risks and where vulnerability to wildfires decreases as a result of the supported projects.	Operations targeting areas exposed to climate-related natural risks, other than floods and wildfires (storms, droughts, heatwaves), and where vulnerability to such risks decreases as a result of the supported projects.	Operations targeting areas exposed to non-climate-related natural risks and risks related to human activities, and where vulnerability to such risks decreases as a result of the supported projects.
Description of results to be achieved with a timeline	The release of funds is linked to achieving the following outcome: verified number of people benefiting from the specific protection measures (i.e. flood, wildfire, non-climate etc.) as a result of supported projects. As an example, the release of funds could be contingent upon reaching a specific number of people within a designated timeframe, such as in the example of Croatia's National Recovery and Resilience Plan, which had a programme focused on measures for protecting against floods that aimed to have 20 000 residents benefiting from improved flood protection measures by 2026. It is worth noting that although certain milestones could be established, the study team currently does not have any specific recommendations regarding the most optimum milestones and timeframe that would balance the simplification and financial sustainability aspects of the proposed FNLC solution. Our intention is to engage in discussions with Member States during the upcoming workshop in order to evaluate the possibility of developing more concrete and tangible proposals.			
Indicator name	Number of people benefiting from flood protection measures as a	Number of people benefiting from wildfire protection	Number of people benefiting from protection measures against climate-related natural disaster (other	Number of people benefiting from protection measures against non-climate-related natural risks and risks related

COMPONENT	DESCRIPTION			
	PREVENTION / MANAGEMENT OF FLOODS AND LANDSLIDES	**PREVENTION / MANAGEMENT OF FIRES**	**PREVENTION / MANAGEMENT OF OTHER CLIMATE-RELATED RISKS**	**PREVENTION / MANAGEMENT OF NON-CLIMATE AND HUMAN-INDUCED RISKS**
	result of the supported projects.	measures as a result of the supported projects.	than flood and wildfires) as a result of the supported projects.	to human activities as a result of the supported projects.
Measurement unit	Number of persons			
Verification mechanism	Document justifying how the target(s) was satisfactorily fulfilled, with appropriate links to the evidence, such as the list of protection measures undertaken and a documentary evidence that verifies the population for which the service is provided.			
Key risks and measures to prevent them	Perverse incentives such as creaming and cherry-picking are reduced, but still present as beneficiaries might, for instance, choose to implement projects in more populated areas to receive a larger outcome-based payment, neglecting less populated areas that could potentially be more prone to disasters. There is also a risk that beneficiaries focus more on increasing the coverage of the project than the quality of the service provided. Additionally, the pressure to deliver results may also cause the beneficiary to downplay certain risks or exclude them from the project scope, potentially leaving gaps in the effectiveness of the operations. To address these perverse incentives, conducting a thorough evaluation of potential risks and establishing quality assurance mechanisms can be useful. These measures are, however, advisory and thus do not require inclusion in the audit trail within a potential EU-Level FNLC scheme but could be potentially implemented at the programme level in due course.			
Potential data sources to establish financial amounts	Emergency events databases, such as the EM-DAT, can be useful in assigning financial values to the indicators discussed previously, as they provide economic information on disasters at the country level. Among other variables, it records data on the value of all damages and economic losses directly or indirectly related to the disaster, which can be useful for an FNLC based on avoidance costs. Supplementary information can come from Eurostat through the indicator 'climate-related economic losses by type of event'. To reduce the data gaps and triangulate with the available data, it would be beneficial to get access to other similar databases, such as the CATDAT, the NatCatSERVICE and the SIGMA. However, given that these last proprietary databases are not available for public consultation, the study team did not have access to the data in order to evaluate its quality. Alternatively, amounts could be assigned based on country examples, such as the case of Croatia's National Recovery and Resilience Plan, which had its budget released upon the completion of a set of predefined targets (among them achieving a specific number of people benefiting from flood protection measures).			

Source: prepared by the study team.

3. Conclusions

The operationalisation of methodology for EU-level SCOs and result-based tools was not a linear, but rather an iterative process. This means that the presented steps of the methodology were deeply intertwined with each other and helped facilitate the outputs from each respective part of the methodological process. As the study team has anticipated from the beginning, the process of developing EU-level SCOs and result-based tools was also mainly a data-driven exercise. Because of this, the methodological approach had to provide ample flexibility to extract the highest possible quality of data from a large sample of Member States. To achieve such results, the implementation of the proposed methodology had to be interrupted at times to reiterate and take corrective actions in our approach, such as to consider potential merging of different areas of the study in order to acquire a larger sample of data to be used for SCO calculations. Certain design elements of EU-level SCOs have also been subject to corrective actions because of the ongoing feedback loops from DG REGIO, Transnational Network of ERDF/CF SCO practitioners, MAs and IBs from Member States and other Commission stakeholders such as DG ENER. Overall, these were pivotal when adjusting the methodological process accordingly and accommodating any underlying issues which might stem from the data collection process or the design of the proposed SCOs.

For the development of EU-level SCOs, the study team prioritised the development of SCOs which reimburse Member States based on delivery of outputs and direct results (e.g. decrease in CO_2 emissions in SMEs or public and housing sector), as opposed to input-based SCOs (e.g. hourly costs of direct research staff). This was a conscious decision made to increase the simplification effect of the developed SCOs, as documents such as timesheets which are a necessity under input-based SCOs are not required under arrangements which reimburse an output or result indicator.

In Area 1, the EU-level SCOs proposed by the study come in the form of a **unit cost for decreasing annual GHG emissions by one ton of CO_2** for both sub-areas. According to historical data, such an indicator was used across both analysed sub-areas more often than any other indicator of intervention outputs or results tracked by the Member States. Its versatility and suitability for all three types of intervention made it a logical choice for an EU-level SCO in Area 1. The proposed SCO offers a single unit cost rate per Member State. Member States still retain flexibility in choosing the activities they intend to carry out in their projects. However, the expenditure for these projects will be reimbursed through the single SCO rate, regardless of the type or number of eligible activities implemented in the intervention. The audit trail for this SCO would be limited to verifying the results achieved by the Member State (via an Energy Performance Certificate). The solution avoids potential perverse incentives such as overcompensation, as Member States will intrinsically achieve lesser results if they opt to implement fewer eligible activities. The implementation of a single SCO rate will also reduce the administrative burden that would be associated with having to select different modules for each project and also avoid the inconsistencies of being reimbursed different amounts depending on the types of activities selected for the intervention. According to consulted stakeholders, interventions implemented across the Member States are heterogenous, which means that streamlining/standardisation attempts would reduce the attractiveness of the EU-level SCO. Therefore, the flexibility offered by the suggested approach is an appropriate representation of the needs of Member States.

As regards sub-area 2A, the selection of options was heavily influenced both by the availability of sufficient quality data and the possibility to establish tangible definitions for SCOs in order for them to be achievable. The EU-level SCOs proposed in this sub-area is a **unit cost for one month of gross new working position (that did not exist before) to directly perform R&D activities in the SME**. From the policy perspective, the proposed

option should help fulfil objectives set out by 'Smarter Europe' such as increasing partnership between private / public research institutions and SMEs. Another added value proposition of this SCO is that it utilises a direct result indicator i.e. job creation as the result of knowledge exchange projects between SMEs and research institutions. The SCO also utilises a common ERDF/CF output indicator – this should enable easier monitoring of achieved outcomes and thus allow for the SCO to be more widely used.

In sub-area 2B, the proposed EU-level SCO considers a **lump sum to cover the cost of one innovation voucher issued to an SME for completing innovation / digitisation activities**. The collected sample of projects in innovative start-up projects in environmental technology or digital products was very small. Therefore, we also took into account data on vouchers for creating and improving any kind of innovative products in supported projects. In the case of innovation vouchers, however, there are underlying differences in how the Member States perceive and approach actual R&I activities. Accordingly, the cost of similar services (in terms of activities carried out) may differ significantly across the Member States. To that end, an outlier analysis was carried out to avoid setting rates which do not comply with the socioeconomic logic in terms of the overall economic development and price level differences. A standardised lump sum should be a significant boost to promoting further SME growth in the area of innovation. Furthermore, a lump sum offers maximum simplification in that all costs of the operation are covered. The proposed SCO option also leaves the possibility for private co-funding by the SME.

For sub-area 2C, the study team proposed **not developing an SCO based on either historical data and/or alternative sources.** While most Member States have provided historical data for this sub-area, the data collected were very heterogeneous in terms of supported activities, cost categories and outputs. As such, the data were not comparable across the Member States. An EU-level SCO merged with other sub-areas was considered. The study team explored the possibility of utilising the collected historical data by merging it with historical data from sub-areas 2A and 2B. Upon reviewing the available data, the study team discovered that merging data with other sub-areas was largely not feasible. The data provided in 2C covered a very large number of activities and outputs but did not have many overlaps with other sub-areas. However, this yielded limited results. In addition to that, merging such data on a larger scale would have increased the risk of inaccurate values since Member States implemented different activities and incurred different costs in these sub-areas.

In sub-area 3A, the proposed EU-Level SCOs considers a **lump sum to cover the cost of one SME attending a single international event** (such as a trade fair, international conference, or partnership exchange). Although limited possibilities were foreseen by the study team to develop alternative calculation options, efforts were made to develop separate lump sums for EU and extra-EU events. However, due to the restricted availability of event-specific information on the location and the results of the statistical analysis, this option had to be excluded. This standardised lump sum has the potential to significantly increase SME participation in fairs since it offers maximum simplification, covering all costs of the operation and allowing for an easy audit trail to be adopted.

For sub-area 3B, the study team proposed **a lump sum to cover the costs of an SME seeking consultancy or advisory services to develop an internationalisation strategy**. Since this refers to projects characterised by a limited budget, the proposed EU-level SCOs have the potential to significantly reduce administrative burden for both SMEs and MA, thereby facilitating and encouraging the implementation of the operation. It is worth highlighting that the minimal requirements provided in the audit trail allow greater flexibility and optimise the adoption of the scheme. To ensure the achievement of high-quality results, it is important to carefully select valuable projects and provide detailed information in the call for proposals about the expected results. In addition, in this case the SCO cover all the eligible cost of the operation offering maximum simplification.

The study has also assessed the feasibility of developing EU-level result-based tools (i.e. FNLC) in three areas. The first area is **sustainable multimodal urban mobility**, more specifically in cycling infrastructure, clean urban transport rolling stock, and clean urban transport infrastructure. After compiling a list of result-based indicators monitored by projects funded by ERDF/CF in the selected investment area for the 2021-2027 period, we have identified three specific indicators (i.e. annual users of dedicated cycling infrastructure, annual users of new or modernised public transport and annual users of new or modernised tram and metro lines). These indicators are being tracked by Member States in the current period and are aligned with key EU strategies. Furthermore, they are directly relevant to the area under investigation and offer the potential for a target-based approach based on the number of new users of a new or modernised mode of transport. Regarding the potential data sources to establish financial amounts, the study team identified four sources, where the most viable was the publication 'Handbook on the external costs of transport'.

The second feasibility check was carried out in the area of **skills for smart specialisation and transition**, more specifically the assessment focused on the intervention field related to skills development for smart specialisation, industrial transition, entrepreneurship, and adaptability of enterprises to change. Preliminary desk research showed that the activities conducted in this context mainly consist of training and apprenticeships aimed at enhancing worker competences across different fields. It also emerged from the analysis that the result indicator 'SMEs staff completing training for skills for smart specialisation, for industrial transition and entrepreneurship' (RCR98), is the most adopted by MS in the current programming period to monitor these types of activities To establish financial amounts for the potential FNLC scheme, the study team identified the 'Continuing Vocational Training Survey (CVTS)' conducted by Eurostat in all EU Member States as a potential data source. Utilising data from this survey, two target-based approaches were considered: one based on the number of participants completing training in an SME linked to the RCR98 indicator, and the other one based on the number of employees completing one or more trainings in a given year.

We also assessed the feasibility of developing FNLC in the area of **climate change adaptation and risk prevention**. By focusing on the prevention or management of floods and landslides, fires, other climate-related risks and non-climate and human-induced risk, we were able to identify four common indicators currently tracked by Member States. They are: population benefiting from flood protection measures; population benefiting from protection measures against climate-related natural disasters (other than flood and wildfires); population benefiting from wildfire protection measures; and population benefiting from protection measures against non-climate-related natural risks and risks related to human activities. Emergency events databases, such as the EM-DAT, were considered useful in assigning financial values to the indicators in the area, providing data that can be useful for the development of an FNLC based on avoidance costs. Alternatively, amounts could be assigned inspired by Croatia's National Recovery and Resilience Plan, which had its budget released upon the completion of a set of predefined targets (among them achieving a specific number of people benefiting from flood protection measures).

Annex 1. Historical data collected from the Member States

This annex contains the historical data collected from Member States, the subsequent calculations which were conducted based on historical data and statistical inferences extrapolations. It is submitted alongside the Final Study Report as separate MS Excel files for Areas 1-3.

