Application of the ICAT TC Toolkit in the City of Mostar, Bosnia and Herzegovina

- Detailed assessment report based on the application of the TC Toolkit

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ICAT Initiative for Climate Action Transparency

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Detailed assessment report based on the application of the TC Toolkit

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Introduction

Within the framework of the Initiative for Climate Action Transparency (ICAT), and with the aim of applying the Transformational Change (TC) Toolkit to interventions defined in the Sustainable Energy and Climate Action Plan (SECAP) of the City of Mostar, a review of the full SECAP portfolio was carried out, including a preliminary analysis of the implementation status, potential impact, investment requirements, and replication opportunities of the interventions (Activity 1). Based on this initial assessment and predefined criteria, a subset of priority interventions showing the highest potential for achieving TC was identified, with a detailed overview of these interventions provided in the following subchapter in a table.

TC, according to the TC Toolkit, represents a fundamental and long-lasting change in a system that disrupts established high-carbon practices and contributes to the transition toward a net-zero CO_2 society, in line with the Paris Agreement's goal of limiting global warming to 1.5–2°C and the United Nations Sustainable Development Goals (SDGs). This concept encompasses large-scale, long-term, and systemic outcomes, including technological changes, actor roles, economic and non-economic incentives, as well as shifts in norms and behavior, which together enable the planned transformation of the system toward sustainable and low-carbon practices. Assessing the TC of interventions allows for understanding how a specific intervention contributes to achieving multiple objectives at the international, national and local levels through structural changes in a sector or across sectors, including reductions in greenhouse gas (GHG) emissions and progress toward the SDGs. In addition to quantifying impacts, the assessment supports:

- Improving policy design and selection;
- Identifying interventions with the greatest potential for paradigm-shifting change;
- Attracting financial resources;
- Reporting and communicating expected or achieved transformational effects.

The objectives of the assessment vary depending on the stage of the intervention, with pre-implementation assessments supporting better selection and prioritization of interventions, while assessments during or after implementation support monitoring transformational effects, informing future policy design, reformulating Nationally Determined Contributions (NDCs), and continuous learning. Identifying the target audience, including policymakers, civil society, the private sector, donors, and other relevant stakeholders, ensures that the assessment results are useful for decision-making and strategic planning. Within this assessment, the TC of interventions is evaluated based on their contribution to achieving these goals and their impact on the long-term sustainability and decarbonization of the local energy and climate system.

In this phase (Activity 2), the selected interventions underwent a detailed evaluation using ICAT Tools. The implementation began with a structured process of data collection and verification to ensure completeness, reliability, and consistency of the quantitative and qualitative inputs used in the assessment. For each selected intervention, a tailored questionnaire was prepared to guide data collection, specifying the required inputs, such as operational data, technological parameters, and economic costs. The data collection process was conducted in close collaboration with the City of Mostar, ensuring that local knowledge, administrative data, and institutional contributions were fully integrated into the assessment. In parallel, national strategic and policy documents were analyzed, including climate action strategies and frameworks relevant to Bosnia and Herzegovina (BiH)'s NDCs, to place the assessment within a broader policy context.

After completing the data collection and verification, the selected SECAP interventions were analyzed

using the relevant ICAT Tools. Specifically, the following were applied:

- **Investment Tool** – to assess the financial sustainability and investment readiness of the interventions;
- **General Assessment Tool** – to evaluate systemic policy changes and behavioral shifts;
- **Portfolio Tool** – to compare multiple interventions and their effectiveness within the intervention portfolio.

This report provides a comprehensive assessment of the progress in implementing the selected SECAP interventions, their financial sustainability, and their transformational impact on the local energy and climate system. The assessment focuses not only on quantifying greenhouse gas emission reduction effects but also on identifying the broader systemic impacts of the interventions, including changes in policies, institutional frameworks, stakeholder behavior, and investment flows. In this way, the report provides an analytical foundation for improving local climate policies, planning future investments, and strengthening the alignment of local actions with national climate objectives and BiH's international commitments.

Overview of Selected Interventions and Their Context

Out of a total of 56 interventions defined under the City of Mostar's SECAP, 15 priority interventions were selected for detailed assessment based on their potential to contribute to TC. The following table identifies a set of priority interventions that show the highest potential for achieving TC.

Table 1: SECAP Interventions Selected for Detailed ICAT Assessment

No.	Intervention
1	Installation of solar systems for electricity production
2	Insulation of collective residential buildings
3	Replacement of existing lighting fixtures in collective residential buildings
4	Decarbonization of public education buildings
5	Renovation of public buildings owned by the City of Mostar
6	Education and promotion of energy efficiency for citizens
7	Establishment of an information system for monitoring energy consumption in public buildings
8	Replacement of existing high-pressure mercury and sodium lamps in public lighting
9	Modernization of public lighting
10	Procurement of 44 electric vehicles for the city-owned vehicle fleet
11	Installation of a software information system for public passenger transport
12	Continuation of construction of bicycle lanes with supporting infrastructure
13	Construction and expansion of infrastructure to support electric vehicles
14	Construction of bus stops extensions
15	Improvement of energy efficiency in the water supply network

All selected interventions were created in the TC Toolkit and for each intervention, the appropriate ICAT Tool was applied to carry out a detailed assessment of their TC, following the guidance provided in the TC Toolkit.

Assessment Process

This chapter describes the key steps and methodological approach used in assessing the TC of interventions defined in the City of Mostar's SECAP. The assessment process includes:

- **Systematic collection and verification of quantitative and qualitative data** to ensure consistency, completeness, and reliability;
- **Application of the TC Toolkit** to assess the TC of selected interventions;
- **Analysis of outcome and process characteristics** to evaluate the scale, duration, and mechanisms of change;
- **Identification of barriers** that may limit the effectiveness and scalability of interventions;
- **Generation of structured reports and visualizations of result**s to support interpretation, comparison, and decision-making.

The objective of this chapter is to provide an overview of how the interventions were evaluated, ensure transparency of the applied TC Toolkit and highlight methodological consistency across all phases of the assessment, from the initial data entry to the final visualization of the TC of the interventions.

Data Collection and Verification

Data collection and verification represent a central phase in the assessment of selected SECAP interventions in the City of Mostar, aimed at ensuring complete, reliable and methodologically consistent information necessary for the analysis of the transformational impact of the interventions.

For each selected intervention, a tailored questionnaire was prepared to serve as a guide throughout the entire data collection process, with clearly defined required input information, including operational data, technological parameters, and economic costs, enabling systematic and consistent data processing. The questionnaire covered key information on each intervention including:

- Title and type of the intervention;
- Description of specific activities;
- Status of the intervention;
- Implementation period;
- Implementing entity or entities;
- Objectives and intended impacts or benefits of the intervention;
- Level of the intervention;
- Geographic coverage;
- Sectors targeted;
- Other related interventions.

These questionnaires served as the primary input documents for creating interventions into the TC Toolkit and defining the assessment boundaries, ensuring that all interventions were analyzed in a uniform and methodologically consistent manner.

The quantitative data used in the assessment encompassed local, national, and global levels, enabling a comprehensive analysis of both the implementation and the transformational impact of the interventions. At the municipal level, data were obtained from the City of Mostar's SECAP, serving as the primary reference for identifying existing emissions, collecting information on selected interventions, and evaluating the progress of their implementation. The national context was

established through the analysis of total GHG emissions in BiH from 2018[1]. This allowed for the quantification of emission outcomes at the national level and for comparison with local results from the City of Mostar, thereby assessing the contribution of local interventions to the achievement of national climate objectives. National strategic and policy documents, including climate action strategies and frameworks relevant to BiH's NDCs, were also analyzed to situate the assessment within a broader policy context. At the global level, it was necessary to determine the GHG emission outcomes for each intervention. For this analysis data on global GHG emissions for 2024 were used, showing that human activities worldwide released a record 53 gigatonnes of CO_2-equivalent into the atmosphere, excluding emissions from land use, land-use change, and forestry (LULUCF)[2]. The inclusion of these global data enabled the quantification of the potential impact of local interventions in a broader international context.

In addition to quantitative data collection, a workshop was organized with representatives of public buildings, as the majority of selected interventions pertain to this sector. At the workshop, representatives from the Mostar Kindergarten, the Secondary School of Economics, primary schools, the Health Center, as well as representatives from the City of Mostar participated. The workshop facilitated the validation of previously collected data, the clarification of gaps, and the collection of additional contextual information, enhancing the credibility of the assessment.

The data collection and verification process was supported by the engagement of experts with relevant expertise, ensuring the rigor and integrity of the assessment. The team oversaw the application of the TC Toolkit and data validation, enabling the assessment results to accurately reflect the progress in implementing SECAP interventions and their TC.

All collected data underwent a rigorous verification process, including cross-checks between sources, reliability assessments, and validation in accordance with ICAT methodological requirements. Any gaps or inconsistencies were addressed through additional consultations with City of Mostar representatives or further document review, ensuring transparency, quality, and reliability of the assessment. This structured and integrated approach to data collection and verification ensured that all subsequent steps in the TC Toolkit were based on verified, standardized and expert-reviewed data, and that the assessment results accurately reflected the progress in the City of Mostar's SECAP intervention implementation and their TC.

Baseline Data, Assumptions and Calculation Methodology for GHG Emissions and Energy Savings

The energy savings and GHG emission reductions used in this assessment are based on the quantitative values reported in the City of Mostar's SECAP. This assessment did not establish a new emissions baseline, nor were the energy and emission impacts of the interventions independently recalculated. The intervention-level values reported in the City of Mostar's SECAP were used as input data for the assessment of TC.

To ensure transparency regarding the origin of these values, this chapter provides a concise overview of the baseline year and the underlying activity data used in the SECAP, the emission factors applied to convert energy consumption into CO_2 emissions, the main assumptions used to define the expected situation following implementation of the interventions, and the general calculation approach used to determine energy savings and GHG emission reductions.

[1] *Third Biennial Update Report on Greenhouse Gas Emissions of Bosnia and Herzegovina under the United Nations Framework Convention on Climate Change (UNFCCC), 2022.*

[2] *GHG Emissions of All World Countries: 2025 Report. Joint Research Centre (JRC), European Commission.*

The SECAP covers the geographical and administrative territory of the City of Mostar and uses **2014 as the baseline year** for the Baseline Emission Inventory (BEI). This year was selected in the SECAP primarily on the basis of the availability and reliability of the data required to establish the energy and emissions baseline. **2030 is used as the target year**, representing the time horizon for the implementation of the planned climate change mitigation interventions and the year against which their expected cumulative impacts are assessed.

Accordingly, the baseline for the values used in this assessment is the **2014 Baseline Emission Inventory presented in the City of Mostar's SECAP**. This assessment therefore relies on the same baseline as the SECAP, without establishing a separate baseline scenario. The energy savings and emission reductions presented in this report are the SECAP's projected changes relative to 2014 levels, not reductions measured against a scenario without the interventions. They should therefore be read as indicative estimates of each intervention's potential contribution to the SECAP target, rather than as additional reductions attributable to the interventions or as verified mitigation results.

The BEI was developed on the basis of sector-specific activity and energy consumption data for the sectors covered by the SECAP. For the **buildings sector**, the relevant baseline parameters included the number and type of buildings, building floor area, electricity and thermal energy consumption, and the consumption of individual energy sources. For the **transport sector**, the baseline was based on parameters such as the structure and categories of the vehicle fleet, fuel types, and the corresponding fuel consumption. For **public lighting**, the inventory included the number and type of lighting fixtures and the electricity consumption of the public lighting system. For **water supply**, the baseline included electricity consumption associated with pumping and other operational processes of the system, together with the relevant characteristics of the water supply system. Emissions associated with waste were addressed separately within the non-energy sector of the SECAP.

The Baseline Emission Inventory (BEI) was prepared in accordance with the **IPCC methodological framework**, while the energy consumption and emissions calculations were carried out using **LEAP (Low Emissions Analysis Platform)** software.

The resulting baseline energy consumption and emission profile for 2014 is summarized in the following tables. The first table presents final energy consumption across the sectors and subsectors, while the second presents the corresponding sectoral CO_2 emissions included in the BEI. Together, these tables provide the quantitative reference framework against which the expected effects of the mitigation interventions are assessed.

Table 2: Final energy consumption by sector and subsector in the 2014 baseline year[3]

ENERGY SECTORS	Final Energy (MWh)	Sector Share (%)
BUILDINGS		
Public buildings owned by the City	9,832	1.26
Public buildings not owned by the City	20,986	2.68
Residential buildings	229,391	29.33
Private business, service and commercial sector	90,000	11.51
PUBLIC LIGHTING		
Public lighting system	7,450.38	0.95
TRANSPORT		
Vehicles under the jurisdiction of the City	760.81	0.10
Public urban transport	15,166.8	1.94
Private and commercial vehicles	402,470	51.46
NON-ENERGY SECTORS		
Water supply	6,010	0.77

[3] *Sustainable Energy and Climate Action Plan (SECAP) of the City of Mostar for the period until 2030. City of Mostar, April 2023.*

ENERGY SECTORS	Final Energy (MWh)	Sector Share (%)
TOTAL	**782,066.99**	**100.00**

Table 3: CO_2 emissions by sector and subsector in the 2014 baseline year[4]

ENERGY SECTORS	Final Emissions (t CO_2eq)	Sector Share (%)
BUILDINGS		
Public buildings owned by the City	3,777	1.04
Public buildings not owned by the City	7,082	1.95
Residential buildings	139,271	38.44
Private business, service and commercial sector	54,956	15.17
PUBLIC LIGHTING		
Public lighting system	5,387	1.49
TRANSPORT		
Vehicles under the jurisdiction of the City	202.00	0.056
Public urban transport	4,050	1.12
Private and commercial vehicles	104,779	28.92
NON-ENERGY SECTORS		
Water supply	4,347	1.20
Waste	38,475	10.62
TOTAL	**362,326**	**100.00**

Building on this baseline profile, the conversion of energy consumption into CO_2 emissions, as well as the estimation of emission reductions associated with individual interventions, depends on the emission factor assigned to each energy carrier. The emission factors applied in the City of Mostar's SECAP are therefore presented below.

Table 4: Emission factors applied in the City of Mostar SECAP[5]

Energy carrier	Emission factor (t CO_2/MWh)
Electricity	*0.723*
Liquefied petroleum gas (LPG)	*0.227*
Fuel oil	*0.279*
Biomass	*0.000*
Motor gasoline	*0.249*
Diesel fuel	*0.267*

***Note: According to the** City of Mostar's SECAP**, electricity emission factor **was calculated based on the shares of electricity generation from thermal and hydropower plants in Bosnia and Herzegovina in 2014, as well as coal consumption in that year. Therefore, the emission factor corresponds to the 2014 baseline year used in the** City of Mostar's SECAP.*

***For certain interventions, the reported energy savings and CO_2 emission reductions imply emission factors that differ from the reference value of 0.723 tCO_2/MWh. These differences originate from the pre-existing values reported in the** City of Mostar's SECAP.*

As the detailed calculation assumptions underlying these estimates are not available, the reasons for these discrepancies could not be independently verified. Therefore, the estimates reported in the** City of Mostar's SECAP **have been retained to ensure consistency with the source document.

The corresponding CO_2 emissions were calculated by multiplying the relevant energy consumption by the applicable emission factor. The expected energy savings and GHG emission reductions for the

[4] *Ibid.*

[5] *Ibid.*

interventions were then determined by comparing the baseline situation with the expected situation after implementation of the intervention.

The intervention impacts presented in the City of Mostar's SECAP are based on a comparison between the relevant baseline situation and the expected situation following implementation of the intervention by 2030.

Therefore, the calculation at the level of an individual intervention depends not only on energy consumption in the 2014 baseline year, but also on the **assumed scale of implementation and the technical effect of the intervention**. Depending on the type of intervention, these assumptions include, for example:

- the number or floor area of buildings expected to be renovated;
- the expected reduction in energy demand following the implementation of energy efficiency interventions;
- the number and capacity of renewable energy systems planned to be installed and their expected annual energy generation;
- the number of public lighting units to be replaced and the expected reduction in electricity consumption;
- changes in vehicle or fuel use associated with transport interventions;
- reductions in electricity consumption associated with improvements to water supply infrastructure; and
- other intervention-specific parameters specified in the City of Mostar's SECAP.

