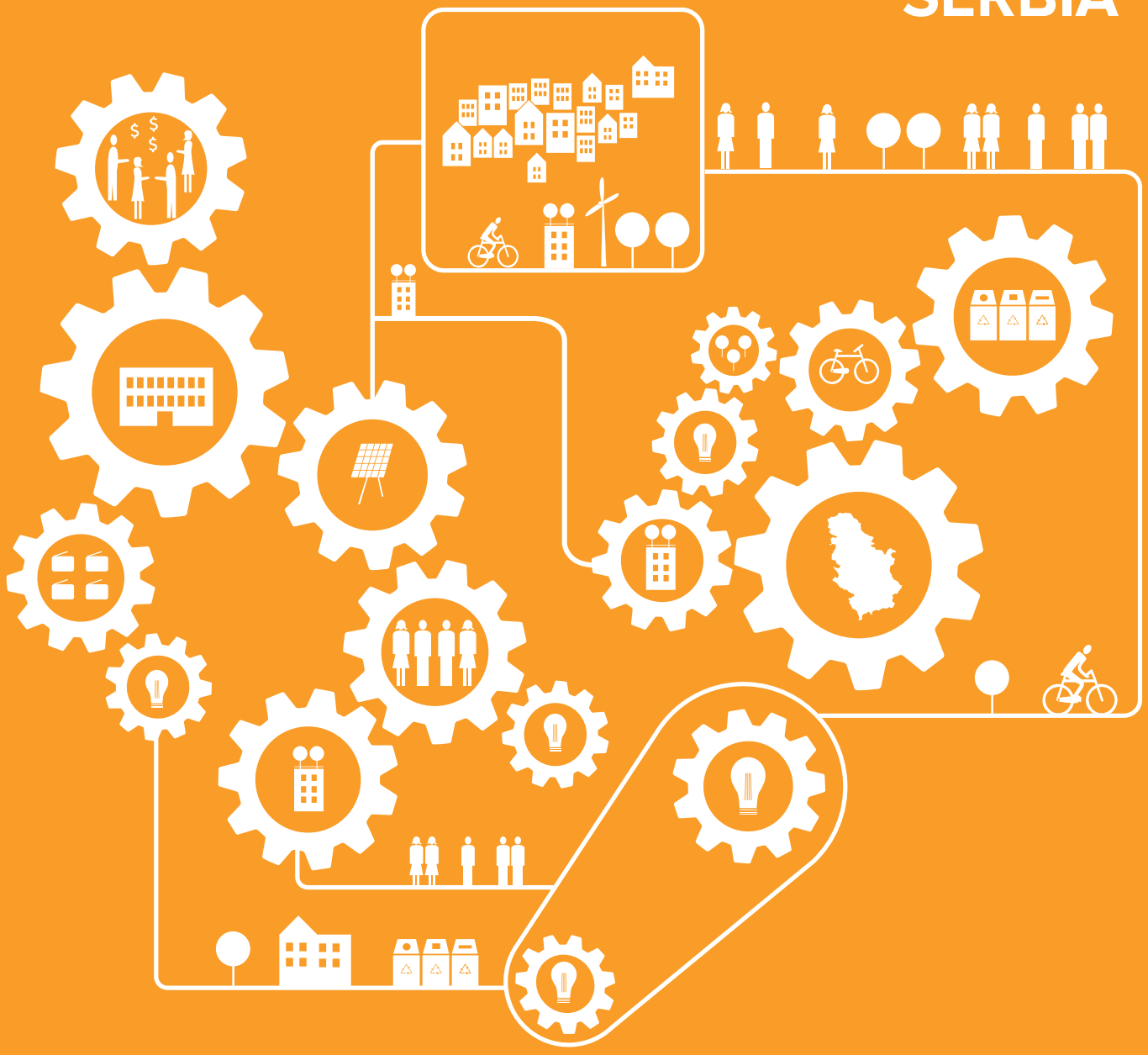
CLIMATE PROMISE

A SAFE AND SUSTAINABLE FUTURE THROUGH BOLD CLIMATE ACTION

CLIMATE FINANCING IN SERBIA



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REPUBLIC OF SERBIA
Ministry of
Environmental Protection

United Nations
Climate Change

CLIMATE FINANCING IN SERBIA

OVERVIEW AND NEXT STEPS

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Author:
Milos Markovic, PhD

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Tatjana Kuburović

Photos:
UNDP

Design:
Tatjana Kuburović

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Abbreviations

MoEP	Ministry of Environmental Protection
MoF	Ministry of Finance
PIM	Public Investment Management
CBT	Climate Budget Tagging
CPEIR	Climate Public Expenditure and Institutional Report
UNFCCC	United Nations Framework Convention on Climate Change
GHG	Greenhouse gas
MRV	Monitoring, Reporting and Verification
RHIS	Republic Hydrometeorological Institute
GDP	Gross Domestic Product
IPCC	The Intergovernmental Panel on Climate Change
IPA	Instrument for pre-accession assistance
LCDS	Low-Carbon Development Strategy
SORS	Statistical Office of the Republic of Serbia
GCF	Green Climate Fund
SDG	Sustainable Development Goals
NCCC	National Climate Change Committee
MoME	Ministry of Mining and Energy
MoAFWM	Ministry of Agriculture, Forestry and Water Management
MoCTI	Ministry of Construction, Traffic and Infrastructure
PFM	Public Finance Management
PIMO	Public Investment Management Office
FMIS	Financial Management Information System
ISIB	Budget Execution Information System
JAFIN	Payment Processing Information System
BIS	Budget Information System
BSL	Budget System Law
LPS	Law on Planning System

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1. Introduction

In 2001 Serbia ratified the United Nations Framework Convention on Climate Change (UNFCCC). The Convention aims to prevent dangerous human interference with the climate system and to stabilize greenhouse gas (GHG) concentrations. By ratifying this Convention, the Republic of Serbia committed itself to submit national reports on implementation of the Convention. As a non-Annex I Party to the UNFCCC, Serbia has no commitments related to reductions of GHG emissions but is expected to integrate climate change (CC) into the Serbian planning processes and to provide relevant information regarding emissions and removal of GHGs. Consequently, Serbia is obliged to submit National Communications (every four years) and Biennial Update Reports (every two years)[1].

The Paris Agreement to the UNFCCC signed in 2015 establishes a framework for global climate action, including:

- mitigation of and adaptation to climate change;
- support for developing nations; and
- transparent monitoring, reporting and verification/evaluation.

Serbia ratified the Paris Agreement in 2017. The agreement requires universal and harmonized monitoring, reporting and verification (MRV) on climate change and climate actions in line with the new transparency requirements. MRV refers to the process of tracking and reporting on implementation and impacts of mitigation and adaptation actions, as well as on financing of these actions. Developed country Parties are expected to provide information on financial support provided and mobilized, along with technology development and transfer and capacity-building, pursuant to Article 13, paragraph 9, of the Paris Agreement.