Annex 2. Operational Programmes sampled for historical data collected

Table 37. Data collection process for Area 1

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
AT	Investments in Growth and Employment - AT - ERDF	Responded - data collection in progress
BE	Flanders - ERDF	Data submitted to Core Team
BE	Brussels - ERDF	Data submitted to Core Team
BG	Regions in Growth - BG - ERDF	Data submitted to Core Team
BG	Innovations and Competitiveness - BG - ERDF	Data submitted to Core Team
CY	Competitiveness and sustainable development - CY - ERDF/CF	Data submitted to Core Team
CZ	Integrated Regional Programme - CZ - ERDF	Data submitted to Core Team
CZ	Environment - CZ - ERDF/CF	Data submitted to Core Team
DE	Bremen - ERDF	Data submitted to Core Team
DE	Rheinland-Pfalz - ERDF	Data submitted to Core Team
DE	Sachsen - ERDF	Data submitted to Core Team
DE	Mecklenburg-Vorpommern - ERDF	Data submitted to Core Team
DE	Baden-Württemberg - ERDF	Data submitted to Core Team
DE	Schleswig-Holstein - ERDF	Data submitted to Core Team
DK	Innovation and Sustainable Growth in Businesses - DK - ERDF	Data submitted to Core Team
EE	Cohesion Policy Funding - EE - ERDF/ESF/CF	Responded - data collection in progress
ES	Canarias - ERDF	Responded - data collection in progress
ES	Galicia - ERDF	Data submitted to Core Team
ES	Extremadura - ERDF	Not responded, will not provide data
ES	Andalucía - ERDF	Data submitted to Core Team
ES	Madrid - ERDF	Data submitted to Core Team

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
ES	Melilla - ERDF	Data submitted to Core Team
ES	Castilla y León - ERDF	Data submitted to Core Team
FI	Sustainable growth and jobs 2014-2020 - Structural Funds Programme of Finland [FI]	Responded, will not provide data
FR	Provence-Alpes-Côte d'Azur - ERDF/ESF/YEI	Data submitted to Core Team
FR	Nord-Pas de Calais - ERDF/ESF/YEI	Data submitted to Core Team
FR	Aquitaine - ERDF/ESF/YEI	Data submitted to Core Team
FR	Guadeloupe - ERDF/ESF/YEI	Data submitted to Core Team
FR	Limousin - ERDF/ESF	Data submitted to Core Team
FR	Lorraine et Vosges - ERDF/ESF/YEI	Data submitted to Core Team
FR	Champagne-Ardenne - ERDF/ESF/YEI	Data submitted to Core Team
FR	Martinique - ERDF/ESF/YEI	Responded - data collection in progress
FR	Picardie - ERDF/ESF/YEI	Data submitted to Core Team
FR	Réunion – ERDF	Data submitted to Core Team
FR	Languedoc-Roussillon - ERDF/ESF/YEI	Data submitted to Core Team
GR	Epirus - ERDF/ESF	Data submitted to Core Team
GR	Pelonnesus - ERDF/ESF	Data submitted to Core Team
GR	Crete - ERDF/ESF	Data submitted to Core Team
GR	Thessaly - ERDF/ESF	Data submitted to Core Team
GR	Competitiveness Entrepreneurship and Innovation - GR - ERDF/ESF	Data submitted to Core Team
HR	Competitiveness and Cohesion - HR - ERDF/CF	Data submitted to Core Team
HU	Economic Development and Innovation Programme - HU - ERDF/ESF/YEI	Data submitted to Core Team
HU	Competitive Central-Hungary - ERDF/ESF	Data submitted to Core Team
IE	Border Midland and Western Regional - ERDF	Data submitted to Core Team
IE	Southern & Eastern Regional Operational Programmel - ERDF	Data submitted to Core Team
IT	Lazio - ERDF	Data submitted to Core Team
IT	Toscana - ERDF	Responded - data collection in progress
IT	Friuli-Venezia Giulia - ERDF	Data submitted to Core Team
IT	Molise - ERDF/ESF	Data submitted to Core Team
IT	Puglia - ERDF/ESF	Data submitted to Core Team
IT	Abruzzo - ERDF	Data submitted to Core Team

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
IT	Liguria - ERDF	Data submitted to Core Team
IT	Veneto - ERDF	Data submitted to Core Team
IT	Valle d'Aosta - ERDF	Data submitted to Core Team
LT	EU Structural Funds Investments - LT - ERDF/ESF/CF/YEI	Data submitted to Core Team
LU	Luxembourg - ERDF	Data submitted to Core Team
LV	Growth and Employment - LV - ERDF/ESF/CF/YEI	Data submitted to Core Team
MT	Fostering a competitive and sustainable economy - MT - ERDF/CF	Data submitted to Core Team
NL	West Netherlands - ERDF	Responded, will not provide data
PL	Podkarpackie Voivodeship - ERDF/ESF	Responded, will not provide data
PL	Lubuskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Dolnośląskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Opolskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Lubelskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Wielkolskie Voivodeship - ERDF/ESF	Responded
PL	Zachodniomorskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Mazowieckie Voivodeship - ERDF/ESF	Data submitted to Core Team
PT	Norte - ERDF/ESF	Data submitted to Core Team
PT	Azores - ERDF/ESF	Data submitted to Core Team
RO	Integrated Regional Programme - RO - ERDF	Data submitted to Core Team
SE	South Sweden - ERDF	Data submitted to Core Team
SE	East-Central Sweden - ERDF	Data submitted to Core Team
SI	EU Cohesion Policy - SI - ERDF/ESF/CF/YEI	Data submitted to Core Team
SK	Quality of Environment - SK - ERDF/CF	Data submitted to Core Team
Additional OPs		
CZ	Prague Growth Pole	Data submitted to Core Team
HU	Territorial and Urban Development Operative Program	Data submitted to Core Team
HU	Environment and Energy Efficiency Operational Programme	Data submitted to Core Team
PL	Malopolskie Voivodeship	Data submitted to Core Team
PL	Pomorskie Voivodeship	Data submitted to Core Team
PT	Seur	Data submitted to Core Team
FR	Alsace	Data submitted to Core Team

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
FR	Poitou-Charentes	Data submitted to Core Team

Source: prepared by the study team.
Note: The initial sample of OPs selected for historical data collection was updated in the process to include eight additional OPs. It was done to mitigate the risk of insufficient data in countries where responses to our inquiries were slow or even absent.

Table 38. Data collection process for Area 2

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
AT	Investments in Growth and Employment - AT - ERDF	Responded - data collection in progress
BE	Flanders - ERDF	Data submitted to Core Team
BE	Brussels - ERDF	Data submitted to Core Team
BG	Innovations and Competitiveness - BG - ERDF	Data submitted to Core Team
CY	Competitiveness and sustainable development - CY - ERDF/CF	Data submitted to Core Team
CZ	Enterprise and Innovation for Competitiveness - CZ - ERDF	Data submitted to Core Team
CZ	Research Development and Education - CZ - ESF/ERDF	Data submitted to Core Team
DE	Bremen - ERDF	Data submitted to Core Team
DE	Rheinland-Pfalz - ERDF	Data submitted to Core Team
DE	Sachsen - ERDF	Data submitted to Core Team
DE	Mecklenburg-Vorpommern - ERDF	Data submitted to Core Team
DE	Baden-Württemberg - ERDF	Responded - no relevant data available
DE	Schleswig-Holstein - ERDF	Data submitted to Core Team
DE	Hamburg - ERDF	Data submitted to Core Team
DK	Innovation and Sustainable Growth in Businesses - DK - ERDF	Data submitted to Core Team
EE	Cohesion Policy Funding - EE - ERDF/ESF/CF	Data submitted to Core Team
ES	Canarias - ERDF	Not responded
ES	Galicia - ERDF	Data submitted to Core Team
ES	Extremadura - ERDF	Responded - No relevant interventions funded
ES	Andalucía - ERDF	Not responded
ES	Madrid - ERDF	Responded - data collection in progress

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
ES	Melilla - ERDF	Responded - No relevant interventions funded
ES	Castilla y León - ERDF	Responded - No relevant interventions funded
FI	Sustainable growth and jobs 2014-2020 - Structural Funds Programme of Finland [FI]	Data submitted to Core Team
FR	Provence-Alpes-Côte d'Azur - ERDF/ESF/YEI	Data submitted to Core Team
FR	Nord-Pas de Calais - ERDF/ESF/YEI	Responded - data collection in progress
FR	Aquitaine - ERDF/ESF/YEI (Nouvelle-Aquitaine)	Data submitted to Core Team
FR	Guadeloupe - ERDF/ESF/YEI	Data submitted to Core Team
FR	Limousin - ERDF/ESF (Nouvelle-Aquitaine)	Data submitted to Core Team
FR	Lorraine et Vosges - ERDF/ESF/YEI (Grand Este)	Responded - No relevant interventions funded
FR	Champagne-Ardenne - ERDF/ESF/YEI (Grand Este)	Data submitted to Core Team
FR	Réunion – ERDF	Data submitted to Core Team
FR	Languedoc-Roussillon - ERDF/ESF/YEI (Occitanie)	Data submitted to Core Team
GR	Epirus - ERDF/ESF	Data submitted to Core Team
GR	Competitiveness Entrepreneurship and Innovation - GR - ERDF/ESF	Data submitted to Core Team
HR	Competitiveness and Cohesion - HR - ERDF/CF	Data submitted to Core Team
HU	Economic Development and Innovation Programme - HU - ERDF/ESF/YEI	Data submitted to Core Team
HU	Competitive Central-Hungary - ERDF/ESF	Data submitted to Core Team
IE	Border Midland and Western Regional - ERDF	Not responded
IE	Southern & Eastern Regional Operational Programmel - ERDF	Data submitted to Core Team
IT	Lazio - ERDF	Responded - data collection in progress
IT	Toscana - ERDF	Data submitted to Core Team
IT	Friuli-Venezia Giulia - ERDF	Responded - data collection in progress
IT	Molise - ERDF/ESF	They cannot manage to provide us data
IT	Puglia - ERDF/ESF	Data submitted to Core Team
IT	Abruzzo – ERDF	Not responded
IT	Liguria - ERDF	Data submitted to Core Team

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
IT	Veneto - ERDF	Data submitted to Core Team
IT	Valle d'Aosta - ERDF	Data submitted to Core Team
LT	EU Structural Funds Investments - LT - ERDF/ESF/CF/YEI	Data submitted to Core Team
LU	Luxembourg - ERDF	Data submitted to Core Team
LV	Growth and Employment - LV - ERDF/ESF/CF/YEI	Data submitted to Core Team
MT	Fostering a competitive and sustainable economy - MT - ERDF/CF	Data submitted to Core Team
NL	South Netherlands- ERDF	Responded - data collection only in September possible
PL	Podkarpackie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Lubuskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Dolnośląskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Opolskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Lubelskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Wielkolskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Zachodniomorskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Mazowieckie Voivodeship - ERDF/ESF	Data submitted to Core Team
PT	Norte - ERDF/ESF	Data submitted to Core Team
PT	Azores - ERDF/ESF	Data submitted to Core Team
RO	Competitiveness Programme - RO - ERDF	Data submitted to Core Team
RO	Regional OP	Data submitted to Core Team
SE	South Sweden - ERDF	Data submitted to Core Team
SI	EU Cohesion Policy - SI - ERDF/ESF/CF/YEI	Data submitted to Core Team
SK	Integrated Infrastructure - SK - ERDF/CF	Data submitted to Core Team
ADDITIONAL OPS		
FR	Midi-Pyrénées (Occitanie)	Data submitted to Core Team
FR	Poitou-Charentes (Nouvelle-Aquitaine)	Data submitted to Core Team

Source: prepared by the study team.

Table 39. Data collection progress for Area 3

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
AT	Investments in Growth and Employment - AT - ERDF	Data submitted to Core Team

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
BE	Flanders - ERDF	Data submitted to Core Team
BE	Brussels - ERDF	Responded - no relevant data available
BG	Innovations and Competitiveness - BG - ERDF	Data submitted to Core Team
CY	Competitiveness and sustainable development - CY - ERDF/CF	Responded - no relevant data available
CZ	Enterprise and Innovation for Competitiveness - CZ - ERDF	Data submitted to Core Team
CZ	Research Development and Education - CZ - ESF/ERDF	Data submitted to Core Team
DE	Bremen - ERDF	Responded - no relevant data available
DE	Rheinland-Pfalz - ERDF	Responded - no relevant data available
DE	Sachsen - ERDF	Data submitted to Core Team
DE	Mecklenburg-Vorpommern - ERDF	Data submitted to Core Team
DE	Baden-Württemberg - ERDF	Responded - no relevant data available
DE	Schleswig-Holstein - ERDF	Responded - no relevant data available
DK	Innovation and Sustainable Growth in Businesses - DK - ERDF	Data submitted to Core Team
EE	Cohesion Policy Funding - EE - ERDF/ESF/CF	Data submitted to Core Team
ES	Canarias - ERDF	Responded - no relevant data available
ES	Galicia - ERDF	Data submitted to Core Team
ES	Extremadura - ERDF	Responded - no relevant data available
ES	Andalucía - ERDF	Not possible to provide data
ES	Madrid - ERDF	Not possible to provide data
ES	Melilla - ERDF	Responded - no relevant data available
ES	Castilla y León - ERDF	Data submitted to Core Team
ES	Multiregional OP for Spain ERDF 2014-20	Data submitted to Core Team
FI	Sustainable growth and jobs 2014-2020 - Structural Funds Programme of Finland [FI]	Data submitted to Core Team
FR	Provence-Alpes-Côte d'Azur - ERDF/ESF/YEI	Responded - no relevant data available
FR	Nord-Pas de Calais - ERDF/ESF/YEI (Hauts-de-France)	Not possible to provide data

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
FR	Aquitaine - ERDF/ESF/YEI (Nouvelle-Aquitaine)	Responded - no relevant data available
FR	Guadeloupe - ERDF/ESF/YEI	No relevant interventions funded
FR	Limousin - ERDF/ESF (Nouvelle-Aquitaine)	Responded - no relevant data available
FR	Lorraine et Vosges - ERDF/ESF/YEI (Grand Este)	Data submitted to Core Team
FR	Champagne-Ardenne - ERDF/ESF/YEI (Grand Este)	Responded - no relevant data available
FR	Alsace (Grand Este)	Data submitted to Core Team
FR	Martinique - ERDF/ESF/YEI	Not possible to provide data
FR	Picardie - ERDF/ESF/YEI (Hauts-de-France)	Not possible to provide data
FR	Réunion – ERDF	Data submitted to Core Team
FR	Languedoc-Roussillon - ERDF/ESF/YEI (Occitanie)	Responded - No relevant interventions funded
GR	Epirus - ERDF/ESF	Responded - no relevant data available
GR	Pelonnesus - ERDF/ESF	Responded - no relevant data available
GR	Crete - ERDF/ESF	Responded - no relevant data available
GR	Thessaly - ERDF/ESF	Responded - no relevant data available
GR	Competitiveness Entrepreneurship and Innovation - GR - ERDF/ESF	Data submitted to Core Team
HR	Competitiveness and Cohesion - HR - ERDF/CF	Data submitted to Core Team
HU	Economic Development and Innovation Programme - HU - ERDF/ESF/YEI	Data submitted to Core Team
HU	Competitive Central-Hungary - ERDF/ESF	Responded - no relevant data available
IE	Border Midland and Western Regional - ERDF	Responded - no relevant data available
IE	Southern & Eastern Regional Operational Programme - ERDF	Responded - no relevant data available
IT	Lazio - ERDF	Not possible to provide data
IT	Toscana - ERDF	Data submitted to Core Team
IT	Friuli-Venezia Giulia - ERDF	Not possible to provide data