The general calculation logic for energy efficiency interventions can be presented as follows:

Energy savings = Baseline energy consumption − Expected energy consumption after implementation

The corresponding reduction in CO_2 emissions associated with energy consumption can generally be expressed as follows:

CO_2 emission reduction = Baseline CO_2 emissions − Expected CO_2 emissions after implementation

or, where an intervention directly results in avoided consumption of a specific energy source:

CO_2 emission reduction = Avoided energy consumption × Applicable emission factor

For interventions involving fuel switching, emissions before and after implementation are calculated separately by applying the corresponding emission factors. The difference between these values represents the estimated emission reduction:

CO_2 emission reduction = (Energy consumption before × EF before) − (Energy consumption after × EF after)

For interventions involving electricity generation from renewable energy sources, such as photovoltaic systems, the electricity generated from the renewable source represents electricity that would otherwise have been supplied from the power grid. The avoided grid electricity consumption is therefore converted into avoided CO_2 emissions using the electricity emission factor applied in the SECAP:

Avoided CO_2 emissions = Renewable electricity generation × Grid electricity emission factor

The same general principle applies to interventions aimed at improving the efficiency of electricity use, such as public lighting modernization or energy efficiency interventions for electricity-consuming infrastructure: the expected reduction in electricity consumption is multiplied by the electricity emission factor to determine the corresponding reduction in CO_2 emissions.

For interventions in the transport sector, the expected change in fuel consumption is combined with the corresponding fuel-specific emission factor. For non-energy interventions, including interventions in the waste sector, the GHG emission reduction values reported in the City of Mostar's SECAP are used, as these effects are not derived solely from the energy-source emission factors described above.

It is therefore important to distinguish between the Baseline Emission Inventory, which represents energy consumption and emissions within the territory of the City of Mostar in 2014, and the calculations at the level of individual interventions, which incorporate assumptions regarding the expected scale and effect of each intervention by 2030. The intervention-level energy savings and GHG emission reductions reported in the City of Mostar's SECAP are the result of combining baseline data, implementation assumptions, and applicable emission factors.

The City of Mostar's SECAP establishes a target of reducing CO_2 emissions by at least 40% by 2030 compared to the 2014 baseline. However, the projected emission reductions resulting from the planned interventions amount to approximately 37.8%, indicating that the existing interventions alone are insufficient to achieve the overall target. According to the City of Mostar's SECAP, this is partly attributed to the specific energy consumption structure of the City of Mostar, where electricity represents a dominant energy source, particularly for heating, unlike many other cities in BiH where fossil fuels, such as coal and fuel oil, are more commonly used. Nevertheless, the City of Mostar's SECAP identifies significant potential for additional emission reduction interventions, particularly in the transport and waste management sectors, which could enable the City to exceed the 40% target. Achieving this will require the City's active involvement in the systematic planning, implementation and financing of additional interventions.

Table 5: Reduction in CO_2 emissions through the implementation of interventions[6]

Sector	CO_2 emissions – 2014 (t CO_2)	CO_2 emissions – 2030 (t CO_2)	Emission reduction (%)
Buildings	205,086	117,564	42.7
Public lighting	5,387	1,492	72.3
Transport	109,031	88,348	18.9
Water supply	4,347	1,990.74	54.2
Waste	38,475	15,891	58.7
TOTAL	**362,326**	**225,285.74**	**37.8**

The SECAP also presents the expected reductions in CO_2 emissions and energy consumption by 2030 resulting from the implementation of the planned interventions, as summarized in the tables below.

Table 6: Reduction in energy consumption through the implementation of interventions[7]

Sector	Energy consumption – 2014 (MWh)	Energy consumption – 2030 (MWh)	Energy consumption reduction (%)
Buildings	350,209	203,520.6	41.9
Public lighting	7,450.38	2,229.38	70.1
Transport	418,397.61	234,620.61	43.9
Water supply	6,010	2,910	51.6
TOTAL	**782,066.99**	**443,280.59**	**43.3**

[6] *Ibid.*

[7] *Ibid.*

According to the City of Mostar's SECAP, the projected reduction in energy consumption in the transport sector by 2030 is 43.9%, while the corresponding CO_2 emission reduction is estimated at 18.9%. This difference implies a change in the average emission intensity of energy consumption in the transport sector. However, the SECAP does not provide a detailed breakdown of the projected energy mix and emission factors for 2030 that would fully explain this difference. Therefore, the original SECAP projections have been retained.

For the purposes of this transformational potential assessment, **the energy savings and GHG emission reductions assigned to individual interventions were taken directly from the corresponding intervention assessments presented in the City of Mostar's SECAP**. These values were not independently recalculated or modified as part of this assessment.

Application of the ICAT Tools

The previously prepared and completed questionnaires facilitated the creation of interventions and the entry of relevant information/data into the TC Toolkit, as well as further analysis using the appropriate ICAT Tool in accordance with the TC Toolkit.

Prior to creating the interventions in the TC Toolkit, the TC Toolkit was carefully reviewed to ensure the correct application of the ICAT Tools and consistency in the assessment.

After creating the interventions in the TC Toolkit and entering the relevant information for all selected interventions, each of them was analyzed using the appropriate ICAT Tool:

- **The Investment Tool** was applied to assess the financial sustainability and investment readiness of the interventions;
- **The General Assessment Tool** was used to evaluate systemic policy shifts and behavioral changes;
- **The Portfolio Tool** facilitated the comparison of multiple interventions and their effectiveness within the overall intervention portfolio.

The selection of the ICAT Tool for each intervention was determined by the TC Toolkit based on the responses provided in the "Assess intervention" section.

The first question was: **"Will the proposed intervention lead to emission reductions that could be (at least partially) traded within a market system?"** Since BiH currently does not have a carbon market, this question was answered "No" for all interventions, meaning that the **Carbon Market Tool** was not applied to any intervention.

The next question was: **"Is the intervention financed (at least in part) by sources other than public budgets?"** If the answer to this question was "Yes," the intervention was assessed using the **Investment Tool**, while a "No" answer led to the **General Assessment Tool**. As a result, one intervention was assessed using the **General Assessment Tool**, while the remaining fourteen interventions were evaluated using the **Investment Tool**.

The question **"Do you want to evaluate the transformational impact of a set of multiple interventions?"** was revisited after assessing all individual interventions in order to conduct an assessment of intervention sets using the **Portfolio Tool**.

The following section presents structured descriptions of all analyzed interventions, prepared based on the completed questionnaires, along with the corresponding ICAT Tool used for their analysis. For each intervention, the start and end dates of implementation are recorded. Since exact dates were not available, the same day and month were used for all interventions, while the years reflect the actual periods of implementation and completion. This approach ensures consistent data entry while

accurately representing the timeframe on an annual basis. Each intervention description is followed by a brief reflection on its transformational potential, which refers to the scores assigned to individual process and outcome characteristics in the TC Toolkit. Category scores are expressed on a scale from 0 (very unlikely) to 4 (very likely), while individual characteristics are rated as very unlikely, unlikely, possible, likely or very likely. The full assessment reports for each intervention, including the rationale for each score, are provided in Appendices A–O. **The process rating** indicates how likely it is that the intervention will actually trigger the change, depending on whether the necessary technology, actors, incentives and social conditions are in place ("Likely" meaning a probability of 60–90%, "Possible" 30–60%). **The outcome rating** indicates how large and how lasting that change could be ("Major" meaning a large-scale, long-lasting change, "Moderate" a noticeable but more limited one).

Intervention 1: Installation of solar systems for electricity production

This intervention involves the installation of solar power systems for electricity generation in 1,500 households, with 50% co-financing of the investment, with a planned annual production of 2,250 MWh of renewable electricity and an estimated emissions reduction of approximately 1,627 t CO_2eq/year. The SolarZET project, through which 33 households were selected for the installation of systems with capacities ranging from 4 to 12 kW, represents an already implemented initial phase of the broader intervention. The table below presents a detailed and structured description of the analyzed intervention.

Table 7: Description of Intervention 1: Installation of solar systems for electricity production

Information	Description
Title of the policy or action	**Installation of solar systems for electricity production**
Type of policy or action	Implementation of technologies, processes or practices
Description of specific interventions	By implementing this intervention, namely the installation of solar systems on 1,500 residential buildings with co-financing covering 50% of the investment, renewable energy production would reach 2,250 MWh/year, while CO_2 emissions would be reduced by approximately 1,627 t CO_2eq/year, with a simultaneous reduction in electricity consumption during peak load periods. A relevant example is the SolarZET project, under which 33 houses were selected for the installation of solar systems with capacities ranging from 4 to 12 kW. The SolarZET project itself has been completed and represents an implemented activity relevant to the broader intervention assessed here. However, the overall intervention remains ongoing, as further similar activities are planned to continue and expand the installation of solar systems in households across the City of Mostar up to 2030. The implementation of the SolarZET project resulted in an estimated emission reduction of around 320 t CO_2/year. Informational workshops for citizens were also held within the project, during which significantly greater interest was recorded than the available project capacity. This indicates considerable potential for the continuation and scaling up of similar programmes, particularly if funding for such activities is secured in the City budget.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar – Department for Spatial Planning, Construction and Reconstruction
Objectives and intended impacts or benefits of the policy or action	By implementing this intervention, through the installation of solar systems on 1,500 households and co-financing covering 50% of the investment, renewable energy production of 2,250 MWh/year can be achieved, along with a reduction of CO_2 emissions by approximately 1,627 t CO_2eq/year, while also reducing electricity consumption during peak load periods.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Energy supply, Buildings
Other related policies or actions	Renovation of public buildings owned by the City of Mostar; Insulation of collective residential buildings; Decarbonization of public buildings intended for education
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

In terms of transformational impact, this intervention could shift household electricity supply in the City of Mostar from centralised fossil-based generation towards decentralised, citizen-owned renewable energy. It is assessed as Likely in terms of process and between Major and Moderate in terms of outcome (Appendix A). This means that the change is likely to happen and could be both large and lasting. Its main driver is the 50% co-financing scheme: incentives received the highest category score (3.5), with economic incentives, adoption, scale-up and benefits for households all rated very likely. The SolarZET project, in which 33 households installed systems of 4–12 kW, shows that the model works and that citizens are interested. The role of local installers, broader coalitions and a shift in social norms were rated only possible, leaving agents and norms at 2.5. In practice,

rooftop solar in the City of Mostar currently expands only as fast as the City's funding calls allow. The intervention will become transformational if co-financing evolves from individual project cycles into a continuous programme, supported by local installation and maintenance capacity.

Intervention 2: Insulation of collective residential buildings

This intervention involves the thermal insulation of 70 collective residential buildings in the City of Mostar, with 50% co-financing of the investment. The aim of the intervention is to significantly reduce energy consumption for heating and CO_2 emissions in the residential sector, contributing to energy efficiency and sustainability. The table below presents a detailed and structured description of the analyzed intervention.

Table 8: Description of Intervention 2: Insulation of collective residential buildings

Information	Description
Title of the policy or action	**Insulation of collective residential buildings**
Type of policy or action	Implementation of technologies, processes or practices
Description of specific interventions	The intervention involves the thermal insulation of the external envelopes (insulation) of 70 residential apartment buildings in the City of Mostar. The insulation is planned under a co-financing model covering 50% of the investment. By insulating the buildings, a reduction of heating fuel consumption of approximately 52% can be achieved, which also results in a decrease in emissions. In practice, tenants have shown strong initiative by self-organizing and implementing insulation interventions across a significant number of buildings. As part of the activities supporting this broader intervention, a memorandum of understanding has been signed with GIZ, and the related project activity has entered its final phase. This specific activity does not represent the completion of the overall intervention. However, despite this progress, financial resources for implementation are not available for the current year. The broader intervention covering the planned thermal insulation of 70 collective residential buildings therefore remains ongoing and is planned to continue until 2030.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2024
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar – Department for Spatial Planning, Construction and Reconstruction
Objectives and intended impacts or benefits of the policy or action	By insulating the buildings, a reduction of heating fuel consumption of approximately 52% can be achieved, which also results in a decrease in emissions, with an expected reduction of approximately 1,703 t CO_2/year.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Buildings
Other related policies or actions	N/A
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

The TC of this intervention lies in turning the energy renovation of multi-apartment buildings from occasional, resident-led initiatives into a regular practice in the City of Mostar's residential sector. It is assessed between Likely and Possible in terms of process and between Major and Moderate in terms of outcome (Appendix B). This means that the potential change is significant, but the conditions needed to achieve it are only partly in place. Its strength lies in the people involved: agents received the highest category score (3), as residents and building managers have already organised insulation works, with support from GIZ, and beneficiaries were rated very likely. The 50% co-financing is a strong economic incentive (rated very likely), but the incentives category reaches only 2.5 because the institutional framework was rated possible. There is no multi-year programme or clear set of rules that would make renovation routine, and available funding falls well short of the planned 70 buildings. Social norms were also rated possible, as energy renovation is not yet seen as a standard investment by building owners. The intervention will contribute to lasting change only if individual renovations

become part of a stable, continuous co-financing programme.

Intervention 3: Replacement of existing lighting fixtures in collective residential buildings

This intervention involves the replacement of existing lighting fixtures in collective residential buildings in the City of Mostar, with 25% co-financing of the investment. The expected annual energy savings amount to approximately 19,740 MWh, with an estimated emissions reduction of around 15,004 tCO_2/year, while implementation is planned to be completed by 2030. The table below presents a detailed and structured description of the analyzed intervention.

Table 9: Description of Intervention 3: Replacement of existing lighting fixtures in collective residential buildings

Information	Description
Title of the policy or action	**Replacement of existing lighting fixtures in collective residential buildings**
Type of policy or action	Implementation of technologies, processes or practices
Description of specific interventions	The intervention involves replacing incandescent bulbs with LED bulbs of appropriate wattage, as well as replacing lighting fixtures using old technology with those utilizing LED technology. The planned replacement covers at least 80% of the total household lighting in the City of Mostar, under a co-financing model covering 25% of the investment. The intervention remains under implementation and is planned to continue until 2030. Further implementation will depend on the availability of financing and the participation of building owners and residents.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2024
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar
Objectives and intended impacts or benefits of the policy or action	By implementing this intervention, it is expected that CO_2 emissions will be reduced by approximately 15,004 t CO_2/year. In addition, the intervention will result in significant energy savings, estimated at around 19,740 MWh/year, contributing to both environmental protection and increased energy efficiency in households.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Buildings
Other related policies or actions	N/A
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

From a TC perspective, this intervention could make energy-efficient lighting the standard in the City of Mostar's residential buildings rather than an individual household choice. It is assessed as Likely in terms of process and Moderate in terms of outcome (Appendix C). This means that the change is likely to happen, but its scale and duration are expected to remain moderate. It is the most balanced intervention in the assessment: technology, agents, incentives and norms all scored 3, and scale-up was rated very likely. LED lighting is affordable and proven, residents see the savings directly on their electricity bills, and the 25% co-financing lowers the entry barrier, so nothing in the process is holding it back. The limitation lies on the outcome side. Although the expected savings are substantial (around 19,740 MWh/year), lighting is only one of many energy uses in residential buildings, and replacing fixtures does not change how buildings are heated or insulated. Its transformational value therefore lies in making efficient lighting the default choice in households, and in using this simple, visible intervention as an entry point for deeper renovation.

Intervention 4: Decarbonization of public education buildings

This intervention involves the decarbonization of public educational buildings in the City of Mostar through the replacement of existing heating systems and the installation of biomass boilers in 31

buildings. The intervention is currently under implementation and is planned to continue until 2030. The aim of the intervention is to increase energy efficiency, reduce fossil fuel consumption, and lower CO_2 emissions by approximately 1,079 t/year. The table below presents a detailed and structured description of the analyzed intervention.