This study will further feed in the related climate change planning and reporting processes, particularly the implementation of the future legal and strategic framework.[2] The United Nations Development Programme (UNDP), acting as the implementing agency of the Global Environment Facility (GEF), is providing technical assistance to the Serbian Government, namely

[1] In accordance with the Paris Agreement requirements, the Biennial Update Reports will be substituted with the Biennial Transparency Reports, see: https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-paris-agreement

[2] With the assistance of EU IPA funds, the Ministry of Environmental Protection prepared the draft Climate Change Law and the draft Low Carbon Development Strategy with the Action Plan (see: http://www.serbiaclimatestrategy.eu/)

Ministry of Environmental Protection, in fulfilling obligations that Serbia has undertaken under various climate change international treaties through the "Second Biennial Update Report and Third National Communication under the UNFCCC" (2BUR-3NC project) and "Establishing Transparency Framework for the Republic of Serbia" (CBIT project). Both projects will result in an improved system of monitoring, reporting and verification of data. Also, they are expected to accelerate Serbia's EU accession process in the area of environment, energy and climate change, contributing to creation of enabling policy and institutional environment for effective implementation of relevant EU Acquis and related national legal acts.

This study represents another step toward achieving objectives that Serbia is pursuing through the international climate change agenda and compliance with the EU climate policy. It is a diagnostic assessment designed to measure the degree to which the local Public Financial Management (PFM) system and all of its associated sub-components are capable to support the fulfilment of climate change related policy objectives in the country through efficient tracking of climate change expenditure. The study is meant to provide analytical foundations for reform in the domain of building the necessary capacities as well as more effective human and financial resources allocation to achieve better climate change performance. The Study aims to provide better understanding of how much government spends on climate change, assess the visibility of climate change financing in the budgets and provide directions on how to enable better tracking of the climate change spending to contribute to increased performance of climate change policy agenda.

This chapter provides a contextual background and introduction, while the rest of the study is organized as follows: Chapter 2 presents the climate change institutional and legal framework, focusing on financing and budgetary aspects. Chapter 3 provides an analysis of the structure and level of available climate change financing data[3]. Chapter 4 offers tailor-made step-by-step procedure for introduction of the Climate Budget Tagging (CBT) in the Serbian PFM classification system to enable better tracking of climate change financing. Chapter 5 concludes the assessment and offers a set of operable recommendations, divided into those that need to be implemented in short and medium-term, stating the institutions responsible for management of related reform actions. Finally, the Study is supplemented by the Loss and Damage analysis of climate change impacts in Serbia as prescribed by the UNFCC. The analysis is provided in the Annex 1 and serves as an inventory of additional arguments to enable better understanding and inspire stronger commitment for climate change financing.

[3] The structure of the diagnostic section of the report (i.e., Chapters 2 and 3) is designed to conceptually mimic the structure proposed by the UNDP sponsored Climate Public Expenditure and Institutional Review (CPEIR). CPEIR is a well-known and established diagnostic tool used to assess opportunities and constraints for integrating climate change concerns within the national and sub-national budget allocation and expenditure process. Although resources available will not permit a full-scale CPEIR implementation, we hope to enable future analytical efforts in the field to properly track climate change financing performance in Serbia by using an internationally recognized approach.

2. Strategic and Legal Framework behind Climate Change Financing

The Law on Climate Change (LCC), that has been in draft form for a few years (the public consultation process was finalised in 2018), establishes a basis for planning, updating and implementation of climate change policies, measures and actions and monitoring and reporting on achievement of their goals. Draft LCC commits sectoral governmental institutions and local self-governments to monitor and report on implemented adaptation and mitigation actions.

During the period 2016 - 2019, the Republic of Serbia was developing a Low-Carbon Development Strategy (LCDS) and Action plan (AP)[4], which is in draft form. The public consultations process was finished at the end of 2019. The Strategy's goal is reduction of national GHG emissions (excluding LULUCF) by 13%, up to 2030, and at least 55% to 69% by 2050 compared to 2010. The AP defines actions, policies and measures needed for achievement of the 2030 GHG emission reduction target, the responsible institutions, timelines and financial requirements for those measures. The draft LCDS and AP are based on the EU 2030 climate and energy framework, but these two documents did not consider the EU Green Deal (they were finalised before the EU Green Deal was published). The resources required for achieving the goals set by the LCDS in the least ambitious scenario[5] (i.e., "M2" as defined by the draft Strategy) are defined in Section 6 of the document. They are estimated at EUR 6.5 billion until 2030 and anywhere between EUR 37.8 and 76.8 billion in the period from 2030 and 2050, of which more than 97% refers to the energy sector. The LCDS provides an estimate of the financing mix and determines that in the period from 2020 until 2030 consumers will bear the largest financial burden (i.e., 63%), 33% will be financed by investors, while the Government is expected to effectively finance 4% of the estimated cost. Finally, the LCDS does not operationalize the possible sources of financing and the challenges around its implementation and integration in the budget process, which is expected to be a cause of concern in the future.

In general, the recognition of the climate change financing issues and their horizonal nature remains insufficient in the legal and policy frameworks at national and sub-national levels, including local communities, while the institutional and individual capacities remain low.

[4] http://www.klimatskastrategija.eu/wp-content/uploads/2019/12/Low-Carbon-Development-Strategy-with-Action-plan_eng.pdf

[5] Implementation of the EU acquis in whole is transposed and implemented, achieving 33.3% GHG emissions compared to 1990; 28.9% RES by 2030 and 24.5% enhanced energy efficiency, as the Serbian contribution to the EU target.

Climate financing originating from State Owned Enterprises (SOEs) is part of their own corporate budget procedures. Public institutions other than that of SOEs – all other public institutions including ministries, administrations, funds and agencies, formulate and finance their climate related projects through the regular budget process. The key piece of legislation governing the budgetary process in Serbia is the Budget System Law (BSL). The Law prescribes a division of responsibilities within the budget preparation and execution and accounting and reporting framework. Among other aspects, it defines the scope of the budget, structure and management of the Treasury Single Account (TSA) and the general ledger, the budget calendar and elements of financial plans of budget beneficiaries, the process of budget execution and the accounting and reporting framework. It differentiates between direct and indirect budget beneficiaries, whereas direct budget beneficiaries are defined as "the institutions and organizations established by the state" (i.e., mostly ministries and separate administrations at their arm's-length), while institutions falling within the category of indirect budget beneficiaries are mostly judicial and educational institutions.

Starting effectively since 2016, the Government of Serbia started full-scale implementation of program-based budgeting. Program-based budgeting normally has a cyclical structure and comprises several interlinked components whereas budget formulation is based on past budget performance which is measured against objectively measured achievements (i.e., results)[6]. The first stage in program-based budgeting implementation is the introduction of appropriate structure of the Budge Law which enables clear and coherent formulation of budget programs and their associated projects to facilitate tracking of budget execution and measurement of program and project performance. Serbia has successfully undertaken this step. In addition to the increased awareness and capacity building across line ministries and agencies, each budget user is obliged to submit detailed description of their programs and projects along with quantitative indicators. Starting from last year, budget users are submitting their budget performance reviews every six months. Timing of submission of these reports (i.e., semi-annual in March and September) is set within the official budget calendar precisely to enable them to feed into the budget preparation process for the next year. However, the quality and structure of these reports is not consistent and does not provide enough analytical insight to represent the basis for modification of existing and formulation of new budget initiatives. This is largely due to lack technical capacities for this type of exercise, but also due to the weak structure of performance indicators and lack of mechanisms to collect data to carry out proper assessment of project implementation.