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
IT	Molise - ERDF/ESF	Responded - no relevant data available
IT	Puglia - ERDF/ESF	Data submitted to Core Team
IT	Abruzzo - ERDF	Not possible to provide data
IT	Liguria - ERDF	Responded - no relevant data available
IT	Veneto - ERDF	Data submitted to Core Team
IT	Valle d'Aosta - ERDF	Responded - no relevant data available
LT	EU Structural Funds Investments - LT - ERDF/ESF/CF/YEI	Data submitted to Core Team
LU	Luxembourg - ERDF	Responded - no relevant data available
LV	Growth and Employment - LV - ERDF/ESF/CF/YEI	Data submitted to Core Team
MT	Fostering a competitive and sustainable economy - MT - ERDF/CF	Data submitted to Core Team
NL	South Netherlands - ERDF	Responded – no relevant data available
PL	Podkarpackie Voivodeship - ERDF/ESF	Responded - no relevant data available
PL	Lubuskie Voivodeship - ERDF/ESF	Responded - no relevant data available
PL	Dolnośląskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Opolskie Voivodeship - ERDF/ESF	Responded - no relevant data available
PL	Lubelskie Voivodeship - ERDF/ESF	Responded - no relevant data available
PL	Wielkolskie Voivodeship - ERDF/ESF	Responded - no relevant data available
PL	Zachodniomorskie Voivodeship - ERDF/ESF	Data submitted to Core Team
PL	Mazowieckie Voivodeship - ERDF/ESF	Responded - no relevant data available
PL	Slaskie Voivodeship	Data submitted to Core Team
PL	Malopolskie Voivodeship	Data submitted to Core Team
PT	Norte - ERDF/ESF	Data submitted to Core Team
PT	Azores - ERDF/ESF	Responded – not relevant data available
PT	Centro	Data submitted to Core Team

MEMBER STATE	OPERATIONAL PROGRAMME	STATUS
PT	Algarve	Data submitted to Core Team
PT	Lisboa	Data submitted to Core Team
PT	Alentejo	Data submitted to Core Team
PT	Competitiveness and Internationalisation OP	Data submitted to Core Team
RO	Integrated Regional Programme - RO - ERDF	Responded - no relevant data available
RO	Regional OP	Not possible to provide data
SE	South Sweden - ERDF	Data submitted to Core Team
SE	East-Central Sweden - ERDF	Responded - no relevant data available
SI	EU Cohesion Policy - SI - ERDF/ESF/CF/YEI	Data submitted to Core Team
SK	Integrated Infrastructure - SK - ERDF/CF	Responded - cannot provide the requested data detail

Source: prepared by the study team.

Annex 3. Data quality assessment of Areas 1, 2 and 3

The assessment of historical data involves checking the following data points due to their necessity for the EU-level SCO development process, namely:

- ***information on activities*** supported in implemented projects: these data are important for comparing the interventions supported by the Member State over time and across different Member States;
- ***data on costs*** incurred in implemented projects, broken down by activity and by category of costs: these data are important for attribution of incurred costs, determination of a standard set of cost items included in the definition of a SCO, identification of outlier cases, elimination of gaps in the cost breakdown data, etc.;
- ***data on outputs and results*** delivered in implemented projects: these data are important for estimation and attribution of the monetary value to indicators used when developing SCOs, especially standard scales of unit costs.

We also present the alternative sources which have been explored in order to aid the development of EU-level SCOs.

Energy Efficiency & Renewable Energy

Data collected from Member States

As far as the availability of the collected data are concerned, Table 40 offers a complete overview of the information gathered at the level of the three sub-areas analysed in this report. It indicates the number of OPs and projects / calls for proposals for which relevant data were provided in each Member State:

- Sub-area 1A (energy efficiency and renewable energy measures in SMEs – EE-RES SMEs): data on 26 OPs (46 % of sampled OPs) from 15 Member States were made available to the study team, which amounts to 429 records on specific projects or calls for proposals.
- Sub-area 1B.1 (energy efficiency and renewable energy measures in housing sector – EE-RES Housing): data on 33 OPs (58 % of sampled OPs) from 16 Member States were collected, which amounts to 893 records referring to either specific projects or calls for proposals.
- Sub-area 1B.2 (energy efficiency and renewable energy measures in non-residential buildings – EE-RES non-residential): data on 36 OPs (63 % of sampled OPs) were provided by 15 Member States, which amounts to 1972 records on specific projects or calls for proposals.

Please note that some figures on recorded projects / calls for proposals may be inflated by inclusion of smaller projects, as is evident in the case of Croatian projects.

Table 40. Overview of data coverage per sub-area in Area 1

	EE-RES SMES		EE-RES HOUSING		EE-RES NON-RESIDENTIAL	
MS	**N. OP**	**N. PROJECT/CALL**	**N. OP**	**N.PROJ/CALL**	**N. OP**	**N.PROJ/CALL**
AT						
BE	1	4	1	7	1	1
BG	1	1	1	17	1	19
CY			1	1		
CZ			1	3		
DE	5	10			4	756
DK	1	19				
EE						
ES	1	79			2	57
FI						
FR	5	59	12	212	7	112
GR			1	3		
HR	1	194	1	585	1	871
HU	1	1	2	2	2	3
IE			2	7		
IT	2	25			3	11
LT	1	7	1	1		
LU			1	2	1	10
LV	1	1	1	1	1	2
MT			1	1	1	4
NL						
PL	3	19	6	27	7	89
PT	1	3	1	23	3	32
RO			1	1	1	1
SE	1	1				
SI	1	6				
SK					1	4

Source: prepared by the study team.

Quality-wise, we checked if all key data points necessary for the SCO development were provided in the requested format. The key issue of the collected data is that it lacked a detailed breakdown into specific activities and cost categories: data providers often indicated which categories of costs were covered under the specific activities, but in most cases were unable to provide a breakdown of amounts spent in each category.

Another important limitation of these data was the inconsistency or variety of supported activities across analysed Member States, even within the same sub-area. Building on this observation, we compiled an

overview of supported activities for each Member State, facilitating a comparison of the scope of activities across countries and selection of the most relevant activities for each of the three sub-areas.

The historical data on outputs or results of implemented projects has shown that ERDF output indicators had the widest coverage of implementation in Member States and was therefore shortlisted for further development.

Most of the historical data were provided at the level of individual projects: 91 % of records for sub-area 1A, 95 % for sub-area 1B.1, and 94 % for sub-area 1B.2 were available at this level of granularity. Only 7 % of records were available at the level of calls for proposals in the case for sub-area 1A, while the same could be said for 3 % of records in sub-area 1B.1 and 4 % of records in sub-area 1B.2. For the remaining 2 % of records in each sub-area, the level of granularity could not be clearly identified because either it was not specified, or the data were provided at various levels of detail.

Only a small portion of the cost data provided to the study relate to ongoing projects: 17 % in sub-area 1A, 7 % in sub-area 1B.1, and 6 % in sub-area 1B.2. Instead, 81 % of records in sub-area 1A, 89 % in sub-area 1B.1, and 90 % in sub-area 1B.2 refer to completed projects. In 3 % of available records for sub-area 1A and 4 % of both sub-areas 1B.1 and 1B.2 it was not possible to clearly define the progress level of selected projects due to unclear or incomplete information.

Most of the projects / calls for proposals were implemented during the last 3 years, i.e. in the period 2019-2021. In some of the cases, however, the reference period was unspecified – the historical data in question refer to the entire programming period of 2014-2020.

Typologies of activities according to collected data

Based on the analysis of the qualitative information gathered in **sub-area 1A**, at least 3 Member States implemented (almost) the full set of activities identified in the DCF (see Table 41). Activities funded in other Member States at least to some degree seemed to overlap with this typology. However, compared to Germany, Italy or Poland, countries such as Belgium, Bulgaria, Denmark or Sweden funded a significantly narrower sub-set of activities.

The most common / most frequently overlapping activities funded in most of the analysed Member States were the following:

- advice consultancy to SME owners on energy efficiency and potential for renewable energy;
- energy audits to identify, quantify and report existing energy consumption profiles;
- installation of photovoltaic system in SMEs.

In the case of Croatia, authorities responsible for the Competitiveness and Cohesion OP were not able to provide disaggregated information on the typology of activities supported in sub-area 1A. However, from the analysis of the eligibility rules of the relevant calls for which data were provided it emerged that all the activities included in the list could potentially be funded under this OP.

In **sub-area 1B.1**, only Greece and Poland funded all activities[65] identified in the DCF (see Table 42). Belgium, Bulgaria, Latvia, Lithuania, Luxembourg, and Malta implemented projects where only a small sub-set of these

[65] Information on activities funded in Croatia, like in sub-area 1A, is limited. However, based on the analysis of the eligibility rules of the relevant calls for proposals, all activities listed in the DCF were eligible in implemented projects.

activities were funded. Other Member States covered a wider range of activities more akin to activities funded in Greece and Poland.

Despite the observed variation in typologies, a significant number of mapped activities seemed to overlap at least to some degree in projects implemented in the analysed Member States. The most common / most frequently overlapping activities were as follows:

- energy audits for buildings;
- replacement of window frames / glass / moving of fixed shading systems;
- upgrade of thermal insulation (walls, roofs, ceiling, etc.);
- installation of new high efficiency or upgrade of existing heating/cooling systems (including based on RES);
- installation of hot water system with the use of RES;
- installation of renewable electricity unit;
- consultancy service for preparing the necessary technical studies / reports as well as monitoring the implementation of the interventions.

In **sub-area 1B.2**, the analysis revealed that all activities included in the DCF (see Table 43) were implemented by Germany, Poland and Portugal. A few other Member States funded a slightly smaller sub-set of activities. Belgium, Bulgaria, and Croatia, on the other hand, implemented much smaller projects where only one or two activities were funded.

Overall, based on the available data, the most common / most frequently overlapping activities in sub-area 1B.2 were largely identical to activities funded in sub-area 1B.1:

- energy audits for buildings;
- replacement of window frames / glass / moving of fixed shading systems;
- upgrade of thermal insulation (walls, roofs, ceiling, etc.);
- installation of new high efficiency or upgrade of existing heating/cooling systems (including based on RES);
- installation of hot water system with the use of RES;
- installation of renewable electricity unit;
- smart management systems;
- consultancy service for preparing the necessary technical studies/reports as well as monitoring the implementation of the interventions.

Table 41. Typologies of activities supported in sub-area 1A

Member State	Advice consultancy to SME owners on energy efficiency and potential for renewable energy	Energy audits to identify, quantify and report existing energy consumption profiles	Replacement of window frames/glass/fixed shading systems in SMEs	Upgrade of thermal insulation in SMEs	Upgrade of heating/cooling systems (including based on RES) in SMEs	Installation of hot water system with the use of RES in SMEs	Installation of photovoltaic system in SMEs	Installation of biomass energy system in SMEs	Energy storage systems in SMEs	Smart management systems in SMEs	Consultancy service for the preparation of the necessary technical studies/reports as well as monitoring of the implementation of the interventions in SMEs	Energy efficiency upgrade of production equipment for groups of SMEs
BE	x	x										
BG		x									x	
DE	x		x	x	x	x	x	x	x	x		x
DK	x											
ES		x			x							x
FR				x	x		x	x				x
HR	x	x	x	x	x	x	x	x	x	x	x	x
HU			x	x	x	x	x	x				
IT	x	x	x	x	x	x	x	x	x	x	x	x
LT	x	x					x					
LV		x									x	
PL		x	x	x	x	x	x	x	x	x	x	x
PT	x	x					x					x
SE	x											
SI							x	x				

Source: prepared by the study team.

Table 42. Typologies of activities supported in sub-area 1B.1

Member State	Energy audits for buildings	Replacement of window frames/glass/moving of fixed shading systems	Upgrade of thermal insulation (walls, roofs, ceiling, etc.)	Installation of new high efficiency or upgrade of existing heating/cooling systems (including based on RES)	Installation of hot water system with the use of RES	Installation of renewable electricity unit	Installation of biomass energy system	Energy storage systems	Smart management systems	Consultancy service for the preparation of the necessary technical studies/reports as well as monitoring of the implementation of the interventions
BE		x	x	x		x				
BG	x									x
CY		x	x	x	x					x
CZ		x	x	x	x	x	x	x		
FR	x	x	x	x	x	x	x			x
GR		x	x	x	x	x	x	x	x	x
HR	x	x	x	x	x	x	x	x	x	x
HU		x	x	x	x	x	x			
IE										
LT	x						x			x
LU	x									
LV	x									x
MT						x				
PL	x	x	x	x	x	x	x	x	x	x
PT	x	x	x	x	x	x				x
RO	x	x	x							x

Source: prepared by the study team.

Table 43. Typologies of activities supported in sub-area 1B.2

Member State	Energy audits for buildings	Replacement of window frames/glass/moving of fixed shading systems	Upgrade of thermal insulation (walls, roofs, ceiling, etc.)	Installation of new high efficiency or upgrade of existing heating/cooling systems (including based on RES)	Installation of hot water system with the use of RES	Installation of renewable electricity unit	Installation of biomass energy system	Energy storage systems	Smart management systems	Consultancy service for the preparation of the necessary technical studies/reports as well as monitoring of the implementation of the interventions
SK	x	x	x	x	x	x	x	x	x	
BE				x						
BG	x									x
DE	x	x	x	x	x	x	x	x	x	x
ES	x	x	x	x		x		x	x	x
FR	x	x	x	x		x				x
HR							x			
HU	x	x	x	x	x	x	x		x	x
IT	x	x	x	x	x	x	x		x	x
LU	x		x		x	x	x		x	
LV	x									x
MT	x	x	x	x		x			x	
PL	x	x	x	x	x	x	x	x	x	x
PT	x	x	x	x	x	x	x	x	x	x
RO	x	x	x	x						x

Source: prepared by the study team.