Table 10: Description of Intervention 4: Decarbonization of public education buildings

Information	Description
Title of the policy or action	**Decarbonization of public education buildings**
Type of policy or action	Implementation of technologies, processes or practices
Description of specific interventions	The intervention plans to replace the existing heating system and switch to biomass boilers for 31 public educational buildings owned by the City of Mostar. It is planned that all buildings will use biomass boilers. Currently, the buildings included in this intervention use ELLU as their heat source. The most significant energy source in the public building sub-sector of the City of Mostar is fuel oil, accounting for the largest share of consumption at 46%, followed by electricity at 35%, and wood biomass at 19%. Emissions from fuel oil amount to 1,265 t CO_2. By implementing this intervention and installing biomass boilers, the total investment would amount to 1,500,000 KM, with estimated renewable energy production of approximately 3,867 MWh/year and CO_2 emission reductions of around 1,079 t/year. The intervention remains under implementation and is planned to continue until 2030.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar – Department for Spatial Planning, Construction and Reconstruction
Objectives and intended impacts or benefits of the policy or action	The objectives of this intervention are to improve the energy efficiency of public educational buildings in the City of Mostar by replacing existing heating systems with biomass boilers. The intervention is expected to provide approximately 3,867 MWh/year of renewable energy and reduce CO_2 emissions by around 1,079 t/year. Additionally, the intervention seeks to promote the use of renewable energy sources and decrease reliance on fossil fuels in public buildings.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Buildings
Other related policies or actions	Installation of solar systems for electricity production
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

Note: *The estimated value of 3,867 MWh/year for Intervention 4 refers to the replacement of fuel oil with biomass for heating in 31 educational buildings and represents estimated renewable energy production.*

In terms of TC, this intervention could start a shift away from fossil fuel heating across the City's public buildings, beginning with schools. It is assessed between Likely and Possible in terms of process and between Major and Moderate in terms of outcome (Appendix D). This means that the potential change is significant, but the conditions needed to achieve it are only partly in place. Most conditions are already there: technology, agents and incentives each scored 3, as biomass boilers are a proven solution, the City has full authority over its own buildings and suppliers are engaged in implementation. The weak point is social norms (rated possible), because the change takes place inside 31 educational buildings and is hardly visible to households and other building owners, who continue to heat with fossil fuels. Replacing boilers alone also does not reduce heat demand, so part of the benefit is lost if the buildings remain poorly insulated. The intervention will become more transformational if the City applies the same approach to its other public buildings, links it with building renovation (Intervention 5) and energy monitoring (Intervention 7), and secures a reliable local biomass supply.

Intervention 5: Renovation of public buildings owned by the City of Mostar

This intervention involves the renovation and thermal insulation of public buildings owned by the City

of Mostar, building on the planning framework and energy data developed through the Interreg MED IMPULSE project. The aim is to significantly improve energy efficiency, reduce energy consumption by approximately 8,872 MWh/year, and decrease CO_2 emissions by around 2,292 t/year. The table below presents a detailed and structured description of the analyzed intervention.

Table 11: Description of Intervention 5: Renovation of public buildings owned by the City of Mostar

Information	Description
Title of the policy or action	**Renovation of public buildings owned by the City of Mostar**
Type of policy or action	Implementation of technologies, processes or practices
Description of specific interventions	The Interreg MED IMPULSE project introduced a reliable management system for planning energy efficiency interventions in public buildings. A total of 75 buildings owned by the City of Mostar, for which basic energy data were collected, were classified into 12 typological groups. For each typological group, one representative– an ambassador – was selected. Detailed data were collected on the building envelope (walls, roof, windows), heating and cooling systems, ventilation systems, fuel and hot water consumption, and lighting. The results were organized into a transnational web and GIS information system, creating a simple tool for reliable Action Plans with high impact. The IMPULSE project itself was implemented from 2016 to 2019 and has been completed. Its results provide the technical and planning basis for the broader intervention assessed here, which concerns the renovation and thermal insulation of public buildings owned by the City of Mostar. The broader intervention remains ongoing and is planned to continue until 2030.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar – Department for Spatial Planning, Construction and Reconstruction
Objectives and intended impacts or benefits of the policy or action	The expected objectives of implementing the thermal insulation of public buildings owned by the City of Mostar are to significantly improve energy efficiency and reduce energy consumption by approximately 8,872 MWh/year. This intervention is also expected to contribute to the reduction of CO_2 emissions by around 2,292 t/year. In addition, the intervention aims to enhance the comfort and sustainability of public buildings, supporting the city's broader environmental and climate goals.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Buildings
Other related policies or actions	Decarbonization of public buildings intended for education; Installation of solar systems for electricity production
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

Note: *The estimated annual energy savings of 8,872.4 MWh for Intervention 5 refer to the planned energy efficiency improvements in 75 City-owned public buildings, as reported in the City of Mostar's SECAP. This value represents approximately 90.2% of the total baseline annual energy consumption of City-owned public buildings in 2014 (9,832 MWh/year). The value represents the projected energy savings that would be achieved through the implementation of the planned building renovation interventions, in accordance with the data reported in the City of Mostar's SECAP.*
According to the City of Mostar, the 31 educational buildings covered by Intervention 4 are also included among the 75 buildings covered by this intervention. The two interventions complement each other, as Intervention 4 replaces the heating source while Intervention 5 reduces heat demand through renovation and insulation.

The TC of this intervention lies in moving the City from sporadic renovations towards a planned, data-driven management of its public buildings. It is assessed as Possible in terms of process and Moderate in terms of outcome (Appendix E), the lowest process rating in the building sector. This means that a moderate change can be expected, but it remains uncertain whether it will happen, as key conditions are not yet in place. The main reason is that the renovation of public buildings rests almost entirely on the City. The involvement of businesses and coalitions was assessed as not relevant, while beneficiaries, economic incentives and the institutional framework were rated only possible, giving agents and incentives a score of 2. In practice, buildings are renovated when individual funding becomes available, from the City budget or national or international donors, rather

than according to a long-term plan. At the same time, the City already has an important asset: the building typology, energy data and web/GIS system developed under the IMPULSE project. The intervention will become transformational if these data are used to set up a multi-year renovation programme with a dedicated budget line, possibly involving ESCO companies.

Intervention 6: Education and promotion of energy efficiency for citizens

This intervention involves organizing educational workshops, information booths in public spaces, and campaigns through media and online channels with the aim of raising citizen awareness about the importance of energy efficiency. The intervention aims to promote energy-saving practices, reduce energy consumption in the residential and public sectors, and contribute to lowering CO_2 emissions in the City of Mostar. The table below presents a structured description of the analyzed intervention.

Table 12: Description of Intervention 6: Education and promotion of energy efficiency for citizens

Information	Description
Title of the policy or action	**Education and promotion of energy efficiency for citizens**
Type of policy or action	Information instruments
Description of specific interventions	This intervention involves organizing educational workshops, info-stands in public spaces, and awareness campaigns through media and online channels. The goal is to raise citizens' awareness about the importance of energy efficiency, promote energy-saving practices, and reduce energy consumption in residential and public buildings. The intervention is currently under implementation through recurring awareness-raising and educational activities carried out within ongoing projects. At least 2–3 informational workshops are organized each year through ongoing projects. Additionally, the establishment of a dedicated information center is planned as a complementary activity to provide continuous information and guidance to citizens on energy efficiency and sustainable energy use. The broader intervention remains ongoing and is planned to continue until 2030.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar, schools and local communities
Objectives and intended impacts or benefits of the policy or action	The aim is to increase citizens' knowledge and awareness of energy efficiency, promote energy-saving behaviors, reduce energy consumption in residential and public sectors, and contribute to lowering CO_2 emissions in the City of Mostar. Expected impacts include reduced household energy costs, lower emissions and long-term improvement in local community energy sustainability.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention targets the City of Mostar, including public institutions, schools, residential buildings and local communities.
Sectors targeted	Others
Other related policies or actions	Local energy efficiency programs, EU sustainable energy projects, school-based educational campaigns, similar regional awareness campaigns.
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

From a TC perspective, this intervention could change how citizens understand and use energy, creating demand for energy-efficient and renewable solutions. It is assessed between Likely and Possible in terms of process and Moderate in terms of outcome (Appendix F). This means that a moderate change can be expected, but the conditions needed to achieve it are only partly in place. The intervention illustrates the familiar gap between knowing and doing. Workshops, information points and campaigns are effective at reaching citizens and connecting institutions: awareness and coalitions for change were rated very likely, and agents and norms each scored 3. However, technology received the lowest score of all interventions (1.5) and behaviour change was rated only possible, because the intervention itself does not provide or finance any technology. Whether citizens actually insulate their homes, install solar panels or change their habits depends on their own

decisions and on separate support programmes. The planned permanent information centre could turn occasional campaigns into continuous advice, but the intervention will become transformational only if it is directly linked to concrete opportunities to act, such as co-financing calls for solar systems, insulation or efficient lighting. This is the only intervention assessed using the ICAT General Assessment Tool.

Intervention 7: Establishment of an information system for monitoring energy consumption in public buildings

This intervention involves the establishment of an information system for monitoring energy consumption in public buildings under the jurisdiction of the City of Mostar. The system enables data collection, consumption analysis, identification of inefficient usage and verification of achieved savings, thereby improving energy efficiency and supporting sustainable energy management in the public sector. The table below presents a detailed and structured description of the analyzed intervention.

Table 13: Description of Intervention 7: Establishment of an information system for monitoring energy consumption in public buildings

Information	Description
Title of the policy or action	**Establishment of an information system for monitoring energy consumption in public buildings**
Type of policy or action	Information instruments
Description of specific interventions	An information system for monitoring energy consumption, energy accounting will be established for all buildings under the jurisdiction of the City of Mostar. The energy management information system is designed for monitoring and analyzing energy and water consumption in public sector buildings and represents an essential tool for systematic energy management. The main functions of the system include: - Collecting and entering basic building data and monitoring energy and water consumption; - Providing easy access to information on total energy and water consumption; - Performing calculations and analyses to detect unwanted, excessive, or irrational consumption and to identify opportunities for achieving energy and financial savings; - Verifying achieved savings; - Automated alerts for critical events and operational irregularities. As part of the next steps, the City plans to apply with a project proposal based on this concept. A pilot project has already been initiated for the City Hall, which will serve as a testing ground for the system, and further applications for funding and expansion are being considered.
Status of the policy or action	Planned
Date of implementation	12/30/2026
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar
Objectives and intended impacts or benefits of the policy or action	The main objectives of establishing an energy management information system for buildings under the jurisdiction of the City of Mostar are to systematically monitor and control energy and water consumption, improve energy efficiency, and identify opportunities for cost savings. The system also aims to detect excessive or irrational consumption, verify achieved savings, and provide timely alerts on critical events or operational irregularities. Ultimately, the intervention seeks to support informed decision-making and promote sustainable energy management in public buildings.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention will be implemented in the City of Mostar.
Sectors targeted	Buildings
Other related policies or actions	Renovation of public buildings owned by the City of Mostar; Decarbonization of public buildings intended for education
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

In terms of TC, this intervention could change how the City makes decisions about its buildings, basing

renovation and budget planning on actual energy data. It is assessed as Likely in terms of process and Moderate in terms of outcome (Appendix G). This means that the change is likely to happen, but its scale and duration are expected to remain moderate. As the system is still at the planning stage, the ratings reflect expected rather than demonstrated effects. All four process categories scored 3, because the City has both the mandate and a clear interest in managing energy use in its own buildings, and local IT specialists can install and maintain the system. The outcome is Moderate because the system does not reduce emissions directly. Its value lies in giving the City something it currently lacks: regular and reliable data on how much energy each building uses, which was also requested by the institutions at the validation workshop. The intervention will become transformational only if the pilot is extended to the whole municipal building stock and the data are actually used to decide which buildings to renovate first, to plan budgets and to verify savings.

Intervention 8: Replacement of existing high-pressure mercury and sodium lamps in public lighting

This intervention relates to the replacement of existing high-pressure mercury and sodium lamps in public lighting with energy-efficient LED fixtures. Under the SECAP scope, the intervention envisaged the replacement of a total of 11,440 lamps. The aim of the intervention is to achieve significant energy savings and reduce CO_2 emissions by approximately 3,775 t/year, while improving the efficiency and sustainability of public lighting. The table below presents a detailed and structured description of the analyzed intervention.

Table 14: Description of Intervention 8: Replacement of existing high-pressure mercury and sodium lamps in public lighting

Information	Description
Title of the policy or action	**Replacement of existing high-pressure mercury and sodium lamps in public lighting**
Type of policy or action	Implementation of technologies, processes or practices
Description of specific interventions	The intervention involves replacing existing lighting fixtures, specifically 25% of high-pressure mercury lamps and 63% of high-pressure sodium lamps in public lighting, with 60 W LED lighting fixtures. Under the SECAP scope, the replacement of a total of 11,440 lighting fixtures was planned. The implementation of the full scope was estimated to achieve energy savings of approximately 5,221 MWh/year, along with a reduction in CO_2 emissions of around 3,775 t CO_2/year. After analysing the current situation, it was determined that this intervention was the highest priority in the public lighting sector. Within the activities implemented under this intervention, approximately 2,300 lighting fixtures were replaced, and mercury-based lamps are no longer in use in the city. These activities have been completed, while further modernization through the ESCO model is considered a subsequent phase of public lighting modernization.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2027
Implementing entity or entities	City of Mostar
Objectives and intended impacts or benefits of the policy or action	Under the SECAP scope, full implementation of the intervention was estimated to achieve energy savings of approximately 5,221 MWh/year and a reduction in CO_2 emissions of around 3,775 t CO_2/year.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is implemented in the City of Mostar.
Sectors targeted	Others
Other related policies or actions	Modernization of public lighting
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

Approximately 2,300 of the 11,440 lighting fixtures envisaged in the SECAP have been replaced, representing around 20% of the planned scope. Mercury-based lamps are no longer in use in the City of Mostar's public lighting system. The initial replacement activities have been completed, and

implementation of the intervention is ongoing. The City is considering an energy service company (ESCO) arrangement for the next phase of modernization.

The TC potential of this intervention lies in making LED technology the standard across Mostar's public lighting network. In the 2014 baseline year, the system consumed approximately 7,450 MWh of electricity and accounted for around 5,387 tCO_2 in emissions. The City covers the electricity costs directly from its budget. For the full planned replacement programme, the SECAP estimates annual electricity savings of approximately 5,221 MWh and annual emission reductions of around 3,775 tCO_2. The likelihood of a transformational process was assessed between "Possible" and "Likely", with a "Moderate" expected outcome (Appendix H). The City's responsibility for public lighting and the prospect of lower electricity costs support implementation. The incentives category scored 3, with both economic incentives and the institutional framework rated "Likely". The agents category received the lowest score (2). Implementation relies on municipal procurement and local contractors, while broader business participation was rated "Possible" and coalition formation "Unlikely". Extending LED replacement across the network will depend on financing for subsequent phases. If adopted, an ESCO arrangement could help the City finance the remaining replacements and achieve the full scope envisaged in the SECAP.

Intervention 9: Modernization of public lighting

This intervention involves the modernization of public lighting through the installation of digital time relays for switching lights on and off, combined with two-phase dimmers, optimizing electricity consumption and reducing unnecessary costs. The intervention enables better control of public lighting activation during seasonal changes and the transition between daylight saving time and standard time. The table below presents a detailed and structured description of the analyzed intervention.

Table 15: Description of Intervention 9: Modernization of public lighting

Information	Description
Title of the policy or action	**Modernization of public lighting**
Type of policy or action	Implementation of technologies, processes or practices
Description of specific interventions	The intervention involves the installation of digital time relays for switching street lighting on and off, in combination with two-stage dimmers, in order to optimize electricity consumption for public lighting. The existing photocells that control the switching of public lighting are outdated technology and often cannot distinguish between dusk and cloudy weather, which causes the lights to turn on when it is actually unnecessary, resulting in additional costs and unnecessary energy consumption. Furthermore, digital relays allow for better control of public lighting activation during seasonal transitions, such as the switch to winter or summer time. The modernization activities are being implemented within the planned 2024-2028 period.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2024
Date of completion (if relevant)	12/30/2028
Implementing entity or entities	City of Mostar
Objectives and intended impacts or benefits of the policy or action	The objectives of this intervention are to optimize electricity consumption for public lighting by installing digital time relays and two-stage dimmers, replacing outdated photocell technology. The intervention aims to reduce unnecessary energy use and costs, achieve energy savings of approximately 155.4 MWh/year, and decrease CO_2 emissions by an estimated 120 t CO_2/year. Additionally, it seeks to improve the management and control of public lighting during seasonal transitions and daylight-saving time changes.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Other
Other related policies or actions	Replacement of existing high-pressure mercury and sodium lamps in public lighting

Information	Description
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

From a TC perspective, this intervention could change public lighting from a fixed, manually managed system into a digitally controlled and optimised one. At present, street lights in much of Mostar are switched on and off by photocells, which react to light conditions and often turn the lights on unnecessarily in cloudy weather, while the lights run at full intensity throughout the night, even when streets are empty. The intervention is assessed as Likely in terms of process and Moderate in terms of outcome (Appendix I). This means that the change is likely to happen, but its scale and duration are expected to remain moderate. It is a relatively small investment with a clear institutional effect: by introducing digital time relays and two-stage dimmers, it changes how the system is managed rather than the lamps themselves. Scale-up and the institutional framework were both rated very likely, and norms scored 3.5, as the City has full responsibility for public lighting and the solution can easily become the standard across the network. The weakest category is agents (2): local contractors are involved in installation, but the intervention was not designed to develop their role or build wider partnerships. The long-term persistence of savings was rated only possible, as it depends on maintenance and the timely replacement of equipment. Combined with LED replacement (Intervention 8), the intervention can lead to a digitally managed public lighting system, provided that staff capacity and maintenance are secured.