Budget execution takes place through a locally developed version of FMIS called ISIB which supports administration of budgetary appropriations. ISIB communicates with the transaction processing information system JAFIN which provides input for the Treasury general ledger from which financial reports are compiled through SAP. All of these information systems are

[6] The budget preparation process is supported by the internally developed and managed application BIS (Budgetary Information System)

managed by the Treasury Administration of the Ministry of Finance. Scope and coverage of these systems are limited to the central government budgetary users. However, the Treasury Administration collects financial reports from the entire public sector, including institutions outside of the scope of the central government budget and local self-governments. This is enabled through the standardized budget classification scheme for all users.

A project formulation, monitoring and evaluation framework compatible with the program-budget framework laid out by the BSL is offered by the Law on Planning System (LPS) which was introduced in 2018. The LPS recognizes four public policy documents: i) strategy, ii) program, iii) policy concept and iv) action plan. These documents are to be based on Development Plan which sets the overall policy agenda for the period of seven years. So far, some of the key planning documents are missing while sectoral strategies are still to be made consistent, in terms of quality and structure. Also, the link to the budget preparation process has to be established in order to fully operationalize the planning mechanisms. Legal adjustments necessary to enable integration are minor. Rather, the focus should be put on achieving interoperability between the information systems supporting the public policy planning system and the budget information system (BIS).

The recently (i.e., July 2019) introduced Order on Management of Capital Projects represents an important legal block of the public policy and investment planning system, including climate financing. The Order introduced a whole new structure for formulation and execution of capital budget for all public institutions at all levels of government and integrated the fragments of the public investment management system that were developed across other public sector institutions. The new system is now set to be coordinated by MoF with institutional support from the Ministry of European Integrations in the project identification and pre-selection phase, as well as the Ministry of Construction, Transport and Infrastructure in the domain of project documentation assessment and review. The process of project prioritization and selection is managed by the Capital Investment Commission which is headed by the Prime Minister. Implementation monitoring and reporting is managed by the MoF.

It seems that the legislative framework for effective planning, preparation, implementation and monitoring of public policy initiatives and capital projects, including climate change related ones, is in place in Serbia. However, there is a long way to go in terms of fully-fledged implementation of these legislative provisions. This is mostly a result of the uncoordinated reform agenda whereas the adoption of laws in the area of planning and program budgeting was going a bit ahead of the development of technical capacities of line ministries and other public institutions to implement this legislation.

3. Analysis of climate change financing in Serbia

3.1. Methodological approach and challenges

Within this chapter, we analyse the climate related expenditures over the period from 2016 until 2018. The reason for choosing 2016 as a cut-off year in the past is that this was the year of introduction of program-based budgeting in Serbia. It enabled tracking of individual projects of budget users, hence it was possible to analyse preceding year budgets and identify those that are relevant for climate financing. The financial data were extracted from the Laws on Final Accounts (i.e., Official annual budget execution reports) for 2016, 2017 and 2018. The initial idea was to look into the period 2016-2019. However, since data on 2019 was not available at the time of drafting the assessment, it was left out of scope for the time being.

Initially envisaged scope included all budgetary users, state owned enterprises (SoEs) and local self-governments. However, the challenges behind data collection limited the analysis to budgetary users. Since the requested data of SoEs is not directly comparable to the data provided by budgetary users, we will treat them separately (see Box 2 at the end of the section).

The budget classification scheme in Serbia – neither economic nor functional, is not climate change sensitive. In other words, it does not allow for simple identification and extraction of climate change related expenditure. The CPEIR Handbook highlights that there is currently no agreed international functional classification of climate change related expenditure[7] which makes identification of climate change related data very challenging. For this purpose, UNDP developed a methodological framework for introduction of Climate Budget Tagging (CBT) classification scheme which would be integrated within the existing budget classification to enable tracking and analysis of climate change expenditure.

To overcome this problem in Serbia, for the purpose of conducting this assessment, the relevant climate financing projects were identified manually - in several steps. First, we identified the key institutions dealing with either mitigation or adaptation to climate change. As

[7] Such as the 10 classification blocks of COFOG

prescribed by the CPEIR methodology we used expert judgment combining financial and climate change specific knowledge to separate projects of these institutions relevant to climate change from others. We then addressed the question of how relevant the projects were for climate change. Since budget classification does not prescribe any relevance index, we applied our own, again based on local expertise and knowledge. Following recommendations of the Climate Budget Tagging (CBT) implementation methodology laid out in Chapter 4 below, we assigned different relevance indices of 0.25, 0.5, 0.75 and 1 depending on how relevant the projects were. Although this may seem as a rather rudimentary solution to the problem of non-existing budget classification which recognizes climate change financing, it was the only feasible option given the circumstances and resources available to the team. Following the introduction of CBT in Serbia, it will be possible to identify these projects in each phase of the budget cycle and extract the data from any of the FMIS components.

The depth and volume of data determined by the local classification framework did not allow for grouping of climate change expenditure according to the UNDP/World Bank CPEIR Typology[8]. This typology typically includes three pillars: Policy and Governance (PG); Scientific, Technical and Societal Capacity (ST) and Climate Change Delivery (CCD). Although funds were certainly spent on achieving better policy and governance through relevant actions (e.g., development of strategic guidelines, improving legal framework or international cooperation activities) or improving the scientific, technical and societal capacities (e.g., investment in scientific resources or awareness raising campaigns), the way budget programs and projects were formulated in the observed period did not allow accurate classification in this sense.

3.2. Overview of levels and structure of climate change related expenditure

Total climate change relevant financing coming from the budget stood at the level of RSD 6.5 billion in 2016, RSD 6.9 billion in 2017 and RSD 9.4 billion in 2018[9] (see Figure 5 below). Total expenditure is increasing at a fast pace in the recent years - 10% in 2017 and as much as 35% in 2019. The list of sectors considered under these estimates excludes Traffic and Economic and Development policy sectors[10]. The reason for that is that these two sectors contain very large infrastructure projects such as roads, highway and railway construction as well as construction and reconstruction of educational and healthcare infrastructure which imply expenditure that is incomparable to the expenditure incurred in other sectors. These projects are not directly related to climate change financing but are remotely relevant in terms of CO_2 reductions resulting from more efficient use of energy due to improved infrastructure. There-

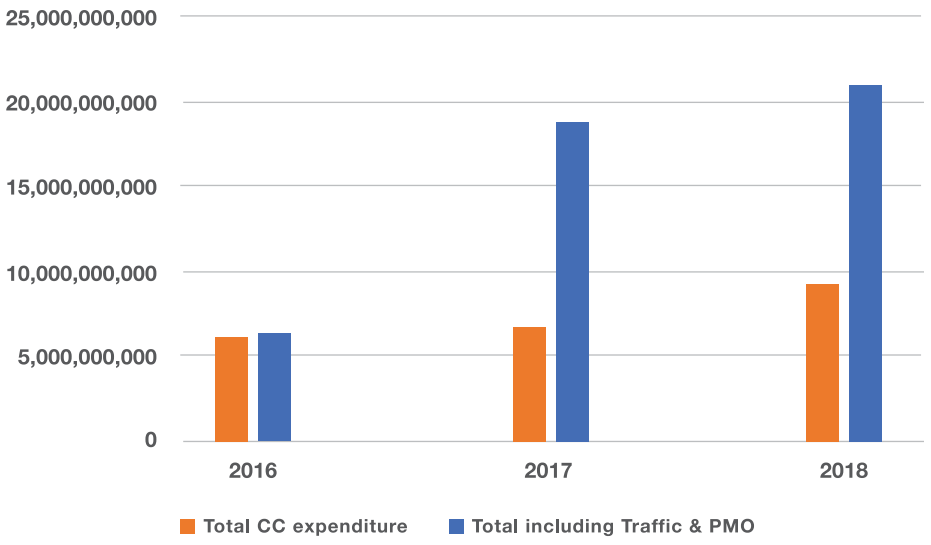
[8] The Handbook also refers to the National Policy Objectives Typology, which does not exist in Serbia but could be developed from the draft Strategy on Climate Change