Costs incurred according to collected data

This section offers an overview of the analysis of the activities for which data on the total cost breakdown at activity level were provided.

As can be observed, Table 44 below shows a lower number of reported activities per Member State than Table 41. This is because many OPs were able to identify the types of activity funded under the relevant projects / calls but do not have activity-level disaggregated cost data available.

Table 44 Overview of cost data quality in selected sub-areas

Sub-area 1A	Sub-area 1B.1	Sub-area 1B.2
A more detailed analysis revealed that 77 % of OPs provided data on costs breakdown at activity level, albeit at varying levels of coverage of the activities. On the basis of the available data it is possible to make an initial analysis of the composition of these operations among the different Member States. First of all, it can be observed how the different Member States are characterised by a certain degree of heterogeneity in terms of activities' structuring of the operations. In particular, it is interesting to note how some countries covered almost all the activities through their interventions (e.g. Italy, Poland) while others just focused on 1 or 2 typologies (e.g. Hungary, Latvia). Finally, according to the collected historical data the most funded activities, in the context of Area 1A were: • Energy audits to identify, quantify and report existing energy consumption profiles, and • Installation of photovoltaic system in SMEs	A similar picture can be painted in the case of sub area 1B.1 – Member States were not able to provide disaggregated cost data at activity level. In the case of Belgium, Croatia, Hungary, Ireland, Latvia, Lithuania, and Romania only data on the total costs of the operation were available. More than half of Member States were able to provide this level of detail, although not always in a complete manner in terms of financial amounts. A more detailed analysis revealed that 57 % of OPs provided data on costs incurred at activity level. It is worth noting that only 19 % of the OPs which provided data at activity level did so for all activities under the sub area, meaning that we had few complete sets of data. In turn, this means that we had to rely on interpolations for those Member States which possess partial data.	A slightly better situation was exhibited in sub area 1B.2 – while a many Member States were not able to provide disaggregated cost data at activity level, the availability of at least partial data on costs of activities were available and thus enabled the study team to conduct necessary interpolations to calculate values for Member States which do not have the necessary data on each activity based on the available data sample. The analysis of availability of cost breakdowns has revealed that 73 % of OPs provided data on costs breakdown at activity level, while in 33 % of the programmes this level of information was provided for all the operations – namely, Bulgaria, Italy, Poland, Slovakia, and Spain.

Sub-area 1A	Sub-area 1B.1	Sub-area 1B.2
'CO34 – Estimated annual decrease of GHG' adopted by 65 % of the OPs in 10 Member States, or by 67 % of the Member States that provided data on relevant interventions. 'CO30 – Additional capacity of renewable energy production' adopted by 42 % of the OPs in 8 Member States, or by 53 % of the Member States that provided data on relevant interventions.	'CO31 – Households with improved energy consumption classification' adopted by all 15 Member States in the sample. However, please note that without sufficient data availability on costs (that was described earlier) it was not possible to cover all of said OPs without making some assumptions. 'CO34 – Estimated annual decrease of GHG' which was adopted by 11 Member States, or 69 % of the Member States that provided data on relevant interventions. 'CO32 – Decrease of annual primary energy consumption of public buildings, in kilowatt-hours per year' adopted by 63 % of Member States in the sample. The relatively wide availability of this indicator under sub-area 1B.1 can be explained by the presence of public housing initiatives. For the purpose of the current analysis, we included such initiatives under sub-area 1B.2. 'CO30 – Additional capacity of renewable energy production' adopted by 7 Member States or by 44 % of the collected sample.	'CO32 – Decrease of annual primary energy consumption of public buildings, in kilowatt-hours per year' adopted by 93 % of the Member States in the sample 'CO34 – Estimated annual decrease of GHG' adopted by 12 Member States or by 80 % of Member States in the sample 'CO31 – Households with improved energy consumption classification' adopted by 47 % of the Member States in the sample. The relatively wide availability of this indicator under the sub-area can be explained by the presence of public housing initiatives, as was the case in the previous section on indicator CO32. For the purpose of the current analysis, we included such initiatives under sub area 1B.1 'CO30 – Additional capacity of renewable energy production' adopted by 7 Member States or 47 % of the Member States in the sample.

Sub-area 1A	Sub-area 1B.1	Sub-area 1B.2
Data on 26 OPs (46 % of sampled OPs) from 15 Member States were made available to the study team, which amounts to 429 records on specific projects or calls for proposals.	Data on 33 OPs (58 % of sampled OPs) from 16 Member States were collected, which amounts to 893 records referring to either specific projects or calls for proposals.	Data on 36 OPs (63 % of sampled OPs) were provided by 15 Member States, which amounts to 1 972 records on specific projects or calls for proposals.

Table 45. Availability of the breakdown of costs at activity level in sub-area 1A

Member State	Breakdown of cost at activity level	Advice consultancy to SME owners on energy efficiency and potential for renewable energy	Energy audits to identify, quantify and report existing energy consumption profiles	Replacement of window frames/glass/fixed shading systems in SMEs	Upgrade of thermal insulation in SMEs	Upgrade of heating/cooling systems (including based on RES) in SMEs	Installation of hot water system with the use of RES in SMEs	Installation of photovoltaic system in SMEs	Installation of biomass energy system in SMEs	Energy storage systems in SMEs	Smart management systems in SMEs	Consultancy service for preparing the necessary technical studies/reports as well as monitoring the implementation of the interventions in SMEs	Energy efficiency upgrade of production equipment for groups of SMEs
BE	NO - ONLY TOT COSTS												
BG	YES		x					x				x	
DE	PARTIAL	x			x	x							
DK	YES	x											
ES	YES		x		x								x
FR	PARTIAL				x			x	x				x
HR	YES		x										
HU	NO - ONLY TOT COSTS												
IT	PARTIAL	x	x	x	x	x	x	x				x	x
LT	NO - ONLY TOT COSTS												
LV	YES		x									x	
PL	PARTIAL		x	x	x	x	x	x	x		x	x	x

Member State	Breakdown of cost at activity level	Advice consultancy to SME owners on energy efficiency and potential for renewable energy	Energy audits to identify, quantify and report existing energy consumption profiles	Replacement of window frames/glass/fixed shading systems in SMEs	Upgrade of thermal insulation in SMEs	Upgrade of heating/cooling systems (including based on RES) in SMEs	Installation of hot water system with the use of RES in SMEs	Installation of photovoltaic system in SMEs	Installation of biomass energy system in SMEs	Energy storage systems in SMEs	Smart management systems in SMEs	Consultancy service for preparing the necessary technical studies/reports as well as monitoring the implementation of the interventions in SMEs	Energy efficiency upgrade of production equipment for groups of SMEs
PT	YES	x						x					x
SE	NO - ONLY TOT COSTS												
SI	YES							x	x				

Source: prepared by the study team.

Table 46. Availability of the breakdown of costs at activity level in sub-area 1B.1

Member State	Breakdown of cost at activity level	Energy audits for buildings	Replacement of window frames/glass/moving of fixed shading systems	Upgrade of thermal insulation (walls, roofs, ceiling, etc.)	Installation of new high efficiency or upgrade of existing heating/cooling systems (including based on RES)	Installation of hot water system with the use of RES	Installation of renewable electricity unit	Installation of biomass energy system	Energy storage systems	Smart management systems	Consultancy service for preparing the necessary technical studies/reports as well as monitoring the implementation of the interventions
BE	NO - ONLY TOT COSTS										
BG	YES	x									x
CY	PARTIAL		x		x	x					x
CZ	PARTIAL				x						
FR	PARTIAL	x	x	x	x	x	x				x
GR	YES	x	x	x	x	x	x	x	x	x	x
HR	NO - ONLY TOT COSTS										
HU	NO - ONLY TOT COSTS										
IE	NO - ONLY TOT COSTS										
LT	NO - ONLY TOT COSTS										
LU	PARTIAL	x									
LV	NO - ONLY TOT COSTS										
MT	PARTIAL						x				
PL	YES	x	x	x	x	x	x	x		x	x
PT	PARTIAL	x	x	x							x
RO	NO - ONLY TOT COSTS										

Source: prepared by the study team.

Table 47. Availability of the breakdown of costs at activity level in sub-area 1B.2

Member State	Breakdown of cost at activity level	Energy audits for buildings	Replacement of window frames/glass/moving of fixed shading systems	Upgrade of thermal insulation (walls, roofs, ceiling, etc.)	Installation of new high efficiency or upgrade of existing heating/cooling systems (including based on RES)	Installation of hot water system with the use of RES	Installation of renewable electricity unit	Installation of biomass energy system	Energy storage systems	Smart management systems	Consultancy service for preparing the necessary technical studies/reports as well as monitoring the implementation of the interventions
SK	YES	x	x	x	x	x	x	x	x	x	
BE	NO - ONLY TOT COSTS										
BG	YES	x									x
DE	PARTIAL		x	x	x						x
ES	YES						x				x
FR	PARTIAL	x	x	x	x		x	x	x		x
HR	NO - ONLY TOT COSTS										
HU	NO - ONLY TOT COSTS										
IT	YES	x	x	x	x	x	x	x	x	x	x
LU	PARTIAL			x			x	x	x		
LV	PARTIAL	x		x							x
MT	PARTIAL	x	x	x	x		x			x	
PL	YES	x	x	x	x	x	x	x	x	x	x
PT	PARTIAL	x	x	x	x		x	x			x
RO	NO - ONLY TOT COSTS										

Source: prepared by the study team.

Outputs and results produced according to collected data

From the analysis of outputs and results of the calls / projects for which data were collected, it emerged that common ERDF output indicators have seen wide usage, as most of the OPs opted for the use of common indicators in all three sub-areas. This indicates their suitability for EU-level SCO development.

Of the 15 MS that provided data on sub-area 1A operations, only 3 did not adopt common output indicators, namely Belgium, Lithuania, and Spain. Table 48 shows that the most used indicators in this area of intervention were:

- 'CO34 – Estimated annual decrease of GHG' adopted by 65 % of the OPs in 10 Member States, or by 67 % of the Member States that provided data on relevant interventions.
- 'CO30 – Additional capacity of renewable energy production' adopted by 42 % of the OPs in 8 Member States, or by 53 % of the Member States that provided data on relevant interventions.

Table 48. Indicators used by member states in sub-area 1A*

Member State	Shortlisted indicators		Other indicators	
	CO30 Additional capacity of renewable energy production	CO34 Estimated annual decrease of GHG	Reduction of final energy consumption in companies (in ktoe)	Number of SMEs supported with consultancies
BE				x
BG		x		
DE	x	x		
DK		x		
ES			x	
FR	x	x		
HR				
HU	x	x		
IT	x	x		
LT				x
LV	x	x		
PL	x	x		
PT	x	x	x	
SE				
SI	x	x		

Source: prepared by the study team.
*Only those indicators which had more than one Member State implementing them were included in the analysis.

Most of the 16 Member States that provided data on sub-area 1B.1 adopted common output indicators. Table 49 shows that the most used common indicators in this area of intervention were:

- 'CO31 – Households with improved energy consumption classification' adopted by all 15 Member States in the sample. However, please note that without sufficient data availability on costs (that was described earlier) it was not possible to cover all of the said OPs without making some assumptions.
- 'CO34 – Estimated annual decrease of GHG' which was adopted by 11 Member States, or 69 % of the Member States that provided data on relevant interventions.
- 'CO32 – Decrease of annual primary energy consumption of public buildings, in kilowatt-hours per year' adopted by 63 % of Member States in the sample. The relatively wide availability of this indicator under the sub-area of 1B.1 can be explained by the presence of public housing initiatives. For the purpose of the current analysis, we included such initiatives under sub-area 1B.2.
- 'CO30 – Additional capacity of renewable energy production' adopted by 7 Member States or by 44 % of the collected sample.

Table 49. Indicators used by member states in sub-area 1B.1

Member State	Shortlisted indicators		Other indicators	
	CO31 Households with improved energy consumption classification	CO34 Estimated annual decrease of GHG	CO32 Decrease of annual primary energy consumption, in kWh/year	CO30 Additional capacity of renewable energy production in MW
BE	x			
BG	x			
CY	x	x	x	x
CZ	x	x	x	
FR	x	x	x	x
GR	x	x	x	x
HR	x		x	
HU	x	x	x	x
IE	x	x	x	
LT	x			
LU	x			
LV	x	x		x
MT	x	x		x
PL	x	x	x	x
PT	x	x	x	
RO	x	x	x	

Source: prepared by the study team.
*Only those indicators which had more than one Member State implementing them were included in the analysis.

Lastly, from 15 Member States that provided data on sub-area 1B.2 operations, the most used common indicators in this area of intervention were:

- 'CO32 – Decrease of annual primary energy consumption of public buildings, in kilowatt-hours per year' adopted by 93 % of the Member States in the sample
- 'CO34 – Estimated annual decrease of GHG' adopted by 12 Member States or by 80 % of Member States in the sample

- 'CO31 – Households with improved energy consumption classification' adopted by 47 % of the Member States in the sample. The relatively wide availability of this indicator under the sub-area can be explained by the presence of public housing initiatives, as was the case in the previous section on indicator CO32. For the purpose of the current analysis, we included such initiatives under sub area 1B.1
- 'CO30 – Additional capacity of renewable energy production' adopted by 7 Member States or 47 % of the Member States in the sample.

Table 50. Indicators used by Member States in sub-area 1B.2

Member State	Shortlisted indicators		Other indicators	
	CO32 Decrease of annual primary energy consumption of public buildings, in kilowatt-hours per year	CO34 Estimated annual decrease of GHG	CO31 Number of households with improved energy consumption classification, in units	CO30 Additional capacity of renewable energy production in MW
SK	x	x	x	x
BE		x		
BG	x			
DE	x	x		
ES	x	x		x
FR	x	x	x	x
HR	x			
HU	x	x		x
IT	x	x	x	x
LU	x		x	x
LV	x	x		
MT	x	x		
PL	x	x	x	x
PT	x	x	x	
RO	x	x	x	

Source: prepared by the study team.
*Only those indicators which had more than one Member State implementing them were included in the analysis.