Intervention 10: Procurement of 44 electric vehicles for the City-owned vehicle fleet

This intervention involves the procurement of 44 electric vehicles for the fleet owned by the City of Mostar, aiming to reduce liquid fuel consumption and CO_2 emissions by approximately 85 t/year. The intervention contributes to the modernization of the city's transport sector and the transition to sustainable energy sources in municipal services. The table below presents a detailed and structured description of the analysed intervention.

Table 16: Description of Intervention 10: Procurement of 44 electric vehicles for the City-owned vehicle fleet

Information	Description
Title of the policy or action	**Procurement of 44 electric vehicles for the City-owned vehicle fleet**
Type of policy or action	Implementation of technologies, processes or practices
Description of specific interventions	In order to reduce CO_2 emissions, the renewal of the vehicle fleet owned by the City of Mostar is being implemented through the gradual replacement of conventional vehicles with electric vehicles. The City of Mostar owns a total of 63 vehicles, including vehicles used by firefighters and official vehicles for city needs. The number of vehicles used by the fire unit (Department for Organizational and Legal Affairs, Civil Protection and Fire Services) is 19. The remaining 44 vehicles are other official city vehicles, bringing the total to 63. The planned procurement of electric vehicles for these 44 city-owned vehicles is estimated at approximately 60,000 KM per vehicle. The SECAP estimates that replacing the 44 official vehicles would save approximately 1,030 MWh of liquid fuel energy per year and reduce CO_2 emissions by approximately 85 tCO_2/year. Implementation has already started through the APOLLO project, under which three electric vehicles have been procured. The vehicles have arrived in Slovenia and are expected to be delivered to City of Mostar, after which they will be put into operation as the initial phase of the wider fleet renewal.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar
Objectives and intended impacts or benefits of the policy or action	By implementing this intervention, energy savings in liquid fuels of around 1,030 MWh can be achieved, along with a reduction of CO_2 emissions from all vehicles by approximately 85 t CO_2/year.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Transport
Other related policies or actions	Construction and expansion of infrastructure to support electric vehicles
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

Note: *The City of Mostar's fleet comprises 63 vehicles, of which 19 are fire service vehicles and 44 are official vehicles used by the City administration. Intervention 10 covers only the replacement of the 44 official vehicles with electric vehicles. The SECAP estimates annual energy savings of 1,030 MWh/year for this intervention. This estimate exceeds the annual energy consumption of 760.81 MWh/year reported for the 44 vehicles in the 2014 baseline inventory. The available data do not explain this discrepancy. The original SECAP estimate has therefore been retained as reported.*

In terms of TC, this intervention could make electric vehicles the norm for the City's own fleet and an example for other public institutions. The 44 official vehicles targeted for replacement form part of a municipal fleet that also includes 19 fire service vehicles. Electric mobility is still largely absent from the city's streets. The intervention is assessed as Possible in terms of process and Moderate in terms of outcome (Appendix J). This means that a moderate change can be expected, but it remains uncertain whether it will happen, as key conditions are not yet in place. Replacing 44 of these vehicles is fully within the City's control, and the first three electric vehicles have already been procured through the APOLLO project, so adoption was rated very likely and technology scored 3. However, almost everything that would carry the change beyond the municipal fleet, including the involvement of businesses, economic incentives, the institutional framework, awareness and social norms, was

rated only possible, leaving agents, incentives and norms at 2. The main practical barriers, the lack of charging infrastructure and drivers' limited experience with electric vehicles, are not addressed by the intervention itself. It can become more than a fleet upgrade if it is coordinated with the charging network (Intervention 13) and if procurement rules make low-emission vehicles the standard for future fleet renewal.

Intervention 11: Installation of a software information system for public passenger transport

This intervention involves the installation of a software information system for public passenger transport, which provides real-time display of the next bus arrival at stops and inside vehicles, increasing the efficiency and attractiveness of public transport. The implementation of the system contributes to reducing energy consumption by approximately 3,200 MWh/year and CO_2 emissions by around 850 t/year, while encouraging a shift from private to public transport. The table below presents a detailed and structured description of the analysed intervention.

Table 17: Description of Intervention 11: Installation of a software information system for public passenger transport

Information	Description
Title of the policy or action	**Installation of a software information system for public passenger transport**
Type of policy or action	Implementation of technologies, processes or practices
Description of specific interventions	This intervention involves the installation of a software-based information system for public passenger transport, designed to display the arrival time of the next bus at all stops, along with the bus line number and name. Additionally, the system provides passengers with information about the next stop inside the bus, which is very useful for tourism as well as for the elderly population. The system consists of a centralized computer that, using sensors on buses and at stops, provides real-time information to passengers. Such a system also contributes to reducing CO_2 emissions by attracting more passengers to public transport who previously relied on private vehicles. A detailed feasibility and cost benefit study is required for this intervention, which should include: the development of the software system, the procurement of hardware (screens to display the arrival time of the next bus: large LED screens for covered stops in the city center and on the outskirts, small LED screens for stops in peripheral areas, small LED screens inside buses to display information about the next stop), the cost of installing the hardware, the cost of training Mostar Bus Ltd. staff to operate the system, and the cost of annual maintenance and system upgrades. Further implementation and expansion of the system include the procurement and installation of hardware, passenger information displays, staff training, maintenance and system upgrades. The intervention has been partially implemented, with initial components of the system already in place, while further upgrades, including the installation of LED displays for real-time passenger information are planned.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2026
Implementing entity or entities	City of Mostar, Mostar Bus Ltd
Objectives and intended impacts or benefits of the policy or action	The objectives of this intervention are to improve the efficiency and attractiveness of public transport in the City of Mostar by providing real-time information to passengers at bus stops and inside buses. By implementing the system, it is expected to reduce energy consumption by approximately 3,200 MWh/year and decrease CO_2 emissions by around 850 t CO_2/year. Additionally, the intervention aims to encourage the use of public transport over private vehicles, enhance the travel experience for residents and tourists, and contribute to sustainable urban mobility.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Transport
Other related policies or actions	N/A

Information	Description
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

The TC of this intervention lies in making public transport in Mostar more predictable and user-friendly, supporting a shift away from private cars. Transport is one of the largest sources of emissions in the city, and private and commercial vehicles alone account for around 29% of Mostar's CO_2 emissions, while public urban transport accounts for just over 1%. Many residents rely on their cars, partly because passengers often do not know when the next bus will arrive. The intervention is assessed between Likely and Possible in terms of process and Moderate in terms of outcome (Appendix K). This means that a moderate change can be expected, but the conditions needed to achieve it are only partly in place. Its strength is a solid institutional and financial basis: incentives scored 3, with economic incentives rated very likely and the institutional framework likely, as the system is already at an advanced stage and is largely financed through grants. The weakest category is agents (2). The system depends on Mostar Bus Ltd., whose staff must operate and maintain it, while the wider involvement of businesses and coalitions was rated only possible. The long-term persistence of emission reductions was also rated only possible, because information alone does not attract passengers if buses are infrequent or unreliable. The intervention can therefore contribute to lasting change only as part of a wider improvement in service quality, together with better bus stops (Intervention 14).

Intervention 12: Continuation of construction of bicycle lanes with supporting infrastructure

This intervention involves the continuation of the construction of bicycle lanes and supporting infrastructure in the City of Mostar, including the establishment of a public bike system. The aim is to promote cycling as a sustainable mode of transport, reduce CO_2 emissions by approximately 5,239 t/year, achieve energy savings of around 20,124 MWh/year, and improve public health and citizen mobility. The table below presents a detailed and structured description of the analysed intervention.

Table 18: Description of Intervention 12: Continuation of construction of bicycle lanes with supporting infrastructure

Information	Description
Title of the policy or action	**Continuation of construction of bicycle lanes with supporting infrastructure**
Type of policy or action	Infrastructure programmes
Description of specific interventions	The intervention promotes the use of bicycles as a means of transport, as well as the establishment of a bike-sharing network, with the aim of increasing the mobility of City of Mostar residents and facilitating travel to work, school, university, and other destinations. It is of great public importance as it represents a socially responsible project that reduces air pollution, encourages physical activity, and improves the city's tourist offer. The group of interventions aimed at improving cycling transport in the City of Mostar includes the following activities: • Construction of bicycle lanes throughout the city; • Continuous maintenance of bicycle lanes. As part of the ongoing implementation of the intervention, the following activities are envisaged: • Arranging and marking bicycle lanes; • Creating boards with maps of marked bicycle lanes; • Reducing the number of potential bicycle accidents by separating bicycle lanes from roads intended for motor vehicles wherever possible; • Providing servicing and parking for private bicycles in garages; • Promoting and encouraging the use of bicycles as a means of transport, especially for short distances; • Continuously conducting programs and education on the benefits of cycling in kindergartens, schools, and public forums; • Designing and implementing the campaign "Cycling is Healthier!"

Information	Description
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar
Objectives and intended impacts or benefits of the policy or action	The objectives of this intervention are to promote the use of bicycles as a sustainable means of transport in the City of Mostar by developing a comprehensive network of bicycle lanes and a bike-sharing system. Through the continued implementation of the intervention, annual energy savings of approximately 20,124 MWh and a reduction in CO_2 emissions of around 5,239 t/year are expected. Additionally, the intervention aims to improve public health, enhance urban mobility, reduce traffic congestion, and provide environmentally friendly transport options for residents and tourists.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Transport
Other related policies or actions	N/A
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

From a TC perspective, this intervention could turn cycling in Mostar from an occasional activity into a practical, everyday mode of transport. Mostar has a mild climate and a relatively compact urban area that are well suited to cycling, but the existing bicycle lanes are still fragmented, and in many parts of the city cyclists share the road with motor traffic. The intervention is assessed as Likely in terms of process and Moderate in terms of outcome (Appendix L). This means that the change is likely to happen, but its scale and duration are expected to remain moderate. It has one of the strongest potentials to change everyday behaviour: norms scored 3.5, with awareness and behaviour rated very likely, because new bicycle lanes and a public bike system are combined with education in kindergartens and schools and the "Cycling is Healthier!" campaign. Technology and incentives also scored 3. The weakest category is agents (2). The City is still the main driver, and although support from civil society provides a basis for a coalition for sustainable mobility, such a coalition and the involvement of businesses were rated only possible. The main practical obstacle is the limited space in the urban area for lanes separated from traffic, which directly affects safety and people's willingness to cycle. The intervention will become transformational if individual sections grow into a connected and safe network.

Intervention 13: Construction and expansion of infrastructure to support electric vehicles

This intervention involves the construction and expansion of infrastructure to support electric vehicles, including the installation of 50 charging stations, half of which will be standard 22 kW chargers and the other half fast 50 kW chargers. The aim is to facilitate the use of electric vehicles in the City of Mostar, reduce greenhouse gas emissions, decrease dependence on fossil fuels, and support the transition to sustainable urban transport. The table below presents a detailed and structured description of the analyzed intervention.

Table 19: Description of Intervention 13: Construction and expansion of infrastructure to support electric vehicles

Information	Description
Title of the policy or action	**Construction and expansion of infrastructure to support electric vehicles**
Type of policy or action	Infrastructure programmes
Description of specific	The construction and expansion of infrastructure to support electric vehicles involves the

Information	Description
interventions	installation of 50 electric vehicle charging stations. It is planned that 50% of the stations will have a power of 22 kW, while the remaining 50% will be fast chargers with a power of 50 kW. These stations are planned to be installed at the busiest locations in the city and on public parking lots, arranged in pairs, with one 22 kW charger paired with one 50 kW fast charger. Preparatory activities for the implementation of the intervention have already been undertaken. The Institute for Spatial Planning prepared a proposal for the installation of 50 charging stations, providing the planning basis for their subsequent installation and expansion across the City of Mostar.
Status of the policy or action	Implementation Ongoing
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2030
Implementing entity or entities	City of Mostar
Objectives and intended impacts or benefits of the policy or action	The objectives of this intervention are to promote the adoption of electric vehicles in the City of Mostar by providing accessible and reliable charging infrastructure. The intervention aims to reduce greenhouse gas emissions by encouraging the replacement of conventional vehicles with electric ones, decrease reliance on fossil fuels, and support the transition to sustainable urban mobility. Additionally, it seeks to enhance the convenience for EV users by installing chargers at high-traffic locations and public parking areas, thereby fostering a more environmentally friendly transport system.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Transport
Other related policies or actions	Procurement of 44 electric vehicles for the City-owned vehicle fleet
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

In terms of TC, this intervention could create the basic conditions for electric mobility in Mostar, for both public and private users. At present, electric vehicles are still rare in the city, and the lack of a public charging network is one of the main reasons why residents and businesses do not consider them a practical option. The intervention is assessed between Likely and Possible in terms of process and between Major and Moderate in terms of outcome (Appendix M). This means that the potential change is significant, but the conditions needed to achieve it are only partly in place. Its process scores are among the lowest in the transport sector: technology and agents each scored 2, as the uptake of electric vehicles, the involvement of businesses and the formation of coalitions were all rated only possible. Put simply, the City can build 50 charging stations, but it cannot decide whether citizens and companies will buy electric vehicles. The assessment also points to barriers outside the scope of the intervention, such as grid capacity for fast chargers and the long-term maintenance of the stations. This intervention and the electrification of the City fleet (Intervention 10) depend on each other, since chargers need vehicles and vehicles need chargers. The intervention can become transformational if it is implemented together with the electrification of the City fleet and complemented by interventions that help citizens buy electric vehicles, such as subsidies.

Intervention 14: Construction of bus stops extensions

This intervention involves the construction and expansion of bus stops, the installation of shelters, and the removal of speed bumps where possible, aiming to increase the efficiency and safety of public transport in the City of Mostar. During the implementation period, 25 bus bays were constructed at existing stops, together with improvements to bus stop infrastructure and passenger shelters. The implementation of the intervention contributes to energy savings of approximately 20,881 MWh/year and a reduction of CO_2 emissions by around 5,454 t/year, while improving passenger comfort and safety, facilitating traffic flow, and promoting sustainable urban mobility. The table below presents a detailed and structured description of the analysed intervention.