[9] Approximately EUR 55 million, EUR 58 million, and EUR 79 million, respectively

[10] A set of projects handled by the Public Investment Management Office (PIMO)

fore, they received the lowest (i.e., 0.25) relevance index. When they are added to the total expenditure it goes up significantly – to RSD 6.5 billion in 2016, RSD 19 billion in 2017 and as much as RSD 21.1 billion in 2018.

Figure 5. Total climate change budget expenditure, 2016-2018 (RSD)



Source: author's calculations based on budget data

In total, the climate change related expenditure reached 0.57% of the budget in 2016, 0.62% in 2017, and 0.80% in 2018. Although there is no evidence to consider such increase as a sign of coordinated effort reflecting stronger commitment of Serbian authorities to the climate change agenda, it is still a promising sign.

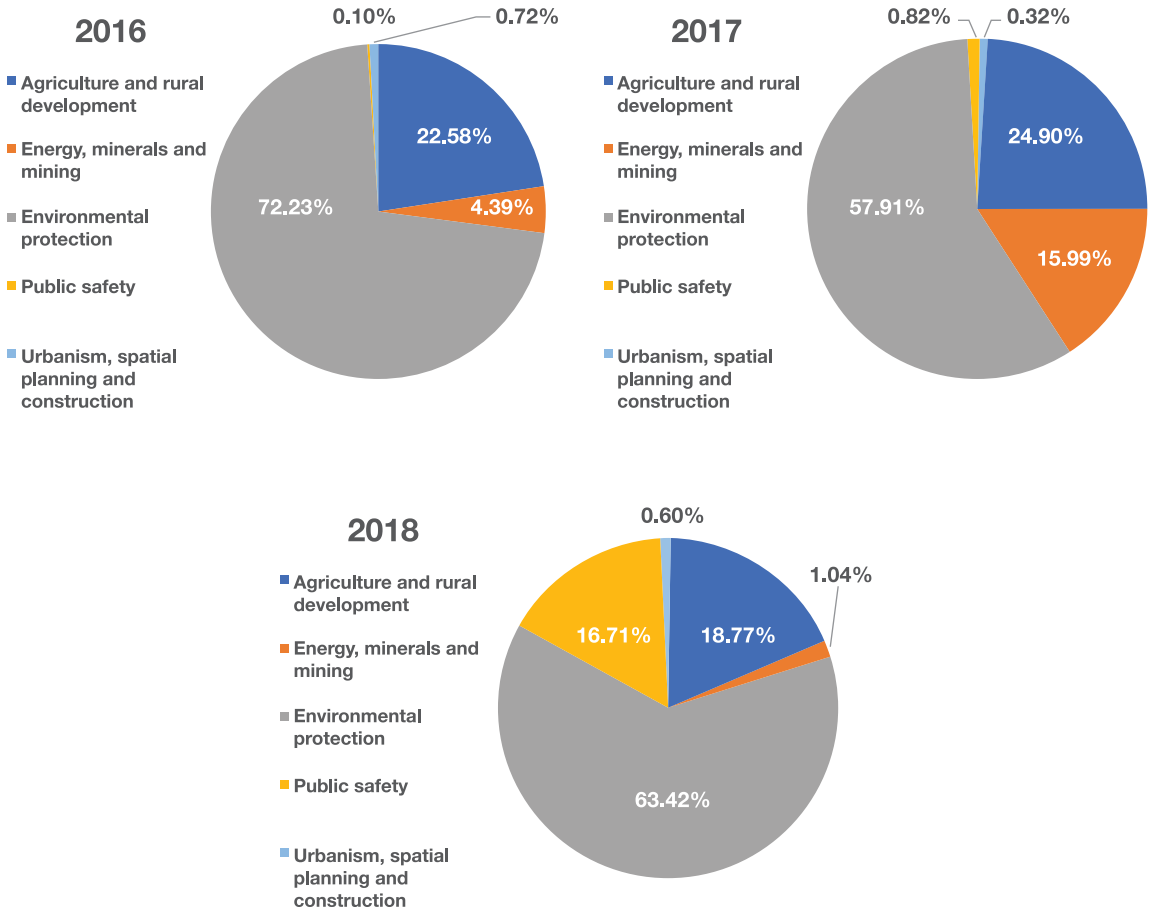
The year-to-year increase in absolute terms was highest in the environmental protection sector. Projects within this sector are managed by the MoEP, Water Directorate of Serbia, Environmental Protection Agency and RHIS. This sector recorded expenditures of RSD 4.5 billion, RSD 4 billion and RSD 5.9 billion in the period from 2016 to 2018, respectively. A large majority of projects had relatively stable expenditure levels in this period, while one of them stood out with negligible expenditures in 2016 and 2017 and over RSD 1 billion expenditure in 2018. It is an irrigation system project managed by the Water Directorate. Other large projects within the sector include watercourse management and flood protection projects which spent over RSD 1 billion RSD in each of the three years.

Although, the share of sector representation of climate change expenditure is uneven because of uneven project implementation dynamics, one year after another it is expectedly dominated by the environmental protection sector which by local definition contains climate change related actions and projects (see Figure 6 below). Although the share of this sector varies from one year to another, it accounts on average for around two thirds of climate change expenditure.

The second most represented sector within the structure is agriculture and rural development with more than 20% average share. Total expenditure within this sector stood at RSD 1.4 billion in 2016, and RSD 1.7 billion in both 2017 and 2018.

Other three sectors – Energy, minerals and mining; Urbanism, spatial planning and construction; and Public safety – take up 5% of climate change expenditure in 2016, 17.2% in 2017 and 17.8% in 2018. The reason for the sharp increase in 2017 is expenditure of over RSD 1.8 billion under the energy, minerals and mining sector within a project dealing with heating network development[11]. While in 2018 the increase is a result of RSD 1.3 billion relevant expenditure aimed at emergency systems improvement.