In addition, other programme-specific indicators have been used in select cases. The table below indicates the unique indicators (i.e. only used by a single Member State) which were implemented in the calls / projects in the dataset.

Table 51. Specific indicators used by Member States across all sub-areas

SMEs (1A)	Housing sector (1B.1)	Public sector (1B.2)
- Number of enterprises receiving support - Private investment matching public support to enterprises (grants) - Number of consultancy sessions arranged by established competence centres - Number of SMEs supported with energy audits - Installation of production systems from renewable sources - Rate of reduction of annual consumption of primary energy in companies (in %) - Reduction of final energy consumption in companies (in toe) - Share of renewable energy in gross final energy consumption in manufacturing industries (in Kwh) - Energy savings in manufacturing industries (in Kwh)	- Annual reduction of greenhouse gas emissions, in kWh/year - Amount of energy produced from renewable energy sources (GJ/year) - Annual reduction in primary energy consumption of residential buildings (kWh/year) - Average consumption of heat energy for heating in multi-apartment residential buildings after implementation of energy efficiency improvement measures kWh/m^2/year - Number of solid fuel boilers / stoves / heating devices replaced as a result of implementation of the programme - Number of prepared energy audits (pcs.) - Number of modernised heat sources [pcs.] - Usable area of buildings subjected to thermal modernisation [m^2] - Number of energy-modernised buildings [pcs.] - The amount of heat energy saved [GJ/year] - The amount of electricity saved - Reduction of final energy consumption as a result of project implementation [GJ/year]	- Number of users of sustainable urban mobility infrastructure - Heating energy consumption per area in state properties – school building in kWh/sqm - Energy renovated area m^2 - Usable area of buildings subjected to thermal modernisation [m^2] - Additional electricity generation capacity from renewable sources [MWe] - Additional heat generation capacity from renewable sources [MWt] - Reduction of final energy consumption as a result of project implementation [GJ/year] - The amount of heat energy saved [GJ/year] - The amount of electricity saved [MWh/year] - Number of energy-modernised buildings - Number of modernised heat sources - The amount of heat energy saved [GJ/year] - The amount of electricity saved [MWh/year] - Usable area of buildings subjected to thermal modernisation - Number of energy-modernised buildings [pcs.] - Reduction of final energy consumption as a result of project implementation [GJ/year] - Surface of the building M^2 - Primary energy consumption in central administration buildings within the scope of the operation - Area of thermal insulation applied to the opaque envelope of supported buildings (m^2) - Area of efficient windows installed in supported buildings (m^2) - Decreased power installed in lighting, indoors and outdoors in supported buildings (kW) - Estimated contribution to the savings of the average annual required heat energy for heating/cooling kWh/m^2

SMEs (1A)	Housing sector (1B.1)	Public sector (1B.2)
- Reduction of final energy consumption in companies (in Mwh) - Number of beneficiaries - Reduction of final energy consumption as a result of project implementation (in GJ) - Amount of electricity saved (in Mwh) - Production of energy from RES (in Mwh) - Number of supported RES energy measures	- Result Indicator: PV Connected Capacity (national indicator) - Improvement of energy classes	- Average energy required for heating / cooling in renovated public sector buildings kWh/m^2 - Contribution to the increase in the use of renewable energy sources (number) - Number of measures of renewable energy sources after and before the energy renovation of the building) - Contribution to reducing energy consumption – kWh - Ra4C1 – Number of public buildings having increased their energy efficiency - Ra4c2 – Area rehabilitated public buildings - Area of thermal solar panels installed to produce domestic hot water (DHW) in supported buildings (m^2) - Number of public buildings with improved energy classification

Source: prepared by the study team.

Data from alternative sources

In this section of the report, we take a more detailed look at the process of preparing data from alternative sources and the availability of key data points used to develop SCOs in the area of energy efficiency and renewable resources.

As indicated earlier, we utilised data on total costs and results achieved in projects contributing to relevant common ERDF/CF indicators which is collected in the study 'Monitoring data on ERDF and Cohesion Fund operations, and on the monitoring systems operated in the 2014-2020 period', contract N° 2019CE16BAT214/2020CE16BAT075). The primary goal of using these data were to calculate SCO values for Member States that did not provide the requested historical data (i.e. failed to send it on time and/or provided insufficient / poor-quality data).

Data cleaning and filtering

The indicators which were shortlisted in the analysis were the following:

- CO30, defined as the additional capacity of renewable energy production, measured in megawatts (MW);
- CO31, defined as the number of households with improved energy consumption classification, measured in household units;
- CO32, defined as decrease of annual primary energy consumption of public buildings, measured in kilowatt-hours per year (kWh/year);
- CO34, defined as estimated annual decrease of Greenhouse Gas (GHG), measured in tons of CO_2 equivalent.

Several steps were taken to clean and prepare alternative source data for further analysis:

- **Removing observations**[66] with missing data points needed for calculations or filtering of data.
- **Establishing criteria for shortlisted filtering variables for the dataset.** This was done to prepare accurate samples for further calculations. The specific criteria chosen for filtering of the microdata is presented under each sub-area.

In order to get a dataset which is complementary to the historical one, irrelevant data from the study Monitoring data on ERDF and Cohesion Fund operations, and on the monitoring systems operated in the 2014-2020 period were filtered out.

As far as energy efficiency and renewable energy projects in SME are concerned, the project types considered are:

- production and distribution of energy derived from renewable sources, 5 637 projects detected;
- energy efficiency and use of renewable energy in business production processes, 3 558 projects detected;
- energy efficiency renovation in enterprise buildings, 2 537 projects detected
- support to SME Competitiveness, 1 project detected.

[66] In statistics, an observation is simply one occurrence of something being measured.

This resulted in a preliminary sample made up of 11 733 projects. Then, only non-repayable grants form of financing was considered, leading to a sample of 11 653 units. Finally, a selection was made based on project status, with only completed projects being considered. The final sample size for energy efficiency and renewable energy projects is 8 360.

As far as energy efficiency and renewable energy projects in housing are concerned, the project types considered were:

- community-led development, with 32 projects detected;
- energy efficiency renovation in the housing sector, with 16 876 projects detected;
- management and mitigation of climate change consequences, with 3 projects detected;
- urban regeneration, with 164 projects detected.

This resulted in a preliminary sample made up of 17 075 projects. Then, only non-repayable grants form of financing was considered, leading to a sample of 14 925 units. Finally, a selection was made based on project status, with only completed projects being considered. The final sample size for energy efficiency and renewable energy projects is 11 503.

The project types selected for energy efficiency and renewable energy projects in public / non-residential buildings were:

- energy efficiency, smart energy management and renewable energy use in public buildings, with 17 024 projects detected;
- infrastructure for primary and secondary education, with 2 projects detected.

This resulted in a preliminary sample made up of 17 026 projects. Then, only non-repayable grants form of financing were considered, leading to a sample of 16 816 units. Finally, a selection was made based on project status, with only completed projects being considered. The final sample size for energy efficiency and renewable energy projects was 9 470.

Table 52. Overview of data from alternative sources

MEMBER STATE	EE-RES SMES		EE-RES HOUSING		EE-RES NON-RESIDENTIAL	
	No. of OPs	No. of projects	No. of OPs	No. of projects	No. of OPs	No. of projects
AT	N/A	N/A	N/A	N/A	N/A	N/A
BE	N/A	N/A	1	4	N/A	N/A
BG	N/A	N/A	N/A	N/A	N/A	N/A
CY	N/A	N/A	N/A	N/A	N/A	N/A
CZ	1	27	2	2187	2	1177
DE	10	672	N/A	N/A	9	476
DK	N/A	N/A	N/A	N/A	N/A	N/A
EE	N/A	N/A	1	417	1	127
ES	12	2878	12	2190	15	1400
FI	N/A	N/A	N/A	N/A	N/A	N/A
FR	23	343	22	618	20	342

GR	N/A	N/A	N/A	N/A	1	21
HR	N/A	N/A	1	527	1	483
HU	N/A	N/A	N/A	N/A	N/A	N/A
IE	N/A	N/A	1	6	N/A	N/A
IT	9	748	2	6	18	575
LT	1	43	N/A	N/A	N/A	N/A
LU	N/A	N/A	N/A	N/A	1	1
LV	1	97	N/A	N/A	1	175
MT	N/A	N/A	N/A	N/A	1	1
NL	N/A	N/A	N/A	N/A	N/A	N/A
PL	15	1287	11	261	16	1379
PT	N/A	N/A	N/A	N/A	N/A	N/A
RO	N/A	N/A	N/A	N/A	N/A	N/A
SE	N/A	N/A	1	1	3	14
SI	N/A	N/A	N/A	N/A	N/A	N/A
SK	N/A	N/A	N/A	N/A	N/A	N/A

Source: prepared by the study team.

Data points

The dataset provided us with detailed information on projects which cover our four common ERDF/CF indicators which were chosen as potential indicators that could be developed into EU-level SCOs. The following data points are key to facilitate SCO calculations:

- implemented total expenditures, in EUR;
- implemented total number outputs, in units (based on common ERDF/CF indicators).

Table 53 below indicates the availability of these data points within the analysed dataset.

Table 53. Availability of key data points needed for SCO development

MEMBER STATE	EE-RES SMES		EE-RES HOUSING		EE-RES NON-RESIDENTIAL	
	CO30	CO34	CO31	CO34	CO32	CO34
AT						
BE			x			
BG						
CY						
CZ		x	x	x		x
DE	x	x			x	x
DK						
EE			x	x		x
ES						

FI						
FR	x	x	x	x	x	x
GR						
HR			x		x	
HU						
IE			x	x		
IT	x	x		x	x	x
LT	x	x				
LU					x	
LV		x			x	x
MT						x
NL						
PL	x	x	x	x	x	x
PT						
RO						
SE						x
SI						
SK						

Source: prepared by the study team.

The dataset also contained other columns with further relevant details, such as project start / end dates, thematic objectives and typologies of the covered projects. There were also project descriptions, which gave us some qualitative details on what types of activities were covered in analysed projects, albeit the quality of these descriptions was rather poor.

Caveats

The dataset lacked detailed information on costs – aside from data on total costs, there was no indication on what was being covered in implemented projects. It also lacked structured information on supported activities – only general project descriptions were available, and their completeness / level of detail varied considerably. Moreover, at times this source provided incomplete data as some of the projects in the dataset have missing data points for total implemented expenditure and/or number of implemented outputs. These values could not be used in the analysis, at least for calculating the considered unit cost. Data availability was higher for allocated expenditure and/or planned number of outputs. However, these data are not verifiable and relies on forecasting rather than actual results of the project.

Overall, the study team was not able to rely on this source to estimate the cost of each activity included in the definition of proposed SCOs. Nevertheless, it can be exploited to compensate for gaps in the collected historical data and ensure a better coverage of countries if/when calculating SCOs-based total costs of the operation.

Research and Innovation activities

Data collected from Member States

After receiving the populated DCFs, we compiled the historical data collected for all three sub-areas into a single dataset. An integral part of this process was assessing if the quality and level of detail of these data were sufficient for developing EU-level SCOs. It also involved a preliminary cleaning of the data to identify any gaps (i.e. the missing values) and, if possible, address any evident cases of irrelevant or poor-quality data.

Our team used the following **set of criteria** for assessing the collected data: 1) data availability, 2) data quality, and 3) data granularity. Each criterion is further specified in Table 54.

Table 54. Criteria used for assessing the collected historical data

CRITERIA	DESCRIPTION
Data availability	Relates to the collected data sample, its completeness and comprehensiveness. The scope and representativeness of data received from the Member States in terms of the number of areas and projects are analysed during this step. This presumes that all data points needed for calculations and establishment of a particular SCO are sufficiently covered in the data sample, whereas the latter provides reasonable coverage of Member States. Incomplete data (i.e. provisional / estimated data or data gaps) are as dangerous as inaccurate data. Gaps in data lead to a partial view of the overall picture. Without a complete picture of how projects are funded, SCOs may be calculated through uninformed actions.
Data quality	Relates to accuracy, consistency, timeliness, and comparability. This relates to the clarity of the key data points in the data collection form, especially the costs of facilitating relevant activities, information on eligible cost categories and the number of outputs. The collected data cannot contradict a value residing in a different source or collected by a different system. The data must be logical, without contradiction or unwarranted variance. This criterion also involves checking whether the supplied data fit the established reference period and other data for that Member State.
Data granularity	Relates to the level of detail at which data are collected. This is important because confusion and inaccurate decisions can otherwise occur. Aggregated, summarised, and manipulated collections of data could offer a different meaning than the data implied at a lower level. An appropriate level of granularity must be defined to provide sufficient uniqueness and for distinctive properties to become visible. This is a requirement for the development of accurate SCOs.

Source: prepared by the study team.

As far as the availability of the collected data are concerned, Table 55 offers a complete overview of the information gathered at the level of the three sub-areas analysed in this section. It indicates the number of OPs and projects / calls for proposals for which relevant data were provided by each Member State:

- Sub-area 2A (Knowledge transfer of SMEs): data on 18 OPs from 13 Member States were made available to the study team, which amounts to 133 records on specific projects or calls for proposals;
- Sub-area 2B (Innovation vouchers for SMEs): data on 17 OPs from 12 Member States were collected, which amounts to 2 252 records referring to either specific projects or calls for proposals;
- Sub-area 2C (RDI research projects): data on 50 OPs were provided by 25 Member States, which amounts to 3 815 records on specific projects or calls for proposals.