Table 20: Description of Intervention 14: Construction of bus stops extensions

Information	Description
Title of the policy or action	**Construction of bus stops extensions**
Type of policy or action	Infrastructure programmes
Description of specific interventions	The intervention involved the improvement of public transport infrastructure through the construction and upgrading of bus stops, including bus bay extensions and the installation of passenger shelters. The intervention was implemented by the City of Mostar in cooperation with the public transport service provider, with the aim of improving traffic flow, passenger safety and the quality of public transport services. Where technically feasible and without compromising pedestrian safety, existing traffic-calming elements were reviewed and adjusted to reduce unnecessary delays for buses. These improvements contributed to smoother traffic flow, reduced vehicle idling, lower fuel consumption and decreased transport-related emissions. Bus shelters were also installed or upgraded to provide protection from direct sunlight and adverse weather conditions, which is particularly important during heat waves, especially for elderly passengers and other vulnerable groups. Following completion of the intervention, regular maintenance of the improved infrastructure will continue as part of its normal operation.
Status of the policy or action	Completed
Date of implementation	12/30/2023
Date of completion (if relevant)	12/30/2025
Implementing entity or entities	City of Mostar
Objectives and intended impacts or benefits of the policy or action	The objectives of this intervention were to improve the efficiency and safety of public transport in the City of Mostar by constructing bus stop extensions, installing shelters at bus stops, and removing speed bumps where possible. Under the SECAP, implementation of the intervention was estimated to result in annual energy savings of approximately 20,881 MWh and a reduction in CO_2 emissions of around 5,454 t/year. Additionally, the intervention aimed to enhance passenger comfort and safety, promote smoother traffic flow and encourage more sustainable and efficient urban mobility.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention was implemented in the City of Mostar.
Sectors targeted	Transport
Other related policies or actions	N/A
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

Note: *The estimated annual CO_2 emission reduction of 5,454 t for Intervention 14 was taken directly from the City of Mostar's SECAP. Although this value exceeds the 2014 baseline emissions of the public urban transport subsector (4,050 t CO_2), it corresponds approximately to 5% of the total transport-sector baseline emissions (109,031 t CO_2). This is consistent with the SECAP's assumption of a 5% reduction in fuel consumption and emissions through improved urban traffic flow, suggesting that the estimated impact may extend beyond public transport vehicles to the wider transport sector. As the detailed calculation assumptions are not specified in the SECAP, the original estimated reduction has been retained.*

The TC of this intervention lies in making public transport a more comfortable and attractive alternative to the car. Before the intervention, many bus stops in the City of Mostar had no bays, so buses stopped in the traffic lane and caused delays, and many stops had no shelter, which is

challenging in a city where summer temperatures can exceed 40°C. The intervention is assessed as Likely in terms of process and Moderate in terms of outcome (Appendix N). This means that the change is likely to happen, but its scale and duration are expected to remain moderate. Its strength lies in direct and visible benefits for passengers rather than in technology. In cooperation with the public transport operator, 25 bus bays were built at existing stops, shelters were installed or upgraded and traffic-calming elements were adjusted to reduce delays for buses. As a result, incentives and norms both scored 3.5, with benefits to users, the institutional framework, awareness and behaviour rated very likely, while technology scored lowest (2), as the intervention relies on conventional construction. With the works completed, the key questions are now regular maintenance and whether better stops are matched by more frequent and reliable bus services, which is a precondition for a real shift from car use to public transport.

Intervention 15: Improvement of energy efficiency in the water supply network

This intervention involves improving energy efficiency in the water supply network through pressure regulation, continuous water loss detection, and increased coverage with water meters. The implementation of the intervention is expected to achieve annual energy savings of approximately 3,100 MWh and reduce CO_2 emissions by around 2,356 t/year. The intervention also contributes to reducing water losses, optimizing system maintenance, and increasing the sustainability and reliability of public water supply. The table below presents a detailed and structured description of the analysed intervention.

Table 21: Description of Intervention 15: Improvement of energy efficiency in the water supply network

Information	Description
Title of the policy or action	**Improvement of energy efficiency in the water supply network**
Type of policy or action	Infrastructure programmes
Description of specific interventions	The intervention includes regulating water pressure in the system, continuous detection of water losses and increased coverage with water meters. A reduction of system losses by 25% is expected through regular detection and intervention maintenance, including the replacement of pipelines, valves and other components. The intervention is currently partially implemented. The utility faces several challenges: initial project ideas have been attempted, but issues with property ownership (cadaster/land registry) have hindered implementation on certain networks. At the water treatment plant, a 140 kW solar power plant has been put into operation, contributing to energy savings. However, due to property-related constraints, further implementation of activities in other parts of the water supply network is currently limited.
Status of the policy or action	Implementation Ongoing
Date of implementation	09/29/2026
Date of completion (if relevant)	09/29/2030
Implementing entity or entities	City of Mostar/Public Utility Company Vodovod Ltd.
Objectives and intended impacts or benefits of the policy or action	The objectives of this intervention are to improve the efficiency of the water supply system in the City of Mostar by regulating water pressure, continuously detecting leaks, and increasing coverage with water meters. By implementing these interventions, it is expected to achieve annual energy savings of approximately 3,100 MWh and reduce CO_2 emissions by around 2,356 t CO_2/year. Additionally, the intervention aims to minimize water losses, optimize system maintenance and enhance the overall sustainability and reliability of the municipal water supply.
Level of the policy or action	Sub-national/sub-sectoral
Geographic coverage	The intervention is being implemented in the City of Mostar.
Sectors targeted	Others
Other related policies or actions	N/A
Reference	City of Mostar's SECAP https://www.mostar.ba/storage/2023/07/SECAP_Mostar_A4-print.pdf

Note: The implementation period recorded for this intervention (2026–2030) refers to the planned phase of further activities aimed at reducing water losses and optimising the water supply system. Some activities, including the 140 kW solar power plant at the water treatment plant, were implemented earlier, which is why the intervention is described as partially implemented.

From a TC perspective, this intervention could move the water utility from reactive repairs towards continuous, efficiency-based management of the network. Like many water systems in the region, the City of Mostar's network is ageing and loses a significant share of water through leaks, while pumping and treatment consumed around 6,010 MWh of energy in the 2014 baseline year, so every litre lost also means energy wasted. The intervention is assessed as Likely in terms of process and Moderate in terms of outcome (Appendix O). This means that the change is likely to happen, but its scale and duration are expected to remain moderate. It has some of the strongest drivers of change among all assessed interventions. Incentives received the maximum score (4), with economic incentives, disincentives and the institutional framework rated very likely, because reducing water losses by the planned 25% directly lowers the utility's costs. Technology also scored 3.5, as pressure regulation, leak detection and metering are proven solutions, and a 140 kW solar power plant at the water treatment plant is already in operation. Norms scored lowest (2), since the work takes place within the utility and has little influence on how citizens use water. The real obstacle is neither funding nor technology, but unresolved property, cadastral and land registry issues, which currently prevent work on parts of the network. Resolving these administrative barriers is therefore the key condition for realising the intervention's full potential.

In accordance with the TC Toolkit, once all interventions were created in the TC Toolkit based on the information presented in the previous tables for each intervention and after selecting the appropriate ICAT Tools, the following steps were applied:



The first step in assessing the transformational impact of selected City of Mostar's SECAP interventions focused on understanding the characteristics of TC. TCs, according to the TC Toolkit refer to changes that go beyond short-term or isolated effects and contribute to long-term decarbonization, institutional change, and behavioural shifts, while simultaneously delivering benefits for sustainable development. In this context, the analysed interventions were not considered solely in terms of CO_2 emission reductions, but also in terms of their potential to influence broader changes in planning, management, investment flows, and user behaviour. This step aimed to establish an analytical framework for assessing the long-term potential of interventions to contribute to systemic changes in the energy, transport, and building sectors in the City of Mostar, in line with climate and development objectives.

The phase of system transformation in which the interventions are implemented was assessed in accordance with the TC Toolkit. This step enabled an understanding of the context in which the interventions are carried out and a realistic evaluation of their TC. The analysis showed that the observed system (City of Mostar), as well as most of the analysed interventions, is in the "Take-off" phase of transformation, characterized by initial institutional steps towards low-carbon development, the presence of strategic documents (City of Mostar's SECAP), pilot projects and growing awareness of the need for an energy transition. However, limitations remain in institutional capacity, financing,

and the speed of intervention implementation, indicating that the system has not yet entered the acceleration phase.

The vision of TC was defined through consultations with key stakeholders and an analysis of the local context to ensure that interventions contribute to long-term and systemic impact. The vision encompasses the desired direction of transformation of the energy, transport, and building system of the City of Mostar towards a low-carbon, resilient, and energy-efficient system, taking into account the goals of the local strategy (City of Mostar's SECAP) and the BiH's long-term climate objectives.

In this way, the TC visions serve as a reference framework for evaluating the potential of each intervention to contribute to long-term systemic changes in the City of Mostar.

During the analysis of interventions in the TC Toolkit, key barriers that could limit the speed and scope of TCs were identified. The most important identified barriers are:

- **Financial barriers** (limited access to capital, dependence on grants);
- **Institutional barriers** (lack of capacity for intervention implementation);
- **Regulatory barriers** (slow procedures, inconsistent regulations);
- **Behavioral barriers** (low awareness and resistance to change);
- **Technical barriers** (lack of local expertise and data).

In accordance with the TC Toolkit identifying these barriers allowed for a realistic assessment of the TC of interventions and ensured that the results of the ICAT analysis were correctly interpreted in the context of local conditions.

An analysis of outcome characteristics and process characteristics was also conducted for each individual intervention. This step represents a central part of the TC Toolkit, as it allows for assessing the potential of interventions to contribute to long-term systemic changes toward low-carbon and sustainable development.

Outcome characteristics relate to the scope and longevity of the effects that interventions can achieve in terms of reducing greenhouse gas emissions and meeting sustainable development goals. Within the TC Toolkit, for each intervention, the following were assessed:

- **Scale of outcome:** The scope of intervention impact, whether interventions act at a micro, medium or macro system level;
- **Timeframe** over which outcome is sustained: How long the effects of the interventions are expected to remain sustainable, whether in the short, medium or long term.

Assessing outcome characteristics allowed for an understanding not only of the immediate effects of interventions but also of their contribution to long-term decarbonization of the system, which is crucial for identifying TC.

After analysing outcome characteristics, process characteristics were identified and assessed in TC Toolkit for each intervention. Process characteristics describe how a particular intervention can initiate changes in systems and enable the achievement of transformational outcomes. These characteristics represent intermediate steps or mechanisms that facilitate the realization of transformative results, allowing for understanding the broader impact of a policy beyond its

immediate scope. According to the TC Toolkit process characteristics were grouped into four categories:

- **Technology** – encompasses research and development (R&D), adoption, and scale-up of technologies and innovations that support low-carbon and sustainable practices;
- **Change agents** – includes actors such as entrepreneurs, coalitions of advocates, and beneficiaries who can initiate or support TCs;
- **Incentives** – economic and non-economic, disincentives, institutional and regulatory changes that facilitate the adoption and scaling of interventions;
- **Norms** – raising awareness, changing behavior, and social norms to support long-term low-carbon and sustainable development.

It was assessed that all four categories are largely relevant for the selected interventions in the City of Mostar, as they allow for the identification of mechanisms through which policies can trigger systemic changes and long-term transformational effects.

During the analysis of each intervention in TC Toolkit, the scale and timeframe of adaptation outcome characteristics were determined to assess the TC of interventions in strengthening resilience and reducing system vulnerability. The assessment also highlighted the need for additional guidance and framing on how to approach adaptation, and specifically on what transformational change means in the context of adaptation. Since all interventions are implemented within the City of Mostar, adaptation in the primary assessment refers to the local level. The direct impact of interventions on reducing vulnerability and increasing resilience of local systems in the sectors was evaluated. The potential impact of interventions at a broader level was assessed through replication of local interventions. It was estimated that the implementation of the same interventions could contribute to national or global adaptation goals, with justification based on replicability potential.

Once all interventions were thoroughly assessed through outcome and process characteristics, TC Toolkit reports for each intervention were generated. These reports represent consolidated information on the TC of interventions and are included in the appendices of this report.

Aggregation of results at the category level was performed by using qualitative assessments of individual characteristics for all process categories (technology, agents of change, incentives, and norms) and outcome categories (outcome scale and outcome timeframe) with expert consultations and detailed documented justification. This approach allows for evaluating the relative importance of each category and its contribution to achieving the transformational vision. The final assessment of the TC of interventions was conducted by combining process and outcome assessments at the category level and the results were visualized using ICAT TC matrices (heatmaps), showing the expected level of policy transformation, the contribution of process characteristics to achieving transformational outcomes, and the level of sustainability and feasibility. The generated reports included in the appendices present detailed category-level aggregation and individual heatmaps for each intervention, while the next chapter presents the overall assessment results using representative heatmaps for interventions with similar levels of TC.

Results of the Assessment of TC

The final assessment of the TC of the interventions was conducted by combining process and outcome ratings at the category level and the results were visualized using ICAT TC matrices (heatmaps).

Firstly, the individual characteristics of interventions were assessed using appropriate indicators, after which these characteristics were combined into broader categories, such as technology, agents of change, incentives and norms. Each category received a qualitative rating based on the impact of the intervention on the characteristics within that category, taking into account the relative importance of each characteristic. This approach allowed for a systematic overview of the interventions and clearly demonstrated how different aspects contribute to the overall effectiveness of the interventions.

After aggregation at the category level, the results were further combined at the process and outcome levels. The process represents how the intervention is implemented and how much it contributes to transformation, while the outcome shows the actual effect of the policy and the degree of achieved transformation. At this stage, the relative importance of each category for the overall result was considered, providing a comprehensive view of the interventions' overall impact.

The final assessment of the TC of the interventions was conducted by combining process and outcome ratings at the category level, aggregating the results to ensure a complete insight into the expected impact of the interventions on the system.

The results were visualized using ICAT TC matrices (heatmaps). Colours in the matrix illustrate the expected degree of transformation:

- Green indicates a significant and sustainable impact;
- Red indicates that transformation has not yet been achieved;
- The gradient between colors reflects uncertainty and the qualitative nature of the assessment.

In this way, the generated heatmaps enable the rapid identification of interventions with TC, facilitating the analysis and planning of future interventions and policies.

Following the aggregation of the assessment results at the outcome and process levels, table below provides a consolidated overview of the final TC assessment results for all 15 interventions. The outcome rating reflects the assessed extent and sustained nature of transformation, while the process rating indicates the assessed likelihood that the transformational process will occur and be sustained. Presenting the results in a consolidated table enables comparison across interventions and provides the basis for the subsequent analysis of common patterns, differences and factors influencing their TC.

Table 22: Consolidated outcome and process results of the TC assessment for the 15 selected City of Mostar's SECAP interventions

No.	Intervention	Outcome: Extent and sustained nature of transformation	Process: Likelihood of transformation
1	Installation of solar systems for electricity production	Between Major and Moderate	Likely
2	Insulation of collective residential buildings	Between Major and Moderate	Between Likely and Possible
3	Replacement of existing lighting fixtures in collective residential buildings	Moderate	Likely
4	Decarbonization of public education buildings	Between Major and Moderate	Between Likely and Possible
5	Renovation of public buildings owned by the City of Mostar	Moderate	Possible

No.	Intervention	Outcome: Extent and sustained nature of transformation	Process: Likelihood of transformation
6	Education and promotion of energy efficiency for citizens	Moderate	Between Likely and Possible
7	Establishment of an information system for monitoring energy consumption in public buildings	Moderate	Likely
8	Replacement of existing high-pressure mercury and sodium lamps in public lighting	Moderate	Between Likely and Possible
9	Modernization of public lighting	Moderate	Likely
10	Procurement of 44 electric vehicles for the city-owned vehicle fleet	Moderate	Possible
11	Installation of a software information system for public passenger transport	Moderate	Between Likely and Possible
12	Continuation of construction of bicycle lanes with supporting infrastructure	Moderate	Likely
13	Construction and expansion of infrastructure to support electric vehicles	Between Major and Moderate	Between Likely and Possible
14	Construction of bus stops extensions	Moderate	Likely
15	Improvement of energy efficiency in the water supply network	Moderate	Likely

Detailed results of the assessment of the TC of all 15 interventions, including aggregated ratings of categories, processes and outcomes, as well as the corresponding heatmaps, are available in the appendices of the report.

As shown in the previous table, the analyzed interventions are concentrated within the range from Moderate to between "Major" and "Moderate" outcomes, while the process ratings range from Possible to Likely TC. This indicates that the assessed interventions generally contribute to the direction of the intended low-carbon transformation, but differ in terms of the expected extent of change and the strength of the conditions supporting their implementation and continuation.

The first important pattern relates to the **outcome dimension**, which reflects the extent and sustained nature of the expected transformation. Eleven of the fifteen interventions were assessed as Moderate, while four interventions were positioned between "Major" and "Moderate" TC.

These results indicate that some interventions have the potential to generate change beyond an individual project or asset, particularly where implementation can be expanded, replicated or integrated into a broader technological or sectoral transition. At the same time, the predominance of Moderate outcomes suggests that, for most interventions, the expected transformation remains constrained by the current scale, coverage or reach of implementation.