Figure 6. Sectoral breakdown of climate change budget expenditure, 2016-2018 (RSD)

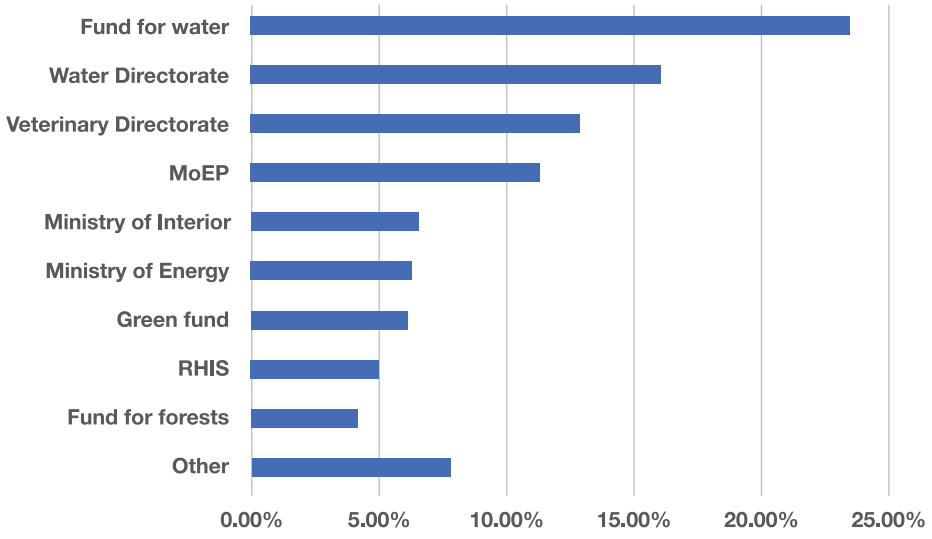


Source: author's calculations based on budget data

The sectoral structure changes significantly in favour of the Traffic and Economic Development (handled by PIMO) when these sectors are considered together with the others.

[11] A great majority of energy related projects relevant to either climate change adaptation or mitigation is implemented across other public sector institutions, such as NIS or SoEs (e.g., EPS or Srbijagas).

Figure 7. Climate expenditure by institution, cumulative (2016-2018)[12]



Source: author's calculations based on budget data

Figure 7 above shows how the aggregate expenditure over the analysed period is distributed across various budget users. The leading spender is the Budgetary Fund for Water managed by the Ministry of Agriculture, Forestry and Water Management (MoAFWM)[13] with over 22% of total climate change related expenditure. It is followed by the Water Directorate which is an independent institution functioning within the MoAFWM. The landscape changes significantly when traffic projects and those managed by PIMO are included. In that case, the Ministry of Construction, Traffic and Infrastructure (MoCTI) tops the list with nearly 40% share while PIMO takes just over 12% of the climate change expenditure from 2016 until 2018.

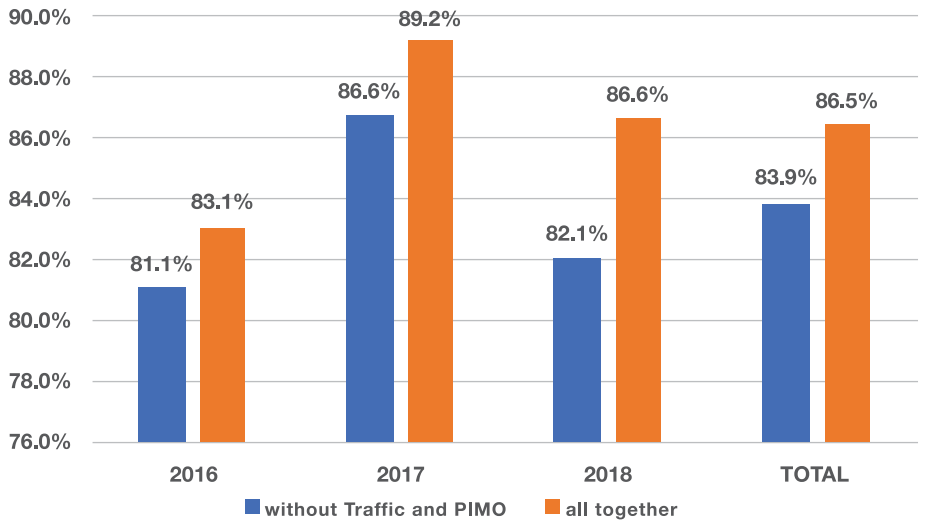
With respect to individual projects, the structure in terms of expenditure volume is expectedly dominated by large road infrastructure projects (i.e., mostly highway construction). When analysed independently from these, the largest project in the period was the one already mentioned dealing with watercourse management and flood protection with RSD 3.9 billion spent over the three-year period. This project is managed by the MoAFWM. Flood damage recovery project managed by the Water Directorate ranks second with nearly RSD 2 billion spent. Other notable (i.e., over 1 billion RSD) projects include Support to waste management and recycling managed by MoEP (RSD 1.6 billion), Irrigation system development managed by the Water Directorate (RSD 1.3 billion) and Emergency situation management managed by the Ministry of Interior (RSD 1.3 billion).

[12] The category "other" includes the Fund for Energy Efficiency, Environmental Protection Agency, Fund for Emergencies, the Directorate for Forests and the Directorate for Plant Protection

[13] Until 2018, this ministry was merged with what is now MoEP

The levels of climate change expenditure cannot be credibly compared to the expected values stated by the draft LCDS because of the weaknesses in measurement approach and all the limitations presented above (i.e., in terms of identification and scope). Whatever the case, although there is a promising trend since 2016, it may seem safe to assume that additional funds invested in climate change would be welcome. From that perspective we looked at the amounts of approved climate change expenditure as defined by the Budget Law in all of three observed years (i.e., appropriation) and compared those amounts to the level of money actually spent in those years (i.e., execution).

Figure 8. Budgeted versus spent funds on climate change projects



Source: author's calculations based on budget data

Figure 8 shows that there is relatively successful financial implementation of climate change related projects – both with and without the traffic sector and PIMO projects. The average amount of money spent on climate change is at 86.5% of the money approved to be spent on climate change when the three-year period is observed cumulatively. With traffic sector and PIMO, this share drops to 83.9%. This is quite expected since these two sectors are managing very large and complex infrastructural projects.

Trend-wise, the implementation seems reasonably stable. There is no major change in share of spent budget observed. The variations are low and could be attributed to normal fluctuation arising from project life-cycle implied financial distribution.

Box 2. State-owned enterprises (SoEs) climate change financing data availability

Eight SoEs were identified as relevant for the analysis: the Oil Industry of Serbia (Naftna Industrija Srbije - NIS), the Power Industry of Serbia (Elektroprivreda Srbije -EPS), Srbijagas, Srbijasume, Vojvodinasume, Srbijavode, Putevi Srbije and Koridori Srbije. Out of this group only three responded to the kind request for data; specifically, NIS, EPS and Srbijasume, where only NIS and EPS reported the actual financial data.

NIS reported aggregate investments in climate change (mostly mitigation CO_2 reduction related) expenditure of RSD 1.06 billion in the period from 2016 until 2018. The largest item in the investment structure is RSD 250 million for construction of small powerplant Majdan X in 2016.

EPS, on the other hand, reported RSD 33.4 million investment in its distribution network as a measure to reduce CO_2 emission. More significant funds were invested in Refurbishment of hydro power plants: around RSD 5 billion investment in HE Djerdap 1 and HE Zvornik, each. EPS also reported the very relevant projects it plans to implement in the future, such as those in solar power plants and wind parks.