Table 55. Overview of data coverage per sub-area

MEMBER STATE	KNOWLEDGE TRANSFER OF SMES (2A)		INNOVATION VOUCHERS FOR SMES (2B)		RDI RESEARCH PROJECTS (2C)	
	N. OP	N. PROJ./ CALL	N. OP	N.PROJ/ CALL	N. OP	N.PROJ/ CALL
AT					1	13
BE	2	2			2	2
BG					1	16
CY			1	1	1	13
CZ	1	3	1	3	2	15
DE	1	1			6	1 178
DK			1	29	1	23
EE			1	1	1	3
ES					1	42
FI					1	1 558
FR	3	35	1	33	6	247
GR					2	7
HR	1	20	1	571	1	293
HU	2	8	1	1	2	13
IE					1	2
IT	1	2	2	17	4	33
LT						
LU	1	14				
LV	1	2			1	3
MT			1	1	1	2
NL					1	27
PL	2	6	5	23	9	187
PT	1	36	1	1 571	1	89
RO	1	2			1	12
SE					1	3
SI	1	2	1	1	1	3
SK					1	31

Source: prepared by the study team.

Quality-wise, we checked if all key data points necessary for the SCO development were provided in the requested format, considering activities, costs and outputs / results.

Total costs were available for the vast majority of the cases in sub-area 2A, missing only 1 out of 133 cases (0.75 %), for 38 out of 2 252 cases in sub-area 2B (1.68 %) and for 160 out of 3 815 cases in sub-area 2C (4.19 %). The activities supported were often described by data providers, even if, in some cases, they were not well-detailed. In fact, the activities were often not accompanied by the categories of costs covered under the specific activities, so data providers were, in most cases, unable to specify the breakdown of amounts spent in each category. The lack of breakdown was generally explained by the fact that some Member States do not collect data at such level of detail. Moreover, in some cases, instead of directly mentioning the supported activities, data providers referred to the related calls for proposals.

Another important limitation of these data were the inconsistency or variety of supported activities, as well as of output / results indicators, across analysed Member States, even within the same sub-area. Collected data in many cases were insufficiently granular and therefore only partially comparable. Building on this observation, we compiled an overview of supported activities for each Member State, facilitating a comparison of the scope of activities across countries and selection of the most relevant activities for each of the three sub-areas.

Most of the historical data were provided at the level of individual projects: 59.4 % of records for sub-area 2A, 96.4 % for sub-area 2B, and 87.1 % for sub-area 2C are available at this level of granularity. Only 15 % of records were available at the level of calls for proposals in the case of sub-area 2A, for 0.2 % of records in sub-area 2B and 3.8 % of records in sub-area 2C. For the remaining records in sub-area 2A, 2B, and 2C, the level of granularity could not be clearly identified because either it was not specified or the data were provided at various levels of detail (25.6 %, 3.4 %, 9.1 %, respectively).

Only a small portion of the cost data provided to the study relates to ongoing projects: 14.3 % in sub-area 2A, 2.5 % in sub-area 2B, and 23.6 % in sub-area 2C, while 82 % of records in sub-area 2A, 97.3 % in sub-area 2B, and 75.6 % in sub-area 2C refer to completed projects. In 3.8 % of available records for sub-area 2A, 0.2 % of sub-areas 2B and 0.8 % of sub-area 2C, it was not possible to clearly define the progress level of selected projects due to unclear or incomplete information.

Most of the projects / calls for proposals were implemented during the period 2018-2019 and in the last 3 years, i.e. in the period 2019-2021. In some cases, however, the reference period was unspecified – the historical data in question refer to the entire programming period of 2014-2020, especially for sub-area 2B and 2C.

As far as the eligibility rules are concerned, 33.1 % of records in sub-area 2A were missing, while there was no specific eligibility rule for 3.8 % of records in the same area. Regarding sub-area 2B, for 2.6 % of records, eligibility rules were missing. Finally, 6.4 % of records for eligibility rules in sub-area 2C were missing, while for 1.5% of records there was no specific eligibility rule.

Typologies of activities according to collected data

Based on the analysis of the qualitative information gathered in **sub-area 2A**, no Member State implemented the full set of activities identified in the DCF. However, compared to France, Hungary, Italy or Romania, countries such as Belgium, Latvia or Slovenia, funded a significantly narrower subset of activities. Table 56 lists the main activities funded by Member States. The most common / most frequently overlapping activities were the following:

- support measures for creating spin-offs to increase the entrepreneurial capacity of research organisations and promote the translation of research results into economic value;
- support for industrial PhDs and traineeships.

Table 56. Main typologies of activities supported in sub-area 2A*

ACTIVITY	MEMBER STATE									
	BE	CZ	DE	FR	HU	IT	LV	LU	PT	RO
Activities to stimulate knowledge transfer									x	x

ACTIVITY	MEMBER STATE									
	BE	CZ	DE	FR	HU	IT	LV	LU	PT	RO
Post-doctoral researcher placements in the private sector, including SMEs		x				x				
Project management					x					x
Project preparation					x	x				
Research on new building materials			x	x						
Specialist consulting and external services						x			x	
Support for industrial PhDs and traineeships		x	x	x						
Support measures for creating spin-offs to increase the entrepreneurial capacity of research organisations and promote the translation of research results into economic value	x	x	x	x			x	x		
Tools and equipment		x				x				

Source: prepared by the study team.
*Only those activities funded by more than one Member State have been included in the table.

In **sub-area 2B**, no Member State funded all activities identified in the DCF. Estonia, Hungary, Italy and Slovenia, implemented projects where only a small subset of these activities was funded. Other Member States covered a wider range of activities (such as France, Cyprus, and Czechia). Table 57 lists the main funded activities.

Despite observed variation in typologies, a significant number of mapped activities seemed to overlap at least to some degree in projects implemented in the analysed Member States. The most frequently overlapping activities were as follows:

- consultancy services provided to SMEs by universities, research centres or knowledge-intensive companies;
- development of digital capabilities;
- establishing and sustaining contacts between SMEs and research facilities, nationally or internationally.

Table 57. Main typologies of activities supported in sub-area 2B*

ACTIVITY	MEMBER STATE											
	CY	CZ	DK	EE	FR	HU	HR	IT	MT	PL	PT	SI
Access to research centres and facilities	x	x										
Consultancy services provided to SMEs by universities, research centres or knowledge-intensive companies	x	x		x	x	x	x	x	x	x	x	
Development of digital capabilities	x	x			x		x		x		x	
Establishing and sustaining contacts between SMEs and research facilities, nationally or internationally	x	x	x									x
Investment in ICT instruments		x			x		x					

Source: prepared by the study team.
*Only those activities funded by more than one Member State have been included in the table.

In **sub-area 2C**, the analysis of the activities was performed through the use of keywords, as there was a large number of different activities. The analysis revealed that many activities included in the DCF were implemented by Germany, Romania, Poland, Hungary and Bulgaria. A few other Member States funded a slightly smaller subset of activities, such as the case of the Latvia, the Netherlands, and Slovakia, that implemented much smaller projects where only one or two activities were funded. Table 58 lists the main activities funded by Member States. Overall, based on the available data, the most common overlapping activities in sub-area 2C were:

- industrial research;
- experimental development;
- testing activities;
- conceptual / designing / development studies;
- infrastructural investments.

Table 58. Main typologies of activities supported in sub-area 2C*

ACTIVITY	MEMBER STATE																								
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU	IE	IT	LV	LT	MT	NL	PL	PT	RO	SE	SI	SK
Activities for obtaining, validating and protecting property rights													x	x									x			
Conceptual/designing/development studies						x		x		x		x									x				x	
Construction activities						x													x		x		x			
Consultancy services						x							x	x							x					
Organising and holding conferences, seminars and round tables			x																x				x	x		
Development of new products and solutions in the collaboration between enterprises and public research institutions						x	x																			
Experimental development				x	x				x				x			x		x			x	x	x		x	
Feasibility study							x	x					x				x						x			x
Fundamental research				x		x							x									x				
Industrial research				x	x	x			x			x	x	x		x					x	x	x		x	
Infrastructural investments					x	x		x				x		x							x					

ACTIVITY	MEMBER STATE																								
	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU	IE	IT	LV	LT	MT	NL	PL	PT	RO	SE	SI	SK
Project management		x				x							x	x								x	x			
Testing activities			x			x							x		x	x					x		x	x		

Source: prepared by the study team.

*Only those activities funded by more than one Member State have been included in the table.

Costs incurred according to collected data

This section offers an overview of the analysis of the categories for which data on the total cost breakdown at category / item level were provided.

On the basis of the available data, it was possible to make an initial analysis of the composition of these operations among the different Member States. For instance, it was observed that the different Member States were characterised by a certain degree of heterogeneity in terms of the costs incurred. For this reason, standardisations of cost categories received for each sub-area have been performed to facilitate the process of computation. In particular, it was necessary to create common cost categories to derive the shares of each cost category by detected outputs.

Concerning sub-area 2A, different cost categories have been merged according to the types of costs described under the Marie Skłodowska-Curie Actions (MSCA) Staff Exchanges (i.e. staff costs / research training, networking costs / management and indirect costs) and ToR (i.e. staff costs for researchers / allowances / research costs: experimental research, non-experimental research, overheads, research / training costs). The macro-categories identified were:

- staff costs
- research training and networking costs
- management and indirect costs
- experimental research costs
- overhead costs.

The specific categories that were merged are detailed in Table 59.

Table 59. Macro-categories in sub-area 2A

MACRO-CATEGORY	SPECIFIC CATEGORIES
Staff costs	• Personnel costs • Salary expenses for industrial research, related to the personnel involved in the implementation of the project (in the course of activities, other than project management) • Salary expenses with the project management team • Salary expenses with the staff involved in the implementation of the project (in the course of activities, other than project management) • Salary for collection staff • Staff costs of researchers
Research training and networking costs	• Cost of allowances for networking, mobility and other activities • Cost of training and coaching costs for professional support for researchers • Expenditure on services for the organisation of events and training courses
Management and indirect costs	• Expenditure on the purchase of inventory and consumables for the management team • Indirect costs • Project management • Project management activities (including project information and publicity activities). Type E activity • SCO of 15 % of the total costs to cover the project management costs • Travel expenses for project management staff
Experimental research costs	• Expenditure on experimental development related to consultancy and equivalent services • Expenditure on the acquisition of tangible fixed assets (other than land and buildings) for experimental development

MACRO-CATEGORY	SPECIFIC CATEGORIES
	• Expenses for experimental development with the purchase of raw materials, consumables and other similar products necessary for the project • Experimental development • Industrial research and/or experimental development activities carried out in effective collaboration with an enterprise. • Salary expenses for experimental development, related to the staff involved in the implementation of the project (in the course of activities, other than project management)
Overhead costs	• Cost of overheads • Overheads (20 % flat rate) • General administrative expenses

Source: prepared by the study team.

As far as sub-area 2B is concerned, a small number of cost categories were identified, compared to the other sub-areas. Nonetheless, cost categories were merged. The macro-categories identified were:

- equipment and materials costs
- intangible assets costs
- ICT instruments costs
- strategic innovation costs
- publicity costs
- consulting costs

The specific categories merged are detailed in Table 60.

Table 60. Macro-categories in sub-area 2B

MACRO-CATEGORY	SPECIFIC CATEGORIES
Equipment and materials costs	▪ Costs of materials ▪ Costs of working equipment
Intangible assets costs	▪ Expertise and external services: costs related to obtaining, validating and defending patents and other intangible assets ▪ Purchase of intangible assets
ICT instruments costs	▪ Hosting, domain and other licences ▪ Secure services online payment ▪ Website design and development
Strategic innovation costs	▪ Assistance in intellectual property management total service cost of finished projects costs of contract research, research services ▪ Business innovation processes + corporate innovation processes (with application to the certifying body) ▪ Business model innovation ▪ Cost of the service consisting in the development of a new or significantly improved product, service, production technology or a new design project ▪ Cross-financing, grants, information and promotion, consultancy services, intangible services, non-consultancy services, operating costs ▪ Innovation costs (innovation in the concept phase + innovation in the design and testing phases) ▪ strategic innovation for the introduction of new products / services ▪ Organisational upgrading + organisational upgrading (with application for ISO 9001/2015 and SMI certification)

MACRO-CATEGORY	SPECIFIC CATEGORIES
	▪ Staff costs ▪ Strategic planning
Publicity costs	▪ Expertise and external services: procurement of support / advisory services ▪ Promotional planning
Consulting costs	▪ Expertise and external services: procurement of innovation support services ▪ Specialist support

Source: prepared by the study team.

Finally, in sub-area 2C the heterogeneity of costs categories detected made their standardisation necessary. In particular, the macro-categories identified were:

- staff costs
- travel costs
- communication costs
- scientific, technical equipment and materials costs
- overhead costs
- external services
- indirect costs
- patent costs
- project management costs

The specific categories merged are listed in Table 61.

Table 61. Macro-categories in sub-area 2C

MACRO-CATEGORY	SPECIFIC CATEGORIES
Staff costs	▪ 20 % personnel costs ▪ Direct cost of personnel ▪ Expenditure on the secondment of highly qualified staff ▪ Indirect cost in the form of simplified costs (20 % of staff costs) ▪ Indirect costs (20 % staff costs) ▪ Personnel costs ▪ Personnel costs (employment contracts, civil law contracts) ▪ Salaries and charges ▪ Salary costs ▪ Staff costs ▪ Staff costs – remuneration with taxes and employees' social security contributions ▪ Staff costs of researchers, technical and other staff
Travel costs	▪ Mission and travel cost ▪ Travel and reception costs ▪ Travel costs ▪ Travel costs of researchers ▪ Travel expenses ▪ Travel, catering and accommodation expenses
Communication costs	▪ Communication ▪ Communication animation events ▪ Communication tools

MACRO-CATEGORY	SPECIFIC CATEGORIES
	▪ Cost of communication
Scientific, technical equipment and materials costs	▪ Cost of using scientific equipment ▪ Costs of scientific and technical equipment (costs of apparatus and equipment - depreciation write-offs) ▪ Costs of scientific and technical equipment (costs of apparatus and equipment - depreciation write-offs, rental costs) ▪ Costs of scientific and technical equipment (costs of apparatus and equipment - depreciation write-offs, equipment rental costs, capital instalments for equipment) ▪ Costs of scientific and technical equipment (depreciation) ▪ Costs of scientific and technical equipment and materials ▪ Equipment and fire safety plan ▪ Equipment costs ▪ Equipment for premises (signage, blinds, etc.) ▪ Equipment, plant and machinery ▪ Internal equipment ▪ Operating cost (rental of laboratory space, purchase of laboratory equipment, purchase of materials, prototype elements) ▪ Other costs (laboratory consumables, small-scale equipment and configuration of research facilities and software purchase A.1.7, A.1.10, A.1.11) ▪ Small equipment ▪ Tools and equipment + expenditure on the acquisition of tangible fixed assets (other than land and buildings), inventories, raw materials and materials, including consumables (RO)
Overhead costs	▪ Cost of overheads ▪ General administrative expenses
External services costs	▪ Costs for external contributions ▪ Costs for services ▪ Expenditure on external services ▪ Expenditure on services ▪ Expert and legal support (analysis, expert opinions / advice) ▪ External services necessary for the proper functioning of the actions ▪ Purchases and services ▪ Service and maintenance expenses ▪ Specialist consulting and external services
Indirect costs	▪ Indirect cost (20 % of payroll) ▪ Indirect costs ▪ Indirect costs of operating ▪ Indirect expenditure under Article 68 (1) (b)
Patent costs	▪ Costs for obtaining, validating and defending patents and other intangible assets ▪ Costs for obtaining, validating and defending patents and other intangible assets and costs for innovation advisory and support services ▪ Costs of contractual research, knowledge and patents ▪ Costs of obtaining and validating patents ▪ Costs of patents, licences, etc. ▪ Intangible assets ▪ Knowledge and patents costs ▪ Expenditure for obtaining, validating and protecting patents and other intangible assets
Project management costs	▪ Management fees ▪ Project management costs

Source: prepared by the study team.