The **process dimension** provides a complementary perspective, as it indicates the extent to which the conditions and mechanisms supporting transformation are in place. Seven interventions were assessed as Likely, six were positioned between "Likely" and "Possible", while two were assessed as "Possible". This distribution indicates that implementation conditions are relatively well developed for a significant share of the assessed interventions, although they are not equally strong across the portfolio. The two interventions assessed as "Possible" (renovation of City-owned public buildings and procurement of 44 electric vehicles for the municipal fleet) demonstrate that the existence of an appropriate technical solution or a clearly defined intervention does not in itself ensure a strong transformational process. The likelihood of transformation also depends on whether implementation can be sustained, institutionalized and expanded beyond the initial project scope.

The relationship between the outcome and process ratings is particularly important for interpreting the assessment results. The findings show that a stronger expected outcome does not necessarily coincide with a stronger transformational process. Of the four interventions positioned between

"Major" and "Moderate" on the outcome dimension, only the installation of solar systems was assessed as "Likely" on the process dimension, while the remaining three were positioned between "Likely" and "Possible". This indicates that the potential scale and significance of a intervention may be relatively high, while the conditions required to realize and sustain that potential remain less developed. In practical terms, the transformational potential of these interventions will depend on whether enabling conditions, such as financing, institutional arrangements, implementation capacity, stakeholder participation, and mechanisms for scaling and replication, develop alongside the technical intervention.

Conversely, several interventions combine a "**Likely" process with a "Moderate" outcome**. These include the replacement of lighting fixtures in collective residential buildings, the information system for monitoring energy consumption for public buildings, modernization of public lighting, bicycle infrastructure, improvements to bus stops, and energy efficiency improvements in the water supply network. This pattern indicates that relatively favorable implementation conditions do not automatically result in a "Major" transformational outcome. In some cases, an intervention addresses only one component of a broader system, while in others its current scale or reach remains insufficient to fundamentally transform the system on its own. Their transformational significance should therefore be understood not only through their individual effects, but also through their interaction with complementary interventions.

Taken together, the assessment results point to a transition that is **underway but not yet fully systemic**. The 15 interventions represent several important building blocks of transformation: deployment of low-carbon and energy-efficient technologies, improvements in monitoring and information systems, development of enabling infrastructure, engagement of citizens and other stakeholders, and interventions that can support changes in mobility and energy-use patterns. However, the concentration of results around "Moderate" outcomes and processes ranging from "Possible" to "Likely" indicates that the main challenge is no longer only the identification of appropriate technical solutions. It increasingly relates to the ability to scale up successful approaches, secure long-term financing, strengthen institutional arrangements, increase participation and uptake and connect individual interventions into coherent sectoral pathways.

In this context, the assessment results are consistent with the broader characterization of City of Mostar as being in the "**Take-off' phase of TC**. The City of Mostar has moved beyond the stage in which transformation is represented only by plans or isolated concepts: several interventions are already being implemented, piloted or prepared for expansion. At the same time, the results do not yet indicate that low-carbon practices and technologies have become sufficiently widespread, institutionalized and self-sustaining to constitute a fully established transformation.

For the City of Mostar, these findings show that the transition towards a low-carbon city has started, but much of its potential is still to be realised. The City already has useful experience and a basis for further action, including energy data for 75 public buildings, initial investments in solar energy and electric mobility, improvements in public lighting, and growing interest among citizens in energy efficiency interventions. However, many of these activities are still implemented through individual projects, often depending on external funding. The assessment suggests that the next important step for Mostar is to build on these experiences and make them part of regular city planning and investment decisions. For example, data collected on public buildings should guide future renovation priorities, while investments in electric vehicles should be accompanied by charging infrastructure and broader improvements in sustainable transport. Similarly, interest among households in solar energy and building insulation needs to be supported by more continuous financing opportunities. In this sense, the main challenge for Mostar is not starting new initiatives, but ensuring that those already initiated can be **continued, expanded and connected**. This is where the greatest opportunity for moving from individual improvements towards lasting systemic change lies.

Results of the TC Assessment Using the Portfolio Tool

The **Portfolio Tool** was used to compare the TC of multiple interventions within a single sector, enabling a systematic assessment of the relative contribution of each intervention to achieving long-term and systemic changes. The **Portfolio Tool** allows for an aggregated evaluation, showing how individual interventions interact and contribute to long-term systemic change.

Portfolio 1: Comparative Analysis of Transport Sector Interventions

The first portfolio focuses on interventions within the transport sector, aimed at improving energy efficiency, reducing CO_2 emissions and promoting sustainable mobility. It includes five key interventions:

- Continuation of construction of bicycle lanes with supporting infrastructure;
- Construction of bus stops extensions;
- Installation of a software information system for public passenger transport;
- Construction and expansion of infrastructure to support electric vehicles;
- Procurement of 44 electric vehicles for the City-owned vehicle fleet.

By comparing these interventions, the portfolio provides insights into the relative contribution of each intervention to the overall TC in the transport sector. Below is presented heatmap for Portfolio 1.

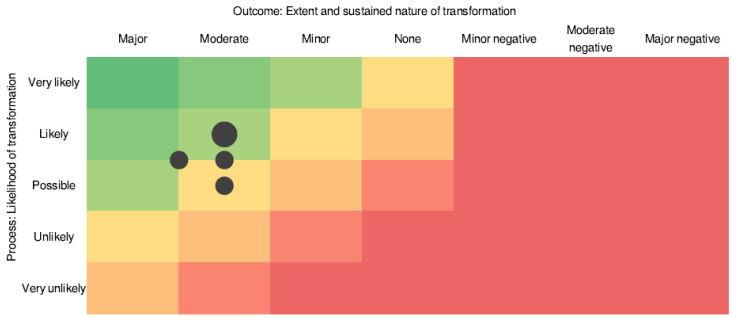


Figure 1: ICAT heatmap for Portfolio 1

Contribution to the transformational vision

At present, transport in the City of Mostar remains largely dependent on private cars and conventional fuels, while cycling infrastructure, public transport services and charging facilities are still being developed. This means that, for many residents, using a private car remains the more practical option for everyday travel. The combined implementation of the assessed interventions could gradually change this situation by making cycling safer, public transport more convenient and reliable, and electric vehicles easier to use. More importantly, these interventions could begin to change how people choose to travel, reducing dependence on private cars for shorter and everyday journeys.

The transformational visions defined for the individual interventions in the transport sector point towards a common long-term direction: a more sustainable urban mobility system based on increased use of active and public transport, improved accessibility and quality of transport services, and a gradual transition towards low-carbon mobility. Although each intervention addresses only one component of this transition, their visions are mutually complementary. Bicycle infrastructure supports a shift towards active mobility; improved bus stops and real-time passenger information

strengthen the attractiveness and accessibility of public transport; while EV charging infrastructure and electrification of the municipal fleet support the gradual introduction of low-carbon vehicle technologies.

Interpretation of the TC result

The result at the level of **Portfolio 1** indicates that a transformational process is **"Likely",** while the expected extent and sustained nature of the transformation is assessed as **"Moderate"**. This combination suggests that the transport-sector interventions, taken together, are likely to advance the transition towards low-carbon mobility, with a moderate degree of lasting change expected at their current scale and coverage.

The contribution of individual infrastructure and technology interventions to systemic transformation depends on how they are used and how they connect to the wider mobility system. For example, charging infrastructure can enable wider adoption of electric vehicles, but its transformational effect depends on actual use and expansion beyond the municipal fleet. Similarly, improved bus stops and real-time passenger information can make public transport more attractive, while their contribution to a shift away from private car use depends on service quality and ridership. Bicycle infrastructure can make cycling a practical alternative for everyday trips where it forms part of a safe and sufficiently connected network. Under Intervention 14, "Construction of Bus Stop Extensions", the completed activities included the construction of 25 bus bays at existing stops and improvements to bus stop infrastructure and passenger shelters.

The **"Likely–Moderate"** result reflects the portfolio's potential to generate lasting change in urban mobility. Achieving a broader transformation would depend on strengthening the links among the five interventions, expanding their scale and coverage, and embedding them in an integrated approach to sustainable urban mobility.

Looking at the five transport interventions together, one pattern stands out clearly. In almost all of them, the City of Mostar is acting largely on its own. Four of the five interventions received a score of only 2 for agents, as businesses, civil society and other partners are not yet strongly involved in carrying the change forward. The only exception is the bus stop extensions, which were implemented together with the public transport operator. Beyond this shared weakness, the interventions fall into two groups. Bicycle lanes and improved bus stops directly change the everyday experience of getting around the city, and this is reflected in the highest norms scores in the entire assessment. Electric mobility, on the other hand, is the least developed part of the portfolio. The electric fleet and the charging network received the lowest process ratings, and each depends on the other, since new vehicles need chargers and chargers need vehicles to use them. The portfolio therefore provides a good basis for encouraging people to walk, cycle and use public transport more often, while the shift to electric mobility will require more coordinated planning and a wider circle of actors beyond the City administration.

GHG mitigation relevance of the Portfolio 1

The TC assessment result at the level of Portfolio 1 should also be considered in relation to the expected contribution of the assessed transport-sector interventions to GHG emission reductions. The four quantified interventions included in Portfolio 1 correspond to estimated emission reductions of approximately **11,628 tCO_2/year**. For comparison, the 2014 baseline emissions of the transport sector amount to **109,031 tCO_2**, meaning that the combined estimates correspond to approximately **10.7% of the sector's 2014 emissions**. At the same time, they represent approximately **56.2%** of the total transport-sector emission reduction of **20,683 tCO_2** planned under the City of Mostar's SECAP by 2030. Regarding Intervention 14 "Construction of bus stops extensions" under the

SECAP, the intervention was assigned an estimated annual emission reduction of 5,454 tCO_2, representing a substantial share of the total projected emission reductions of Portfolio 1. This value was taken directly from the SECAP and represents its estimated mitigation impact.

The GHG emission reduction estimates originate from individual interventions defined in the City of Mostar's SECAP and overlaps between interventions are possible, particularly where several interventions contribute to the same shift in travel behavior from private vehicles towards public or active transport. Therefore, their effects may not be fully additive.

For **Portfolio 1**, a detailed report was generated and is included in the appendices of this report under the title **Portfolio 1: Comparative Analysis of Transport Sector Interventions**.

Portfolio 2: Comparative Analysis of Buildings Sector Interventions

The second portfolio focuses on interventions within the building sector in the City of Mostar, aiming to improve energy efficiency, reduce CO_2 emissions, and decarbonize public and residential buildings. The portfolio includes six key interventions:

- Establishment of an information system for monitoring energy consumption in public buildings;
- Decarbonization of public education buildings;
- Replacement of existing lighting fixtures in collective residential buildings;
- Insulation of collective residential buildings;
- Renovation of public buildings owned by the City of Mostar;
- Installation of solar systems for electricity production.

By comparing these interventions, the Portfolio Tool provided insights into the relative contribution of each intervention to the overall TC in the building sector. Below is the heatmap for Portfolio 2.

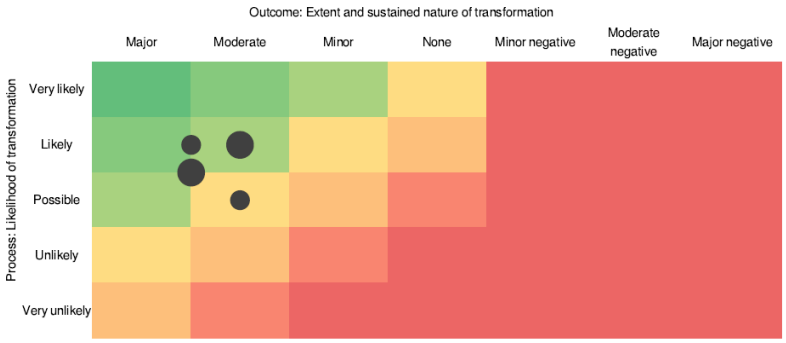


Figure 2: ICAT heatmap for Portfolio 2

Contribution to the transformational vision

The transformational visions defined for the individual interventions within **Portfolio 2** are directed towards a common long-term pathway: a more energy-efficient and low-carbon building sector in the City of Mostar, supported by renewable energy sources, improved energy management and reduced dependence on fossil fuels. The interventions address different but mutually complementary components of this transition. Thermal insulation and LED lighting reduce energy demand in residential buildings; renovation and decarbonization interventions improve the energy and carbon performance of public buildings; solar systems support decentralized renewable electricity generation and a more active role for households; while the information system for monitoring energy consumption provides the data and management capacity required for the systematic identification, planning and verification of energy-efficiency improvements.

For Mostar, this transition would mean moving from a building sector with high energy consumption and continued dependence on fossil fuels towards one where energy efficiency and renewable energy become standard practices in both public and residential buildings. At present, improvements are largely driven by individual renovation projects and available funding opportunities, while a more systematic approach to managing energy consumption is still being developed. The combined implementation of these interventions could change this by reducing energy demand, increasing local renewable electricity generation and enabling the City to plan and monitor investments more effectively.

Interpretation of the TC result

Portfolio 2 includes interventions for which the likelihood of a transformational process ranges from **"Possible"** to **"Likely"**. In terms of the expected extent and sustained nature of transformation, the results fall within the **"Moderate"** category or on the boundary between **"Moderate"** and **"Major"**. This distribution reflects the different roles that the interventions play as complementary components of a broader transition in the building sector.

Portfolio 2 brings together several dimensions of the building-sector transition. Solar systems support the introduction of decentralized renewable energy generation, while insulation and renovation interventions reduce energy demand. Decarbonization of heating systems in public education buildings addresses the energy source used to meet that demand. At the same time, the information system for monitoring energy consumption has an enabling function, as it strengthens the data and management basis for identifying inefficiencies, prioritizing investments and verifying achieved savings. Education and citizen engagement associated with the implementation of interventions in the residential sector further influence participation and uptake. Taken together, these interventions address both the technical performance of buildings and some of the conditions required to sustain and expand the transition.

The distribution of outcome ratings also indicates that the current **Portfolio 2** has the potential to generate meaningful change, although the extent of transformation differs across individual interventions. A shift from activities focused on individual buildings and project-based approaches towards programmatic renovation, systematic energy management and wider deployment of renewable energy technologies would be necessary for these interventions to result in a broader and more sustained transformation of the building stock. In this respect, replication and scale are particularly important: experience gained through individual public buildings, residential buildings or pilot initiatives becomes transformational when it is translated into approaches that can be repeatedly applied across a substantially larger share of the building stock.

Looking at the six building-sector interventions together, technology is clearly not what holds the transition back: all of them received technology scores of 2.5 or 3, as solar systems, insulation, LED lighting and biomass boilers are mature and well-known solutions. The difference between the stronger and the weaker interventions lies mainly in incentives and in the involvement of other actors. Solar systems, supported by a clear co-financing scheme, received the highest incentives score (3.5), while the renovation of City-owned public buildings received the lowest scores for both incentives and agents (2), as it depends almost entirely on the City and on individual funding opportunities. A second common pattern relates to social norms, which were rated only possible for four of the six interventions. Energy efficiency and renewable energy are therefore not yet seen as a normal, everyday choice for residents and building managers. Overall, the transformation of the building sector in Mostar will depend less on access to technology and more on stable, long-term incentive programmes, clear rules for multi-apartment buildings and making efficient and renewable solutions a social norm.

GHG mitigation relevance of the Portfolio 2

The TC assessment results should also be considered together with the expected contribution to GHG emission reductions of the interventions included in **Portfolio 2**. Taken together, the five interventions with quantified estimates correspond to potential emission reductions of approximately **21,705 tCO_2/year**. Compared with the 2014 building-sector baseline emissions of **205,086 tCO_2,** this corresponds to approximately **10.6%** of these emissions. As the educational buildings covered by Intervention 4 are also included in Intervention 5, the combined estimate may be slightly overstated. However, the effect is limited: it cannot exceed the 1,079 tCO_2 emission reduction estimated for Intervention 4, which is around 5% of the portfolio total. The City of Mostar's SECAP envisages an overall emission reduction of approximately **87,522 tCO_2 in the building sector by 2030**, meaning that the quantified interventions included in Portfolio 2 represent approximately **24.8% of the planned emission reduction in this sector**. The values are based on estimates associated with individual interventions from the City of Mostar's SECAP and their simple aggregation does not account for possible interactions or overlaps between interventions. This is particularly relevant where several interventions affect energy consumption or energy supply within the same building stock. The Portfolio 2-level assessment therefore shows that **GHG mitigation impact and TC represent related but distinct dimensions of the transition**.