4. Introduction of Climate Budget Tagging (CBT) in Serbia

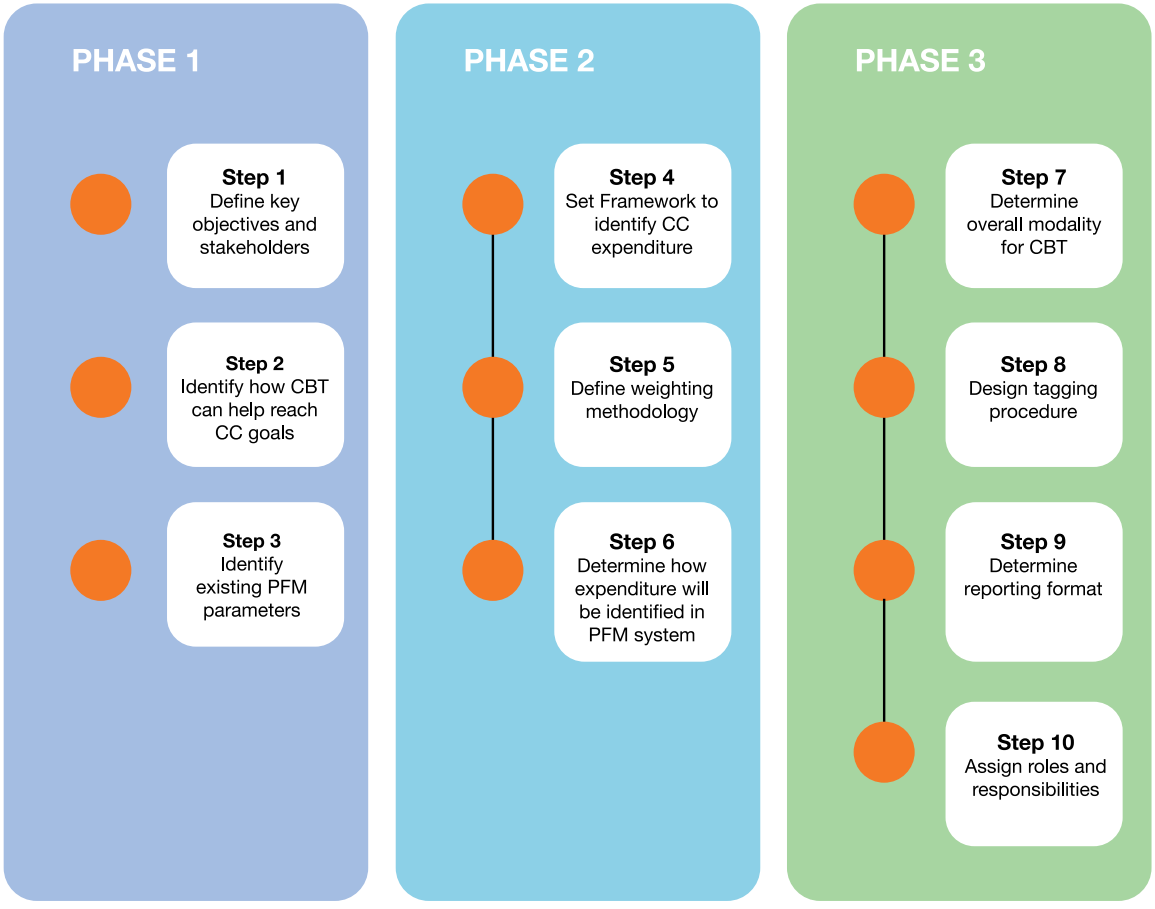
The analysis of data presented in Chapter 3 above laid out the weaknesses of the current budget classification system in terms of tracking climate change related expenditure. In order to enable efficient climate change expenditure tracking and provide evidence-based foundation for reshaping climate change policy actions it will be necessary for Serbia to make certain adjustments to its budget classification framework. For this purpose, UNPD has developed Climate Budget Tagging (CBT) tool which is designed to facilitate identification, classification, weighting and marking of climate-relevant expenditures in the government's budget system, enabling the estimation, monitoring and tracking of those expenditures. CBT is used by a growing number of countries to identify and routinely measure climate relevant expenditure within the existing budget system.

This chapter is based primarily on the UNDP developed "Guidance note for Governments to track climate finance in their budget". This publication was released in 2019 and represents a comprehensive step-by-step manual on how to introduce CBT and also points to common implementation challenges providing useful insights from CBT implementation process from other countries through a set of case studies. CBT implementation consists of three phases:

1. Identification of purpose and setting of CBT
2. Determining the technical design, and
3. Determining the implementation design

The remaining part of the chapter presents a digest version of the way these implementation steps are planned and executed in general. We also developed detailed technical recommendations on how they should be structured in the Serbian context, having in mind local institutional and legal framework related to budget classification, execution and reporting. Figure 9 below provides a graphical presentation of CBT implementation steps.

Figure 9. CBT implementation steps



4.1. Phase 1: Identification of purpose and setting of CBT

Climate change policy often cuts across a number of ministries, state-owned and private sector companies and implementation. This is why implementation of a classification scheme such as CBT requires clear identification of scope, objectives and most importantly key stakeholders which would take full ownership and responsibility for such initiative. It is also important that the preparatory work in the first phase includes raising awareness about the importance of CBT while promoting benefits of having such a system in place. Below we discuss the three steps which comprise this initial phase of CBT implementation.

Step 1: Define key objectives and stakeholders of CBT

Overall objectives are very much common regardless of the geography in which CBT is implemented. However, priorities may be different and it is up to each implementing country

to identify and communicate clearly their own objectives for having the CBT. Formulation of these objectives will guide the decision on the final design of the CBT and implicitly point to the group of stakeholders which will lead the way in implementation phase. Some of the commonly set objectives for introducing the CBT include:

a) To monitor and report on national climate change policies/action plans and international commitments, and to improve the effectiveness of existing spending

b) To support mobilization of additional external financing by (a) identifying the funding gap on a regular basis, and (b) demonstrating government commitment and co-finance

c) To mobilize climate-related action across government sectors by providing evidence of ongoing climate related activities and creating synergies

Recommendation for Serbia: Since all suggested objectives would apply in case of Serbia it is suggested that a combination of these is accepted as an agreed CBT implementation goal. The stakeholder list should be implied by the structure of the objective but it would in any case be populated from the list of usual suspects, such as MoEP, MoF and donors and development partners supporting climate change policy implementation. It is suggested that stakeholders use some of the existing inter-sectoral technical cooperation hubs (i.e., working groups) created for climate change related issues to formulate the CBT agenda.

Step 2: Identify how CBT can contribute to achieving the national climate change policy objectives

The main purpose of this step is to position the CBT system in the national climate change policy framework and enable key stakeholders to point to the way in which it facilitates achievement of the objectives defined by the framework. Some of the common ways in which CBT does contribute to the climate change policy include: strengthening the monitoring framework (financial information is crucial in climate change policy performance review), informing government planning and prioritization (tracking climate change related expenditure enables the government to shape its climate change policy in a more efficient and effective manner) and raising awareness within the government and among the public about the scale of public spending on climate change action.

Recommendation for Serbia: Introduction of CBT is instrumental in adjusting and re-shaping climate change policy. Since Serbia is finally about to introduce the key strategic documents in the field (i.e., LCC and LCDS), the time is right to showcase how tracking of financial information related to policy implementation based on these documents can contribute to measurement of policy effectiveness and its redesign to achieve better results. Serbia could follow the example of Moldova which placed the CBT within is monitoring and evaluation framework

for the national adaptation plan (NAP). Such action would be complementary to the ongoing efforts of Serbia to introduce such a system at the national level.