Concerning the availability of cost breakdowns at the activity level, in general, detailed information was limited across all sub-areas of Area 2. While several Member States have been able to provide information on total costs incurred, not all of them were able to provide complete information in terms of financial amounts for each activity funded.

Out of the Member States that provided data for the sub-areas, 11 Member States were able to provide data in the required detail in sub-area 2A, 7 in sub-area 2B and 15 in 2C, as indicated in Table 62. It is worth noting that the fact that not all MS that provided data at the activity level did so for all activities under the three sub-areas, it means that few complete sets of data are available. In turn, this means that we had to rely on statistical techniques to estimate the values for those Member States which possess partial data.

Table 62. Availability of breakdown of costs at the activity level

MS	KNOWLEDGE TRANSFER OF SMES (2A)	INNOVATION VOUCHERS FOR SMES (2B)	RDI RESEARCH PROJECTS (2C)
AT			NO – ONLY TOT COSTS
BE	YES		YES
BG			YES
CY	NO – ONLY TOT COSTS		YES
CZ	NO – ONLY TOT COSTS	NO – ONLY TOT COSTS	NO – ONLY TOT COSTS
DE	YES		NO – ONLY TOT COSTS
DK		NO – ONLY TOT COSTS	NO – ONLY TOT COSTS
EE		NO – ONLY TOT COSTS	NO – ONLY TOT COSTS
ES			NO – ONLY TOT COSTS
FI			NO – ONLY TOT COSTS
FR	YES	YES	YES
GR			YES
HR	NO – ONLY TOT COSTS	NO – ONLY TOT COSTS	NO – ONLY TOT COSTS
HU	YES	YES	YES
IE			NO – ONLY TOT COSTS
IT	YES	NO – ONLY TOT COSTS	YES
LT		YES	YES
LU	YES		
LV	YES		YES
MT		YES	YES
NL			NO – ONLY TOT COSTS
PL	YES	YES	YES
PT	YES	YES	YES
RO	YES		YES
SE			NO – ONLY TOT COSTS

MS	KNOWLEDGE TRANSFER OF SMES (2A)	INNOVATION VOUCHERS FOR SMES (2B)	RDI RESEARCH PROJECTS (2C)
SI	YES	YES	YES
SK			YES

Source: prepared by the study team.

Outputs and results produced according to collected data

From the analysis of outputs and results of the calls / projects for which data were collected, we have observed that there was significant heterogeneity among Member States in the outputs being monitored. While we were able to identify some common indicators (Table 63) OPs recorded a large number of specific measures, which created some challenges for the development of EU-level SCOs in Area 2, in particular for sub-area 2C.

In sub-area 2A, the most used indicators were:

- number of enterprises cooperating with research institutions (CO26), adopted by 9 Member States;
- number of new researchers in supported entities (CO24), adopted by 7 Member States;
- number of enterprises receiving support (CO01), adopted by 6 Member States.

In sub-area 2B, the most frequent measures were:

- number of enterprises supported to introduce new to the firm products (CO29), adopted by 4 Member States;
- number of enterprises supported to introduce new to the market products (CO28), adopted by 4 Member States;
- number of enterprises receiving support (CO01), adopted by 4 Member States;
- number of enterprises cooperating with research institutions (CO26), adopted by 2 Member States.

It is notable that sub-area 2B collected data for operations on 'innovation vouchers for SMEs for R&D implementation' therefore some projects (denoted as rows in the dataset) were meant to facilitate one innovation voucher. Overall, the study team has 10 Member States for which we have either separate rows for an innovation voucher, or innovation vouchers being tracked as 'outputs' in a larger scale project.

Finally, in sub-area 2C, the most common indicators were:

- number of enterprises receiving support (CO01), adopted by 13 Member States;
- number of new researchers in supported entities (CO24), adopted by 12 Member States;
- number of enterprises cooperating with research institutions (CO26), adopted by 9 Member States.

In sub-area 2A, outside of the more common indicators listed above, 23 different outputs / results were indicated by the OPs. A similar situation happened in sub-area 2B, with 22 specific indicators. As mentioned above, the most problematic scenario happened in sub-area 2C, which provided a total of

78 unique indicators indicating significant heterogeneity between Member States and within different OPs of the Member State.

Table 63. Historical data provided on most common outputs / results indicators per sub-area

MEMBER STATE	KNOWLEDGE TRANSFER OF SMES (2A)			INNOVATION VOUCHERS FOR SMES (2B)				RDI RESEARCH PROJECTS (2C)		
	CO26	CO24	CO01	CO29	CO28	CO01	CO26	CO26	CO24	CO01
BE	x	x						x	x	x
CY						x		x	x	x
CZ	x						x	x	x	
DE	x							x	x	
DK				x	x					
FR	x	x	x					x	x	x
GR								x	x	
HR		x		x	x			x	x	x
HU	x	x	x							
IT		x	x	x	x	x		x	x	x
LU	x	x								
LV			x					x	x	
MT						x				
PL	x		x	x	x	x	x	x	x	x
RO	x		x					x	x	x
SE								x		x
SI	x	x						x	x	x

Source: prepared by the study team.

Data from alternative sources

The study team has gathered relevant data from public sources and conducted a comprehensive analysis of alternative sources in relation to their quality and suitability for SCO development in Area 2.

Development of one of the alternatives for sub-area 2A relies on existing information from **Marie Skłodowska-Curie Actions (MSCA): Staff exchanges action.** Namely, our study made use of the unit costs developed for intersectoral mobility of research staff. The indicator information collected from this alternative source acted as proxy for standardised information that has not been provided by Member States. The action contributes to boosting jobs, growth and investment by training researchers for new knowledge and skills. It encourages short-term international, interdisciplinary and inter-sectoral exchanges (secondments) of staff members involved in research and innovation activities of participating organisations. It aims to develop sustainable collaborative projects between different organisations from the academic and non-academic sectors (in particular SMEs), based in Europe and beyond. This proxy source contains the following relevant aspects related to intersectoral mobility of researchers, such as staff costs; research, networking, training costs and management costs / indirect costs.

Furthermore, as a complementary source the historical data collected for sub-area 2A, an additional source of relevant data were identified, namely the study '**Monitoring data on ERDF and Cohesion Fund operations, and on the monitoring systems operated in the 2014-2020 period**'. The study, among other things, collected data on total costs and results achieved in ERDF/CF projects, including projects in the area of research and Innovation. It also collected relevant information on common ERDF indicators, such as CO24 (gross new working position (that did not exist before) to directly perform R&D activities in the SME).

For the development of SCOs in sub-area 2B we used information from the **Community Innovation Survey** (Eurostat). This biennial data collection provides information on statistics about enterprises that have product and business process innovations, their strategies, knowledge management and innovation activities, as well as about factors that facilitate or hinder innovation ('innovation environment'). The core statistics cover innovation activities, cooperation, development, expenditures and turnover. The Community Innovation Survey provides statistics about enterprises that have product and business process innovations, their strategies, knowledge management and innovation activities. This data source was primarily used as a triangulation source with historical data.

Table 64. Relevant variables from Community Innovation Survey

VARIABLES	DESCRIPTION
Filter variables	Size of enterprise (e.g. from 10 to 49 employees; from 50 to 249 employees); type of enterprise (e.g. innovative enterprises and non-innovative enterprises); type of activities (e.g. Innovation core activities (Com.Reg. 995/2012)).
Expenditure variables	Absolute EUR figures (or % out of all costs) for expenditure on R&D activities performed in-house and contracted out, capital goods for innovation (such as acquisition of machinery, equipment, software, intellectual property rights (IPRs), rent for buildings and others).
Output/result variables	Indicators of created outputs such as new or significantly improved products to the firm or the market; new or improved processes related to business process innovation, new or improved methods for producing goods or providing services. Indicators of hampering factors for innovation activities, such as lack of qualified employees within enterprise, lack of collaboration partners or lack of access to external knowledge.

Source: Metadata for Community Innovation Survey.

SME Growth and Competitiveness

The assessment of the quality of the historical data collected under this area involves checking the following data points due to their necessity for the EU-level SCO development process, namely:

- ***data on costs*** incurred in implemented projects, possibly broken down by activity and by category of costs: these data are important for attribution of incurred costs, determination of a standard set of cost items included in the definition of a SCO, identification of outlier cases, elimination of gaps in the cost breakdown data, etc.;
- ***information on activities*** supported in implemented projects: these data are important for comparing the interventions supported by the Member State over time and across different Member States;
- ***data on inputs, outputs and results***: these data are important for estimation and attribution of the monetary value to indicators used when developing SCOs, especially standard scales of unit costs.

Data collected from Member States

After receiving the populated DCFs, we compiled the historical data collected for the two sub-areas into a single dataset. An integral part of this process was assessing if the quality and level of detail of these data were sufficient for developing EU-level SCOs. It also involved a preliminary cleaning of the data in order to identify any gaps (i.e. the missing values) and, if possible, address any evident cases of irrelevant or poor-quality data.

Our team used the following **set of criteria** for assessing the collected data: 1) data availability, 2) data quality, and 3) data granularity. Each criterion is further specified in Table 65.

Table 65. Criteria used for assessing the collected historical data

CRITERIA	DESCRIPTION
Data availability	Relates to the collected data sample, its **completeness** and **comprehensiveness.** The scope and representativeness of data received from the Member States in terms of number of areas and projects is analysed during this step. This presumes that all data points needed for calculations and establishment of a particular SCO are sufficiently covered in the data sample, whereas the latter provides a reasonable coverage of Member States. Incomplete data (i.e. provisional / estimated data or data gaps) are as dangerous as inaccurate data. Gaps in data lead to a partial view of the overall picture. Without a complete picture of how projects are funded, SCOs may be calculated through uninformed actions.
Data quality	Relates to the **accuracy, consistency, timeliness** and **comparability**. This relates to the clarity of the key data points in the data collection form (DCF), especially the costs of facilitating relevant activities, information on eligible cost categories and number of outputs. The collected data cannot contradict a value residing in a different source or collected by a different system. The data must be logical, without contradiction or unwarranted variance. This criterion also involves checking whether the supplied data fit the established reference period and other data for that Member State.
Data granularity	Relates to the **level of detail at which data are collected**. This is important because confusion and inaccurate decisions can otherwise occur. Aggregated, summarised and manipulated collections of data could offer a different meaning than the data implied at a lower level. An appropriate level of granularity must be defined to provide sufficient uniqueness and for distinctive properties to become visible. This is a requirement for the development of accurate SCOs

Source: prepared by the study team.

As far as the availability of the collected data are concerned, the two tables below offer a complete overview of the information gathered at the level of the two sub-areas analysed in relation to the area SME Growth and competitiveness.

Table 66. Networking activities of SMEs (sub-area 3A): overview of data coverage

	DATA PROVIDED		RELEVANT PROJECTS		ALSO COMPLETED AND WITH INFO ON TOTAL COSTS		ALSO WITH INFO ON N. SME AND N. EVENT	
MEMBER STATE	N. OP	N. PROJ./CALL	N. OP	N. PROJ./CALL	N. OP	N.PROJ./CALL	N. OP	N.PROJ./CALL
AT	1	10	-	-	-	-	-	-
BE	1	24	1	24	1	24	-	-
BG	1	67	-	-	-	-	-	-
CY	-	-	-	-	-	-	-	-
CZ	1	3	1	3	1	3	1	3
DE	2	4616	-	-	-	-	-	-
DK	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-
ES	2	657	2	441	2	441	1	105
FI	1	202	-	-	-	-	-	-
FR	2	42	2	28	2	28	1	4
GR	1	90	1	90	1	90	-	-
HR	1	396	1	32	1	32	1	32
HU	1	2	1	1	1	1	-	-
IE	-	-	-	-	-	-	-	-
IT	2	880	2	880	2	878	1	6
LT	1	5	1	5	1	5	-	-
LU	-	-	-	-	-	-	-	-
LV	1	4	-	-	-	-	-	-
MT	1	1	-	-	-	-	-	-
NL	-	-	-	-	-	-	-	-
PL	4	37	2	18	2	14	1	8
PT	6	691	6	691	6	691	6	691
RO	-	-	-	-	-	-	-	-
SE	1	1	-	-	-	-	-	-
SI	1	7	1	7	1	6	1	2
SK	-	-	-	-	-	-	-	-
TOT	31	7735	21	2220	21	2213	13	851

Source: prepared by the study team

Concerning sub-area 3A (networking activities of SMEs), as illustrated by the table above:

- The study teams received over 7 700 records on specific projects or calls for proposals, from 19 Member States (and 31 OPs). The other 8 Member States (CY, DK, EE, IE, LU, NL, RO, SK) were

contacted and declared that they do not have relevant data to provide (e.g. the monitoring system of some MS does not allow the extraction of sufficiently detailed data).