For the building sector, achieving deeper transformation will depend on converting individual investments and pilot activities into scalable and long-term sustainable programs that combine reductions in energy demand, low-carbon energy supply, systematic energy management, and mechanisms for continued investment and stakeholder participation. For **Portfolio 2**, a detailed report was generated and is included in the appendices of this report under the title **Portfolio 2: Comparative Analysis of Buildings Sector Interventions**.

Portfolio 3: Comparative Analysis for Other Interventions

Portfolio 3 focuses on interventions that are not categorized under any specific sector within the TC Toolkit and are classified in the "Others" section. The interventions aim to improve energy efficiency and modernize public infrastructure, as well as to educate citizens on energy efficiency. The portfolio includes four key interventions:

- Improvement of energy efficiency in the water supply network;
- Modernization of public lighting;
- Replacement of existing high-pressure mercury and sodium lamps in public lighting;
- Education and promotion of energy efficiency for citizens.

By comparing these interventions, the Portfolio Tool provided insights into the relative contribution of each intervention to the overall TC. Below is the heatmap for Portfolio 3.

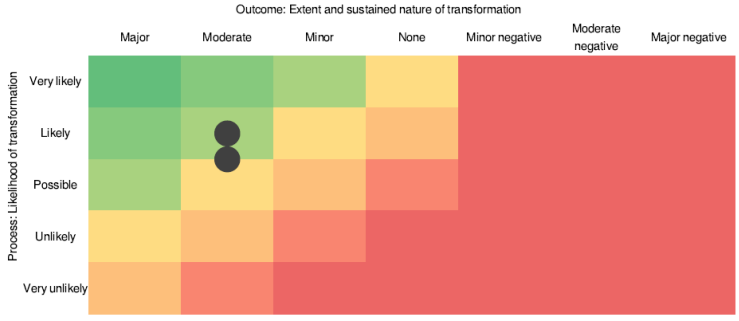


Figure 3: ICAT heatmap for Portfolio 3

By comparing these interventions, the Portfolio Tool provided insights into the relative contribution

of each intervention to the overall TC of the interventions categorized under the “Others” section.

Contribution to the transformational vision

The transformational visions defined for the interventions in the **Portfolio 3** share a common direction towards more efficient use of energy and resources, lower emissions and stronger long-term management of municipal systems. The water supply intervention focuses on reducing water losses and energy consumption through improved monitoring, pressure regulation and infrastructure management, while the two public lighting interventions combine efficient LED technology with progressively smarter and more automated control of the lighting system. The education and promotion intervention complements these infrastructure-oriented interventions by targeting citizen awareness, energy-use practices and longer-term behavioural change.

For the City of Mostar, these interventions could contribute to a gradual shift from traditional infrastructure operation and occasional energy-saving activities towards more efficient and systematic management of municipal resources. At present, water losses, outdated lighting technologies and limited monitoring and control of energy consumption remain challenges for the City's public services. Improving the water supply network and public lighting would not only reduce energy consumption and operating costs, but could also introduce more efficient maintenance and management practices in municipal utilities. At the same time, continuous education and information for citizens could encourage more responsible energy use beyond public infrastructure.

Interpretation of the TC result

Portfolio 3 combines technical infrastructure interventions in the water supply and public lighting systems with an information and awareness-raising intervention targeting citizens. Both markers on the heatmap fall within the “Moderate” category for the expected extent and sustained nature of transformation. One is positioned at “Likely” for the likelihood of a transformational process, while the other lies on the boundary between “Possible” and “Likely”. This pattern suggests that the interventions can support lasting improvements in municipal infrastructure and energy management, with the extent of change depending on how widely the improvements are applied and sustained in practice.

The public lighting interventions demonstrate this distinction particularly clearly. Replacing high-pressure mercury and sodium lamps with LED technology changes the technological basis of the lighting system, while the introduction of digital time relays and two-stage dimmers improves the way the system is controlled and managed. Their combined implementation therefore goes beyond the simple replacement of individual equipment and creates the basis for a more energy-efficient and systematically managed public lighting system. However, the extent of TC depends on whether these improvements are expanded across the wider network, integrated into regular infrastructure management, and supported by sustainable financing and maintenance models.

A similar distinction is evident in the water supply intervention. Pressure regulation, systematic leak detection, and increased metering can contribute to a shift from reactive infrastructure repair towards continuous management of water and energy efficiency. The operation of a 140 kW solar power plant at the water treatment facility represents an additional concrete element of this transition. At the same time, implementation is constrained by property-related, cadastral, and land-registry issues affecting certain parts of the network. This demonstrates that the availability of technical solutions alone is not sufficient to achieve transformation if institutional and administrative barriers limit their wider application.

The education and promotion intervention plays a different role within the portfolio. Unlike the infrastructure interventions, its effect on emissions depends on changes in citizens’ behaviour and is

therefore difficult to attribute and verify. Its contribution is primarily enabling: awareness-raising, information, and advisory activities can influence energy-use practices and increase citizens' willingness and capacity to participate in other energy-efficiency and renewable-energy interventions. Its transformational relevance therefore depends on whether these activities evolve from occasional project-based campaigns into sustained and institutionalized support, and whether they are effectively linked to concrete opportunities for citizens to take action.

Looking at the characteristic scores, the four interventions complement each other in an interesting way. The water supply intervention has the strongest drivers of change in the entire assessment, with clear financial benefits for the utility and proven technical solutions, yet it has very little contact with citizens. The education and promotion intervention is its mirror image, as it reaches people directly and builds awareness and partnerships but does not itself bring new technologies into use. The two public lighting interventions share a common weakness, as both are implemented mainly by the City with limited involvement of other actors. In other words, what one intervention lacks, another often provides. This potential will not be realised on its own, because the interventions are carried out by different institutions, including the City and Vodovod Ltd., and are not formally connected. Linking them more closely, for example by informing citizens about water savings or the benefits of modern public lighting, would make the portfolio more than the sum of its parts.

GHG mitigation relevance of the Portfolio 3

For the **water supply system**, the energy efficiency intervention has an estimated emission reduction of approximately **2,356 tCO_2/year**. Compared with the 2014 baseline emissions of the water supply system of **4,347 tCO_2**, this corresponds to approximately **54.2%** of these emissions. This indicates a potentially significant contribution to emission reductions within this specific municipal system. However, the TC assessment shows that realising and sustaining this potential also depends on overcoming institutional and property-related constraints that currently hinder implementation in certain parts of the network.

For **public lighting**, the replacement of mercury and sodium lamps has an estimated emission reduction of approximately **3,775 tCO_2/year**, while the modernisation of the lighting control system contributes an additional estimated reduction of **120 tCO_2/year**. Taken together, these two interventions correspond to an emission reduction of approximately **3,895 tCO_2/year**. Compared with the 2014 public lighting baseline emissions of **5,387 tCO_2,** this is equivalent to approximately **72.3%** of these emissions.

However, it is important to distinguish between the projected emission reduction potential and the actual implementation progress. The original SECAP envisaged the replacement of 11,440 lighting fixtures under Intervention 8, while approximately 2,300 fixtures have been replaced to date, representing around 20% of the planned scope. According to the City of Mostar, the initial replacement phase has been completed and implementation is ongoing. Nevertheless, the estimated emission reduction of 3,775 tCO_2/year refers to the full implementation scope originally envisaged in the SECAP. Accordingly, the combined reduction of 3,895 tCO_2/year, corresponding to approximately 72.3% of the sectoral baseline, should be interpreted as the projected mitigation potential under the full SECAP implementation scenario, not as an achieved reduction. The original SECAP estimates have been retained to maintain consistency with the source document and illustrate the full emission reduction potential of these interventions, **as only the initial phase of lighting fixture replacement has been completed and implementation will continue until the full scope envisaged in the SECAP is achieved,** while the emission reductions achieved to date have not been separately quantified.

These results provide a particularly useful illustration of the distinction between **GHG mitigation potential and TC**. The public lighting interventions have a very significant estimated contribution to emission reductions relative to the sectoral baseline, but a large direct emission reduction does not

automatically imply an equally high level of TC. The TC assessment also considers whether the change is sufficiently broad and sustained, and whether the technological, institutional, behavioral and other enabling processes are strong enough to support its continuation and replication.

On the other hand, the emission reduction associated with the education and promotion intervention depends on behavioural change and is more difficult to verify. Its main value lies in supporting the effectiveness and uptake of other interventions implemented under the City of Mostar's SECAP.

For **Portfolio 3**, a detailed report was generated and is included in the appendices of this report under the title **Portfolio 3: Comparative Analysis for Other Interventions**.

Application of Assessment Results in Domestic Policymaking, National/International Reporting, NDC Development and Implementation, Participation in Mobilization of Financial Resources

The results of the TC assessment of City of Mostar's SECAP interventions, conducted through TC Toolkit analysis, provide concrete data that enable understanding of how local interventions can contribute to achieving national targets. The analysis identifies interventions with the highest TC, allowing strategic guidance of local activities in line with NDC priorities. This ensures vertical policy alignment, where local actions directly support national emission reduction and climate adaptation goals, while providing a solid foundation for financial mobilization and future intervention planning.

BiH's NDC for the period 2020-2030 was prepared in accordance with Decision 1/CP.21 of the Paris Agreement and represents a revision of the first INDC submitted in 2015. The NDC includes more ambitious GHG emission reduction targets across all relevant sectors. The NDC goals encompass both unconditional and conditional scenarios, with the conditional targets relying on enhanced international support, particularly in decarbonizing the power sector and ensuring a just transition for mining regions[8].

Currently, NDC 3.0 is being prepared. Although the global submission deadline was February 2025, BiH is still finalizing more ambitious goals that are better aligned with international commitments, including efforts to limit global warming to 1.5–2 °C in accordance with the Paris Agreement.

The analysis conducted using the ICAT TC Toolkit indicates that the intervention "Insulation of collective residential buildings" has an outcome rating between Major and Moderate, with the likelihood of transformation assessed as between Likely and Possible. In comparison, interventions such as "Establishment of an information system for monitoring energy consumption in public buildings" and "Replacement of existing lighting fixtures in collective residential buildings" have Moderate outcome ratings, but their likelihood of transformation is assessed as Likely. The intervention "Education and promotion of energy efficiency for citizens" also has a Moderate outcome rating, with the likelihood of transformation assessed as between Likely and Possible. These findings highlight the complementary contributions of technical, educational and institutional interventions to TC and the achievement of NDC objectives. ICAT heatmaps provide a structured overview of the assessed transformational potential, supporting the identification of priorities for further implementation and financial mobilization.

Quantified data on the TC of interventions facilitate the prioritization of interventions based on their actual contribution to NDC goals, ensuring that limited resources are allocated to the most effective

[8] *Nationally Determined Contribution of Bosnia and Herzegovina (NDC) for the period 2020–2030, UNFCCC, 2021.*

activities. These data support continuous monitoring and policy adaptation, enhancing the TC of interventions and optimizing their implementation.

Also, City of Mostar's SECAP interventions, including "Renovation of public buildings owned by the City of Mostar" and "Installation of solar systems for electricity production" contribute to reducing energy consumption and CO_2 emissions. These local results directly align with and support national guidance outlined in the NDC Roadmap, which anticipates larger infrastructure projects in the residential and public sectors.

Overall, the analysis of City of Mostar's SECAP in alignment with the NDC, demonstrates that local interventions enable concrete and measurable transformation, while national interventions provide a framework for long-term investments and more ambitious goals. The integration of local and national interventions through vertical policy alignment ensures that local initiatives directly contribute to achieving NDC objectives, while ICAT analysis data enable:

- **Strengthening project and grant applications:** Clearly documented impacts of interventions, visualized through heatmaps and TC ratings, provide strong evidence of planned activities' effectiveness. Such data enhance the credibility of applications and facilitate access to international funds and grants;
- **Supporting the prioritization of interventions:** Analysis of TC allows the identification of interventions with the greatest impact and sustainability. This helps local authorities and national bodies decide which interventions deserve priority financial support and ensures that limited resources are allocated to the most effective activities;
- **Demonstrating effectiveness:** Using results from the TC Toolkit analysis, it is possible to quantify each intervention's contribution to NDC and SDG goals. This ensures transparency, progress monitoring and the ability to adapt policies based on achieved outcomes.

This approach demonstrates that local initiatives not only contribute to national climate goals, but also provide a clear foundation for planning future interventions, mobilizing resources and tracking their impact, ensuring consistent and measurable implementation of NDC goals at all levels.

Feedback from the Stakeholder Dialogues

Stakeholder engagement was an integral part of the assessment process and was organized through several stages, starting with structured consultations with representatives of the City of Mostar, followed by a consultation workshop with relevant local institutions and subsequently, broader stakeholder dialogue in the context of the ICAT side event organized during SECW 2026. These consultations served different but complementary purposes, including defining the scope of the assessment, identifying priority interventions, verifying and supplementing the data used in the ICAT TC Toolkit, discussing preliminary assessment results and placing the findings within the broader context of local climate action.

Initial Consultations with Representatives of the City of Mostar

The project team established close cooperation with the City of Mostar through a series of structured working meetings. These consultations were particularly important during the initial phase of the assessment, as they provided a better understanding of the institutional, strategic and implementation context in which the SECAP interventions are being implemented.

The initial discussions focused on the City of Mostar's existing climate and energy strategies, institutional responsibilities, decision-making processes, available implementation capacities and the status of City of Mostar's SECAP implementation. This provided the basis for adapting the assessment process to the local governance framework and for identifying the type and level of data that could realistically be obtained for the application of the ICAT TC Toolkit.

A particularly important outcome of these consultations was the joint review of the interventions included in the City of Mostar's SECAP. Together with City of Mostar representatives, the project team considered their implementation status, expected contribution to GHG reductions, estimated investment requirements, potential for replication and relevance to the City of Mostar's climate objectives. The subsequent meetings were used to define the assessment boundaries and identify the qualitative and quantitative information required for individual interventions. Relevant institutions and other stakeholders that could provide additional information or contribute to data verification were also identified. In parallel, representatives of the City of Mostar were introduced to the main steps and requirements of the ICAT TC Toolkit, including the assessment of transformational impacts and the documentation of supporting data and assumptions.

The final working meeting focused on confirming the assessment plan, responsibilities, timeframe and subsequent steps. Feedback provided by the City of Mostar throughout this process was incorporated into the assessment approach. As a result, the final assessment framework reflected both the methodological requirements of the ICAT TC Toolkit and the practical conditions, priorities and information available at the local level.

Consultation Workshop with Local Institutions

The consultation workshop brought together representatives of public buildings, which are the focus of most of the assessed interventions. In addition to validating and supplementing the data on energy consumption and heating systems in individual buildings, the workshop provided an opportunity to hear how the interventions are experienced by the institutions that use these buildings every day. Participants noted that the energy efficiency interventions implemented so far, such as the installation of biomass boilers, have improved comfort and working conditions in their buildings. They also emphasised the need for a system for regular monitoring of energy consumption, which would allow them to track the effects of implemented interventions and manage energy use more effectively. In addition, participants highlighted that the introduction of new technical systems should go hand in hand with training of the staff responsible for their operation and maintenance. Questions were also raised about how buildings are prioritised for future renovation, and participants expressed interest in educational activities on energy efficiency for children and students. These insights confirmed several findings of the TC assessment, particularly the importance of monitoring systems, institutional capacity and the link between infrastructure investments and awareness-raising.

Technical Working Session with the City of Mostar

In addition to the initial consultations and the workshop with local institutions, a technical working session was held with representatives of the City of Mostar to review the assessment findings and discuss their implications for the future implementation of SECAP interventions. Particular attention was given to the relationship between individual interventions and the broader objectives of the City's energy and climate policies.

One of the important issues identified during the discussions was the lack of a systematic approach to monitoring and documenting the implementation of SECAP interventions. In many cases, information on implementation progress, completed activities and achieved results is held by individual municipal officials responsible for specific areas, rather than being regularly collected and recorded in a centralized system. As a result, obtaining a complete overview of SECAP implementation often requires direct consultations with several departments and individuals. This also makes it more difficult to track progress over time, verify achieved results and assess the overall contribution of individual interventions to the City's climate objectives.