Step 3: Identify the parameters set by the existing PFM system

CBT is a concept rather than an off-the-shelf scheme which is ready for implementation. It is, thus, important to understand the current PFM setup to be able to develop and deliver the most effective CBT design. The Guidelines for introduction of CBT include a list of questions which need to be answered before it will be safe to proceed to the CBT design phase. These questions relate to the issues of budget presentation (whether programmatic or not), budget planning, budget classification, as well as the quality and scope of different IT systems in place to support these processes. Most if not all of these questions are thoroughly answered in the section 3.3. above. In order to complete the picture related to local PFM system characteristics, Box 3 below provides more insight on the matter of budgetary classification in Serbia – the four most important segments of it: economic, functional, organizational and program.

Box 3. Budget Classification in Serbia

The matter of budget related classifications is generally regulated by the Budget System Law (BSL) . The individual classifications (i.e. functional, economic, administrative and program) are defined in bylaws which are embedded in the BSL. Consistency of implementation of the classification throughout the public expenditure cycle (budgeting, expenditure, reporting) is warranted by the system architecture and the design of the underlying business processes. There is a sufficient level of interoperability between the BPMIS, ISIB, JAFIN as well as the accounting and reporting modules (SAP) managed by the Treasury. Current and capital budget preparation, execution and reporting procedures are fully integrated and covered by the uniform classification schemes.

Economic and functional classifications are defined by the Rulebook on Standard Classification Framework and Chart of Accounts for Budgetary System (Official Gazette 16/2016, amended subsequently) which apply equally to central and local government level. Economic classification applied is not fully compliant with GSF2014 methodology. Fiscal surveillance tables follow the GFSM 1986 framework but are routinely bridged to the GFS 2014 for reporting purposes. There are institutional and technical efforts made to ensure that the classification framework in place is made up-to-date with all applicable standards. For that matter, SORS, MoF and NBS

have established a working group with technical support from the IMF experts. The mandate of the working group is to implement Government Finance Statistics (GFS) in line with the European System of National and Regional Accounts 2010 (ESA 2010), GFSM 2014, and the Public Sector Debt Statistics (PSDS) Compilation Guide. Functional and sub-functional classification is based on 10 main functions as prescribed by COFOG classification. The only difference is that COFOG numbers the functions from 1 to 10 while they are numbered from 0 to 9 locally.

Organizational classification of the BCG units is navigated based on the legislative piece titled Rulebook on Determining and Maintaining the Registry of Public Funds Users and on Conditions and Procedures for Opening and Closure of TSA Accounts held at Treasury Administration (Official Gazette 99/18, amended subsequently). Every year, the Treasury Administration compiles a list of institutions that fall under the broad definition of public funds user (contained within the BSL) and publishes the entire registry of such institutions along with attributes such as their location, tax identification number and type. There are eleven types of institutions including direct (DBB) and indirect budget beneficiaries (IBB), mandatory social insurance organizations and institutions financed by those (e.g. hospitals and pharmacies) and the category of "other users" which includes regulatory agencies and institutes as well as SoEs which are controlled by the Government at any level.[1]

Program classification is prescribed by the Instructions for Preparation of the Program Budget which is updated frequently (i.e. last amendment was in July 2020) and is published on the website of the MoF. The classification is centrally managed by the Budget Department of the MoF and it identifies categories such as program, program activity/project. The Instructions define the methodological basis for formulation of other important program budgeting elements such as objectives, indicators and performance measurement.

4.2. Phase II: Determining the technical design

The key words when structuring an appropriate CBT are scope and relevance. In other words, an effective classification system should be comprehensive enough and detailed enough to inform climate change policy in the most effective and comprehensive way. Also, the system should be able to differentiate between relevant and irrelevant financial data to provide accurate analytical feed for the policy makers. This phase is about the three steps which will lead to the fit-for-purpose CBT design ready for implementation.

Step 4: Define and classify climate relevant expenditure

This step will yield a framework which would enable the identification of expenditures relevant for climate change. This is typically made out of a list of activities grouped by types of interventions that can be carried out by different institutions. The source of information for defining these activities is typically found in:

a) key climate change policy national document (i.e., law or strategy)

b) OECD-DAC Rio Markers[14] offering definition of climate actions by sector and type (adaptation vs. mitigation)

c) definition and criteria for adaptation and mitigation developed by the multilateral development banks to track their investments

Within the same step, it is then necessary to determine the features of the classification itself. The CBT Implementation Guidelines suggest that the typology should, as a minimum, differentiate between adaptation and mitigation activities. There are, of course, no limitations to the level of details but the optimum level should also enable identification of the sources of funding, types of intervention and mapping of relevant expenditures to the national strategy priority areas to enable better implementation monitoring.

An example of a useful source of reference for structuring classification that enables differentiation between intervention types is the classification used in the UNDPS's CPEIR Methodology which classifies all activities in 44 types of which 14 belong to "policy and governance" including development of strategic and legal framework, 9 belong to the group titled "scientific, technical and societal capacity" including research and awareness raising campaigns, and finally 21 belong to the group "climate change delivery" which covers all sectors in which climate change adaptation and/or mitigation activities are implemented.

Recommendation for Serbia: The program classification implemented within the budgetary framework in Serbia provides a solid foundation for incorporating a CBT classification scheme. Section 7.2 of the Instructions for preparation of program budget prescribe budget

[14] Available at https://www.oecd.org/dac/environment-development/Revised%20climate%20marker%20handbook_FINAL.pdf

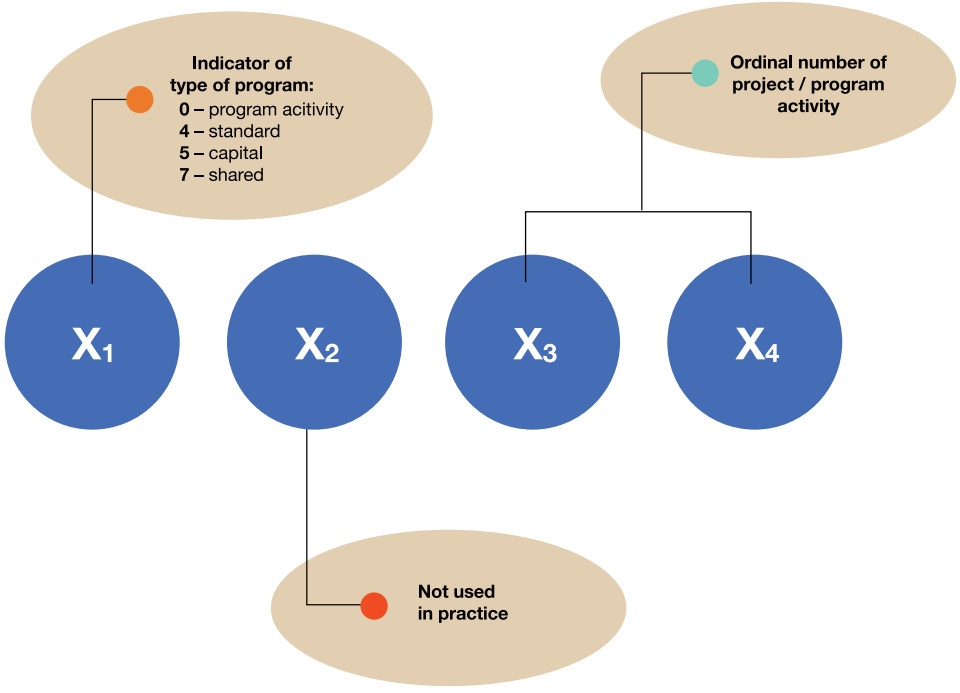
programs and projects classification structure. Programs are assigned a 4-digit code of which first two digits are reserved for the sector code while the remaining two digits display the ordinal number of the program. The list of sectors defined by MoF includes 24 sectors including "Environmental protection" where climate change related actions belong. Projects, on the other hand, are also assigned a 4-digit code. Projects are differentiated from program activities as a form of task which has a more permanent character. Program activities start with 0 while the remaining digits display their ordinal number. Codes of capital projects start with number 5, those shared among different budget users start with 7, while standard projects start with number 4. The remaining digits are meant to display the order of projects within a program.