- All in all, approximately 70 % of the data provided refer to projects / calls not relevant for the analysis. For example:
    - Data provided by Austrian authorities were not relevant as they referred to operations supporting start-ups or to operations supporting the digitalisation of the SMEs or to innovation networks.
    - Data provided by Bulgaria were considered as not relevant as they referred to projects supporting business growth and for the MA it was not possible to isolate the specific costs for supporting the internationalisation of the SMEs.
    - Data provided by Sachsen programme (Germany) were excluded because they referred to projects that receive a maximum grant of EUR 5 000. Therefore, the values collected did not include the total costs of the operation but only a part of the costs (corresponding to the ceiling of EUR 5 000).
    - Data provided by Mecklenburg-Vorpommern programme (Germany) were excluded because they referred only to projects attending fairs located in Germany (i.e. not in other EU MS or extra-EU countries). And therefore, the values collected did not include the costs for travelling in other EU Member States or extra-EU countries.
    - Data from Czechia and Galicia (Spain) were excluded as they did not provide historical data but a description of SCO schemes.
    - Data from Finland were excluded as they referred to projects identified based on the code of intervention 063 (i.e. Cluster support and business networks primarily benefiting SMEs) which may include operations such as cluster creation and support which differ from the networking activities as understood in the context of this study.
    - Data from Latvia were excluded as they referred to trainings and support for business incubators.
- In the case of 8 Member States (CZ, ES, FR, HR, IT, PL, PT, SI) we have single records providing detailed information on (a) the number of SMEs supported by each project / call and on (b) the number of events attended by the SMEs supported. For some MS only partial data were provided (e.g. data provided by Finland do not include the number of SMEs supported through the single operation).
- In terms of granularity, 97 % of the data refers to individual projects. Only 3 % of the records refer to data aggregated at call level.

Table 67. Consultancy / advisory services to elaborate an internationalisation strategy (sub-area 3B): overview of data coverage

	DATA PROVIDED		RELEVANT PROJECTS		ALSO COMPLETED AND WITH INFO ON TOTAL COSTS		ALSO WITH INFO ON N. SME AND N. SERVICES	
MEMBER STATE	**N. OP**	**N. PROJ./CALL**	**N. OP**	**N.PROJ./CALL**	**N. OP**	**N.PROJ./CALL**	**N. OP**	**N.PROJ./CALL**
AT	-	-	-	-	-	-	-	-
BE	1	10	1	10	1	9	1	9
BG	1	67	-	-	-	-	-	-
CY	-	-	-	-	-	-	-	-
CZ	1	2	1	2	1	2	1	2
DE	-	-	-	-	-	-	-	-
DK	1	17	-	-	-	-	-	-
EE	1	1	1	1	-	-	-	-
ES	2	44	1	34	1	34	1	34
FI	-	-	-	-	-	-	-	-
FR	-	-	-	-	-	-	-	-
GR	-	-	-	-	-	-	-	-
HR	-	-	-	-	-	-	-	-
HU	1	5	1	5	1	5	1	5
IE	-	-	-	-	-	-	-	-
IT	1	2	1	2	1	2	1	2
LT	-	-	-	-	-	-	-	-
LU	-	-	-	-	-	-	-	-
LV	1	1	-	-	-	-	-	-
MT	2	4	-	-	-	-	-	-
NL	-	-	-	-	-	-	-	-
PL	3	8	3	8	2	7	2	7
PT	6	1 188	6	1 188	6	1 188	6	1 188
RO	-	-	-	-	-	-	-	-
SE	1	2	1	2	1	2	1	2
SI	1	2	1	2	1	2	1	2
SK	-	-	-	-	-	-	-	-
TOT	23	1 353	17	1 254	15	1 251	15	1 251

Source: prepared by the study team

Concerning Sub Area 3B (Consultancy / advisory services to elaborate an internationalisation strategy), as illustrated by Table 67:

- The study teams received over 1 300 records on specific projects or calls for proposals, from 14 Member States (and 23 OPs). The other 13 Member States (AT, CY, DE, FI, FR, GR, IE, LT, LU, NL, RO and SK) were contacted and declared that they did not have relevant to provide (e.g. the monitoring system of some Member States does not allow the extraction of sufficiently detailed data).
- All in all, approximately 93 % of the s provided refer to projects / calls relevant to the analysis. Some data were considered as not relevant for various reasons. For example:
    - Data provided by Malta were excluded because they referred to projects that receive a maximum grant of EUR 5 000. Therefore, the values collected did not include the total costs of the operation but only a part of the costs (corresponding to the ceiling of EUR 5 000).
    - Data provided by Denmark were excluded as it was not possible to isolate the intervention which contribute to the internationalisation of the SMEs from other types of consultancy / advisory services.
- In the case of 9 Member States (BE, CZ, ES, HU, IT, PL, PT, SE, SI) we had single records providing detailed information on (a) the number of SMEs supported by each project / call and on (b) the number of Consultancy / advisory services per SMEs supported.

Typologies of activities according to collected data

Table 68 illustrates the type of eligible activities under operations supporting networking activities of SMEs. (sub-area 3A). The table refers only to the data by CZ, ES, FR, HR, IT, PL, PT, SI – the 8 Member States that provided relevant data – on completed projects with detailed info on the total verified costs, the number of SMEs supported and the number of events attended by the SMEs supported.

Table 68. Networking activities of SMEs (sub-area 3A): type of eligible activities

MEMBER STATE	FAIR	INTERNATIONAL SCIENTIFIC CONFERENCE	PARTNERSHIP EXCHANGE
CZ	3		
ES	441		
FR			28
HR	37		
IT	878	1	1
PL	19		
PT	691		
SI	3	1	3

Source: prepared by the study team

As illustrated by Table 68 above, 7 out of 8 MS that provided relevant data, did support (exclusively or mainly) the participation to trade fairs. The only exception is FR which supported partnership exchanges.

Additional information on the adopted modality of attendance to the above-mentioned activities were also requested to the data owners. In particular, respondents should specify if the relevant projects / calls for

proposals reported in the forms funded the participation to these activities in presence, remotely or in hybrid form. All records provided by the 8 MS referred to networking activities held in presence.

Table 69 illustrates the type of eligible activities under operations supporting SMEs recurring to consultancy / advisory services to elaborate an internationalisation strategy (sub-area 3B). The table refers only to the provided by BE, CZ, ES, HU, IT, PL, PT, SE, SI –the 9 Member States that provided relevant data – on completed projects with detailed information on the total verified costs, the number of SMEs supported and the number of consultancy / advisory services supported.

Table 69. Consultancy / advisory services to elaborate an internationalisation strategy (sub-area 3B): type of eligible activities

MEMBER STATE	EXPORT STRATEGY	MARKET RESEARCH	EXPORT STRATEGY + MARKET RESEARCH
BE	7	3	
CZ			2
ES		34	
HU		5	
IT	2		
PL			8
PT		1188	
SE		2	
SI		2	

Source: prepared by the study team

As illustrated by Table 69, 8 out of 9 MS that provided relevant data, did support operations for the definition of a market research. In the case of CZ and PL these operations cover both the elaboration of a market research and of an export strategy. Relevant data provided by IT only refer to project supporting the elaboration of export strategies.

Costs incurred according to collected data

This section illustrates the type of eligible costs under operations supporting networking activities of SMEs. (sub-area 3A). The analysis refers only to the data provided by CZ, ES, FR, HR, IT, PL, PT, SI – the 8 Member States that provided relevant data on completed projects – with detailed information on the total verified costs, the number of SMEs supported and the number of events attended by the SMEs supported. The following categories of costs are eligible:

- costs related to renting stands;
- promotion costs (e.g. production of booklets for the exhibition);
- costs related to registering for the event;
- travel and accommodation costs;
- costs of the transportation of the materials;
- staff costs;
- costs of specialised external services (e.g. for translation services).

As regards the eligible costs under operations supporting SMEs recurring to consultancy / advisory services to elaborate an internationalisation strategy (sub-area 3B), the analysis refers only to the data provided by BE, CZ, ES, HU, IT, PL, PT, SE, SI – the 9 Member States that provided relevant data, on completed projects – with detailed info on the total verified costs, the number of SMEs supported and the number of consultancy / advisory services supported. The following categories of costs are eligible:

- staff costs;
- direct costs other than staff (e.g. travel, trademarks, acquisition of information, equipment, etc.);
- indirect costs.

Outputs and results produced according to collected data

Table 70 illustrates the indicators used to monitor the operations supporting networking activities of SMEs (sub-area 3A). The table refers only to the data provided by BE, CZ, ES, HU, IT, PL, PT, SE, SI – the 9 Member States that provided relevant data, on completed projects – with detailed info on the total verified costs, the number of SMEs supported and the number of consultancy / advisory services supported.

Table 70. Networking activities of SMEs (sub-area 3A): type of indicators

MEMBER STATE	NUMBER OF SMES SUPPORTED	NUMBER OF EVENTS ATTENDED BY THE SMES SUPPORTED	FIRMS RECEIVING SUPPORT (CO01)	FIRMS RECEIVING GRANTS (CO02)	PRIVATE INVESTMENTS CORRESPONDING TO PUBLIC SUPPORT TO COMPANIES, IN EURO (CO06)	FIRMS COOPERATING WITH RESEARCH INSTITUTION (CO26)	INCREASED INCOME FROM EXPORTS (SALES ABROAD) (EUR)	INCREASED SALES REVENUE (EUR)	NUMBER OF FOREIGN TRADE CONTRACTS SIGNED BY ENTERPRISES SUPPORTED IN THE SCOPE OF INTERNATIONALISATION	FIRMS SUPPORTED IN THE SCOPE OF INTERNATIONALISATION	NUMBER OF SUPPORTED INFORMATION AND PROMOTION PROJECTS ON A NATIONAL LEVEL	NUMBER OF SUPPORTED INFORMATION AND PROMOTION PROJECTS OF AN INTERNATIONAL LEVEL	NUMBER OF PARTICIPATIONS IN EXHIBITIONS AND FAIRS ABROAD
CZ	3	3	0	0	0	0	0	0	0	0	0	0	3
ES	441	105	0	0	0	0	0	0	0	0	0	0	0
FR	28	4	4	0	0	1	0	0	0	0	0	0	0
HR	37	37	0	0	25	0	28	37	0	0	0	0	0
IT	880	6	6	6	0	0	0	0	0	0	0	0	0
PL	19	9	0	0	0	0	0	0	8	9	6	10	0
PT	691	691	0	0	0	0	0	0	0	0	0	0	0
SI	7	3	7	7	0	0	0	0	0	0	0	0	0

Source: prepared by the study team

As illustrated by Table 70 the 8 Member States that provided relevant data, use different types of indicators to monitor operations supporting networking activities of SMEs.

The two indicators most used were 'number of SMEs supported', and 'number of events attended by the SMEs supported', which were used by all 8 Member States.

The use of common ERDF/CF output indicators is limited to:

- 3 Member States in the case of CO01 (FR, IT, SI);
- 2 Member States in the case of CO02 (IT, SI);
- only HR in the case of CO06;
- only FR in the case of CO26;
- several Member States use programme-specific indicators.

Table 71 illustrates the indicators used to monitor the operations supporting SMEs recurring to consultancy / advisory services to elaborate an internationalisation strategy (sub-area 3B). The table refers only to the data provided by BE, CZ, ES, HU, IT, PL, PT, SE, SI – the 9 Member States that provided relevant data, on completed projects – with detailed info on the total verified costs, the number of SMEs supported and the number of consultancy / advisory services supported.

Table 71. Consultancy / advisory services to elaborate an internationalisation strategy (sub-area 3A): type of indicators

MEMBER STATE	NUMBER OF SMES SUPPORTED	NUMBER OF ADVISORY/CONSULTANCY SERVICES SUPPORTED PER SMES	FIRMS RECEIVING SUPPORT (CO01)	FIRMS RECEIVING GRANTS (CO02)	FIRMS RECEIVING NON-FINANCIAL SUPPORT (CO04)	NUMBER OF ENTERPRISES SUPPORTED IN THE SCOPE OF INTERNATIONALISATION	NUMBER OF FOREIGN TRADE CONTRACTS SIGNED BY ENTERPRISES SUPPORTED IN	NUMBER OF BUSINESS CONTACTS	NUMBER OF ENTERPRISES THAT INTRODUCED ORGANIZATIONAL AND	NUMBER OF ENTERPRISES PARTICIPATING IN THE SURVEY	NUMBER OF PLATFORMS / APPLICATIONS SUPPORTING INTERNATIONALISATION	NUMBER OF INTERNATIONALISATION CENTRES OPENED UNDER THE PROJECT	NUMBER OF NEW EMPLOYEES IN COMPANIES WHICH RECEIVED SUPPORT	NUMBER OF COMPANIES WHICH HAVE COOPERATED TO STRENGTHEN THEIR	NUMBER OF SERVICE AREAS OFFERED ACCORDING TO THE BUSINESS PLAN
BE	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0
CZ	2	2	0	0	0	0	0	0	0	0	0	0	0	0	2
ES	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0
HU	5	5	0	0	2	0	0	0	0	0	0	0	0	0	0
IT	2	2	2	2	0	2	0	0	0	0	0	0	0	0	0
PL	8	8	0	0	1	6	7	4	4	1	1	1	0	0	0
PT	1188	1188	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	2	2	0	0	0	0	2	0	0	0	0	0	1	1	0
SI	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0

Source: prepared by the study team

As illustrated by Table 71, the 9 MS that provided relevant data, use different types of indicators to monitor operations supporting consultancy / advisory services to elaborate an internationalisation strategy.

The indicators most used were 'number of SMEs supported', and 'number of advisory / consultancy services supported per SMEs', which were used by all 9 Member States that provided relevant data.

The use of common ERDF/CF output indicators is limited to:

- 2 Member States in case of CO01 (IT, SI);
- 2 Member States in case of CO02 (IT, SI);
- 2 Member States in case of CO04 (HU, PL);
- several Member States use programme-specific indicators.

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