The discussions therefore highlighted the need to improve coordination between municipal departments and establish more consistent procedures for collecting, updating and reporting

information on SECAP implementation. The TC assessment demonstrated the value of having reliable and regularly updated data, not only for monitoring energy savings and emission reductions, but also for identifying implementation barriers and supporting future investment decisions.

The working session also provided an opportunity to discuss how the assessment findings could support the prioritization of future investments, the continuation and scaling up of successful interventions, and the integration of TC considerations into the City's planning and decision-making processes.

Representatives of the City of Mostar indicated that the assessment results will be used as an input for future funding applications to domestic funds and international donors, as well as in the review and update of the City's SECAP. They noted that the results provided a new perspective on several interventions, particularly those with a large expected emission reduction but a weaker transformational process, highlighting that the success of these interventions depends not only on investment, but also on institutional capacity, coordination and the engagement of other actors. The City also expressed interest in applying the TC Toolkit in future assessments of its climate and energy interventions.

SECW 2026 Side Event

On 23 September 2026, as part of Sarajevo Energy and Climate Week (SECW 2026), one of the leading regional events dedicated to energy transition and climate action, the City of Mostar and nLogic Advisory organized the side event "Assessing Transformational Change at the Local Level – Experience from the City of Mostar". The event brought together stakeholders from different sectors and provided an opportunity to present the assessment approach, the results obtained for selected SECAP interventions and the main lessons learned during the application of the Toolkit.

Particular attention was given to the added value of the TC Toolkit compared to traditional monitoring of climate interventions. The presentation demonstrated how the Toolkit can help assess not only expected energy savings and GHG emission reductions, but also the broader changes that interventions may bring to local policies, institutional practices, investment decisions and citizens' behavior. The possibility of comparing individual interventions and assessing their combined contribution to transformational change was also highlighted.

An important topic of the discussion was the potential for applying this approach in other cities and municipalities in Bosnia and Herzegovina. The experience from Mostar provided a practical example of how existing SECAP interventions can be assessed from a broader perspective, helping local authorities better understand which interventions have the potential to contribute to long-term systemic change and what conditions are needed to achieve it.

The discussion also highlighted several considerations relevant to the wider application of the methodology. These included the importance of reliable local data, the need to involve different institutions in the assessment process, and the value of using assessment findings to support investment prioritization and future climate planning. At the same time, the experience from Mostar demonstrated that applying the Toolkit requires a good understanding of local implementation conditions, particularly where information on individual interventions is not systematically collected or regularly updated.

Several concrete questions were raised by participants during the discussion. These related to the time and data required to apply the TC Toolkit, the feasibility of its use by smaller municipalities with limited technical and administrative capacities, and the extent to which the scoring of individual characteristics depends on expert judgement. The project team explained that the reliability of the scores depends on transparent documentation of the rationale for each score and on validation with relevant stakeholders, as was done in the case of Mostar. The assessment results themselves were

not challenged by participants. In informal discussions held on the margins of the event, representatives of the Municipality of Centar Sarajevo, which is currently preparing its Local Environmental Action Plan (LEAP), showed interest in the approach and noted that it could be useful when selecting and prioritising interventions for their own plan.

An important conclusion emerging from the discussion was that the ICAT TC Toolkit could be useful not only for assessing existing SECAP interventions, but also at an earlier stage, when municipalities are defining investment priorities and developing future climate action plans. By considering the potential for long-term systemic change alongside expected emission reductions, investment costs and implementation feasibility, the assessment could provide an additional basis for deciding which interventions should receive priority. The discussion also pointed to the potential for applying this approach beyond the local level, particularly in supporting the identification of climate investment priorities linked to Bosnia and Herzegovina's national climate commitments. In this respect, the experience from Mostar offers a practical example that could be adapted and replicated by other municipalities and, potentially, inform broader climate planning processes.

Lessons learned

The assessment process of TC interventions defined in the City of Mostar's SECAP showed that the TC potential of local climate actions can be considered through estimated GHG emission reductions, energy savings and the level of implementation of individual projects, while simultaneously taking into account the expected scale and durability of results and the quality of the processes that enable those results to be achieved, scaled up and sustained over the long term. Such an approach is particularly relevant for the City of Mostar's SECAP, where most interventions individually affect relatively limited parts of the energy, transport, or infrastructure system, while their actual transformational significance becomes visible only when their interaction is considered.

This difference between outcome and process characteristics represents one of the most important lessons learned. An intervention may have the potential to generate significant and long-lasting results, but if institutional capacities, financing mechanisms, the regulatory framework, stakeholder coordination, or user acceptance are insufficiently developed, the likelihood of fully realizing that potential remains limited. Four interventions were assessed between "Moderate" and "Major" in terms of outcome. For insulation of multi-apartment buildings, decarbonization of public education buildings and expansion of electric vehicle infrastructure, the likelihood of the transformational process was assessed between "Possible" and "Likely". Installation of solar systems was the only one of the four assessed as "Likely" on the process dimension, with the 50% co-financing scheme identified as its strongest incentive. For these interventions, the priority in the coming period should not be limited to further demonstrating their technical potential, but should also include strengthening the implementation environment that enables the achievement and long-term sustainability of the expected effects.

On the other hand, interventions with a "Moderate" outcome and a "Likely" process show that relatively strong implementation mechanisms increase the likelihood of transformational impact, although the limited scale of an individual intervention may still constrain the depth of systemic change. The lesson learned is therefore that TC is strengthened through improved implementation as well as through scaling up, replication and greater interconnection of successful interventions. Individual projects can become transformational when their solutions evolve into common practice, continuous programs, or institutionalized approaches to planning and management.

Most of the analyzed interventions, as well as the local system considered as a whole, are in the "Take-off" phase. Strategic documents, demonstration and pilot projects, local experience and growing awareness of the need for a low-carbon transition are already present, while the pace of implementation, institutional capacities and access to stable sources of financing remain limiting factors.

The analysis of process characteristics further shows that technology alone is not sufficient to achieve TC. The analyzed portfolio already includes a range of available low-carbon solutions, including solar systems, thermal insulation, LED lighting, biomass, electric vehicles, charging infrastructure, digital information systems and interventions aimed at improving the efficiency of water supply infrastructure. The transformational challenge therefore shifts to a considerable extent from the availability of technology towards its scaling up, financing, institutionalization and acceptance by users.

The City of Mostar has a key coordination and implementation role, but the realization of the transformational vision also depends on public institutions, utility companies, Mostar Bus, residents, building managers and owners, schools, local communities, financial and development partners and civil society organizations. Consultations and a technical working session with City representatives

helped identify gaps in the monitoring of SECAP implementation. At the workshop with representatives of local public institutions, participants validated and supplemented building-level data and highlighted practical needs, including training for staff responsible for operating and maintaining new systems. The SECW 2026 side event provided a wider forum for discussing the findings and their potential use in other municipalities.

The assessment of incentives showed that different co-financing models, international projects and the ESCO approach can serve as important mechanisms for accelerating implementation. At the same time, experience with certain interventions indicates that the lack of predictable financial resources and dependence on occasional grants may constrain scaling up. The lesson learned is that TC requires a shift from financing individual projects towards more stable multiannual financing and co-financing mechanisms, particularly for interventions that have already demonstrated user interest or technical feasibility.

The portfolio analysis of the building sector shows how six interventions contribute to an integrated process of decarbonizing the building stock. The planned information system for monitoring energy consumption in public buildings would give the City a more reliable basis for prioritizing renovations, planning budgets and verifying energy savings. Renovation and thermal insulation reduce energy demand, decarbonization of heating systems reduces dependence on fossil fuels, solar systems increase decentralized renewable energy generation, and replacement of inefficient lighting reduces electricity consumption. In **Portfolio 2**, the assessed likelihood of a transformational process ranges from **"Possible"** to **"Likely"**, while the expected outcomes fall within **"Moderate"** or on the boundary between **"Moderate"** and **"Major"**. The interventions address complementary functions that can be brought together through renovation programs and systematic energy management across the building stock.

In the transport sector, **Portfolio 1** received an overall rating of **"Likely"** for the transformational process and **"Moderate"** for the expected extent and sustained nature of transformation. Cycling infrastructure, improvements to bus stops, digitalization of public transport, electric vehicle infrastructure and electrification of the municipal vehicle fleet together support the transition towards low-carbon mobility. A broader transformation will depend on how these interventions are coordinated and whether they lead to changes in modal share, including greater use of public transport and cycling, as well as reduced dependence on private fossil-fuel vehicles.

In **Portfolio 3**, both markers shown on the heatmap fall within the **"Moderate"** outcome category. One is positioned at **"Likely"** for the transformational process, while the other lies on the boundary between **"Possible"** and **"Likely"**. Replacement and modernization of public lighting have substantial potential for direct emission reductions relative to the size of that sector, while the estimated emission reduction from the water supply intervention corresponds to approximately 54% of the water supply sector's 2014 emissions. The extent and durability of transformation also depend on whether the technical improvements are extended across the networks, incorporated into routine infrastructure management and supported by long-term financing and maintenance. Citizen information and awareness-raising can reinforce these efforts when linked to concrete opportunities to participate in energy efficiency and renewable energy initiatives.

Overall, the three portfolios support the City of Mostar's transformational vision by addressing different requirements for systemic change. Some interventions directly reduce energy consumption and emissions, while others provide infrastructure for low-carbon technologies, generate data for better management, influence investment decisions or support changes in citizens' behaviour. Integrating these functions into municipal planning, investment and day-to-day operations can help extend and sustain the changes initiated by individual interventions.

The data collection and verification process remains an important lesson learned, primarily because

it showed that a transformational assessment requires information that standard technical documents often do not contain. Quantitative data on emissions, energy and investments enable the assessment of the magnitude of effects, while qualitative data from consultations are needed to understand why a particular result is likely, which barriers constrain implementation, and whether conditions exist for scaling up and sustaining change. Tailored questionnaires and the involvement of local stakeholders proved useful precisely because they enabled these two groups of data to be linked.

Cooperation with stakeholders also demonstrated that participation should form an integral part of future monitoring of TC rather than being a one-off activity during the assessment phase. For the City of Mostar, this would mean periodically involving public institutions, utility companies, citizens, businesses, and other stakeholders in monitoring the implementation of the City of Mostar SECAP, reviewing assumptions and identifying new barriers or opportunities for scaling up.

The most important overall lesson learned is therefore that TC in the City of Mostar will not result from a single intervention, but from the ability to connect, scale up and institutionalize existing initiatives. The assessment results show that technological solutions and individual examples of good practice are already present and that several interventions have favorable transformational potential. At the same time, differences between process and outcome assessments, the dominant “Take-off” phase and the portfolio assessment results indicate that moving towards stronger transformation will require strengthening institutional capacities, stabilizing financing mechanisms, improving coordination between interventions, systematically using data for decision-making and expanding successful models to a larger number of users and buildings.

Feedback on TC Toolkit Usability and Improvement Areas

The application of the TC Toolkit in assessing the TC of interventions defined in the City of Mostar's SECAP has provided valuable insights into the usability of the tool, as well as ideas for its future development.

Experience has shown that the TC Toolkit is extremely useful for systematically assessing interventions, combining quantitative and qualitative data, visualizing results through heatmaps, and facilitating the analysis of the long-term impact of interventions on TC in the energy, transport and buildings sectors. The clearly defined TC Toolkit has significantly contributed to methodological consistency and reduced the risk of data entry errors, while the Portfolio Tool has enabled the review and comparison of multiple interventions within a portfolio.

Technical issues identified in the online TC Toolkit during the application were reported to the ICAT team and resolved during the project. The experience in the City of Mostar also points to several areas that could be considered as the Toolkit is developed further:

- **Guidance on tool selection:** More detailed initial questions in the Assess Interventions section could help users identify the most suitable ICAT Tool, particularly for complex or cross-sectoral interventions;
- **Visualisation of results:** Additional options for visualising results could further support the interpretation and communication of findings to decision makers and stakeholders;
- **Transformational change in adaptation:** The ICAT TC Methodology focuses on climate mitigation and sustainable development. Future development could consider additional guidance on assessing the transformational impact of adaptation interventions, including more detailed explanations on how to approach the criteria, outcome scales and the timeframe over which results are sustained;
- **Implementation periods:** Allowing users to enter only the start and end year of implementation would simplify data entry where exact dates are not available, as is often the case at the local level.

Although the City of Mostar served as a pilot project, there is room for broader application of the ICAT TC Tool in assessing the TC of interventions, both nationally and internationally. Broader use of the tool would enable a more consistent and systematic assessment of the TC of different interventions, facilitating the identification of the most effective interventions and supporting strategic decision-making.

Overall, the TC Toolkit has proven to be an effective and methodologically robust tool for assessing the TC of interventions, and a valuable resource for local authorities, institutions and stakeholders involved in the planning and implementation of climate actions.

Conclusions and Next Steps

This report documents the ongoing implementation of Activity 2: Conducting the assessment of the TC of interventions using the ICAT TC Tools and presents the methodological approach and practical steps taken to evaluate the transformational impact of selected SECAP interventions in the City of Mostar. Building on the framework established in Activity 1, the project is now generating evidence-based insights into the outcomes of the assessed interventions' TC.

Through Activity 2, the selected interventions have been evaluated using the TC Toolkit, allowing for a detailed analysis of both process and outcome characteristics, as well as the identification of key drivers, barriers, and enabling conditions for TC. The systematic application of the TC Toolkit ensures that the assessment results are transparent, replicable and aligned with ICAT standards.

Key outputs of this activity include the assessment of the TC of 15 interventions from the City of Mostar's SECAP, identification of areas demonstrating significant progress toward low-emission and climate-resilient development, and the generation of data and visualizations (e.g., heatmaps, summary tables) that support interpretation and decision-making.

The findings from Activity 2 have directly informed Activity 3, including the preparation of a comprehensive case study that presents the assessment results, key findings and lessons learned in an accessible format. This will ensure that insights gained through the TC assessment are effectively communicated, validated, and integrated into local planning and policy processes.

By completing Activity 2, the project provides the critical evidence base needed to:

- Support informed decision-making at the municipal level;
- Strengthen the alignment of the City of Mostar's SECAP interventions with national climate objectives and NDCs;
- Identify opportunities for scaling and replicating high-impact interventions;
- Highlight priority areas for improving the enabling environment for TC in the energy, transport, and building sectors.

Activity 3 will leverage these results to engage stakeholders, promote knowledge sharing and ensure the practical uptake of assessment findings, thereby maximizing the long-term impact of the TC Toolkit assessment in the City of Mostar.

Through the combined implementation of Activities 1–3, the project demonstrates a structured, transparent and locally adapted approach to evaluating municipal climate action, providing valuable methodological and practical insights for other cities and local governments seeking to advance TC and low-carbon, climate-resilient development pathways.

Appendices

Appendix A: Installation of solar systems for electricity production – TC Assessment Report

Appendix B: Insulation of collective residential buildings – TC Assessment Report

Appendix C: Replacement of existing lighting fixtures in collective residential buildings – TC Assessment Report

Appendix D: Decarbonization of public education buildings – TC Assessment Report

Appendix E: Renovation of public buildings owned by the City of Mostar – TC Assessment Report

Appendix F: Education and promotion of energy efficiency for citizens – TC Assessment Report

Appendix G: Establishment of an information system for monitoring energy consumption in public buildings – TC Assessment Report

Appendix H: Replacement of existing high-pressure mercury and sodium lamps in public lighting – TC Assessment Report

Appendix I: Modernization of public lighting – TC Assessment Report

Appendix J: Procurement of 44 electric vehicles for the city-owned vehicle fleet – TC Assessment Report

Appendix K: Installation of a software information system for public passenger transport – TC Assessment Report

Appendix L: Continuation of construction of bicycle lanes with supporting infrastructure – TC Assessment Report

Appendix M: Construction and expansion of infrastructure to support electric vehicles – TC Assessment Report

Appendix N: Construction of bus stop extensions – TC Assessment Report

Appendix O: Improvement of energy efficiency in the water supply network – TC Assessment Report

Portfolio 1: Comparative Analysis of Transport Sector Interventions

Portfolio 2: Comparative Analysis of Buildings Sector Interventions

Portfolio 3: Comparative Analysis for Other Interventions