We recommend two options on how to approach incorporation of CBT in the current coding system. Both options are based on what is currently in place and require minimum technical adjustments. It was our intention to avoid suggesting a solution which would impose additional independent classification primarily due to financial and technical difficulties linked to implementation of such solution within the current system.

Option 1:

Our recommendation is that CBT is embedded in the existing system used for coding projects and program activities within the budget system of Serbia. The current system consists of 4 digits of which only the first, third and fourth are in use. Figure 10 below shows the current structure of the projects and program activity coding system.

Figure 10. Current structure of budgetary projects/program activity coding system



CBT should be implemented through introduction of one additional number in the second position which would serve the purpose of climate change expenditure identification together with the existing second digit which is currently redundant. The first digit would retain its purpose as well as the third and fourth figures which would take positions four and five in the new system. Figure 11 below shows the suggested future structure of the projects and program activity coding system which incorporates CBT.

The objective of the future CBT classification is to enable:

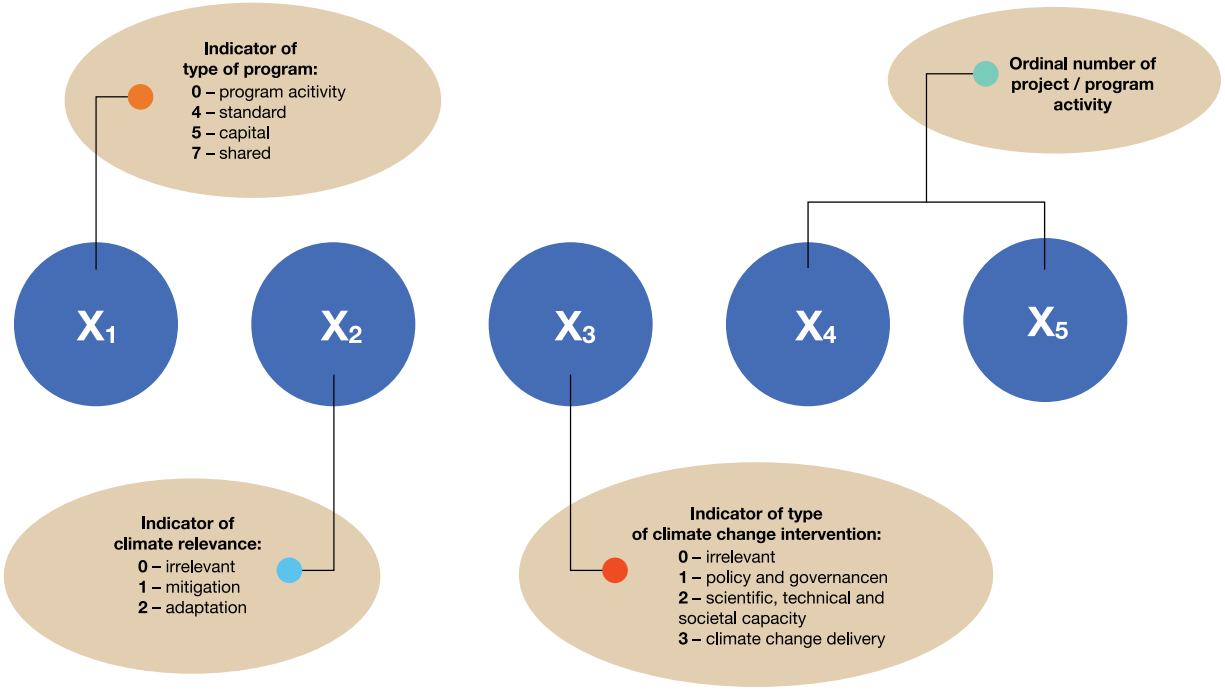
1. identification of expenditures relevant for climate change
2. differentiate between climate change mitigation and adaptation actions
3. identification of type of intervention
4. identification of the source of funding

The first two objectives would be achieved by using the second digit (i.e., X2) shown in Figure 13 below. This digit would take the value of 0 if project is irrelevant for climate change, 1 if it falls in the domain of climate change mitigation and 2 if it is relevant for climate change adaptation.

Objective number 3 would be achieved by adapting the classification used withing the UNDPS's CPEIR Methodology and marking the expenditure to belong to one of the three areas of intervention (i.e., types). The third digit (i.e., X3) would take the value of 0 if the project is irrelevant for climate change, 1 if the project belongs to "policy and governance", 2 if they belong to "scientific, technical and societal capacity" group and 3 if they belong to "climate change delivery".

Finally, the identification of funding source required by objective 4 from the list above is already enabled by the budget structure and is prescribed by Article 8 of the Rulebook on Standard Classification Framework and Chart of Accounts for Budgetary System. The Rulebook provides a list of 17 different sources of financing ranging from budgetary revenues (i.e., source 01) to donations (i.e., source 05), foreign and domestic loans (i.e., sources 10 and 11) and EU financial support (i.e., source 56). Every expenditure item is assigned its source of funding and it is possible to extract this information from the ISIB system.

Figure 11. Proposed structure of budgetary projects/program activity coding system



Option 2:

Here, we recommend that the existing sector number 4 which reads "Environmental protection" is split into two sectors – one dealing specifically with climate change and another which would include non-climate change related environmental financial activities. The new sector could take number 22 (there are currently 21 sectors in total) and could simply read "Climate change".

This option is minimalistic and provides only for accurate identification of climate change related expenditure without going beyond that (i.e., providing for differentiation between mitigation and adaptation and identification for sector).

The advantage of this approach versus the one described under Option 1 above is that it is far less demanding to implement in terms of financial and technical resources.

Finally, it is important to highlight that these two CBT implementation options are not mutually exclusive. Option 2 can be implemented as the first step and subsequently be followed by Option 1 which would provide more analytical insight by identification of more climate change related expenditure details.

Step 5: Define the methodology for weighting the tagged expenditure

Under this step, it will be necessary to determine the way in which budgetary users will determine the degree of relevance of their expenditure against the national climate change policy agenda.

Ways to determine this methodology include assigning the priority level of strategic objectives laid out in the strategic documents of the country. The relevance of expenditure would then be determined depending on the specific objective it is related to. Alternatively, a CPEIR climate relevance index ranging from 0 to 100% could be used. The index involves the use of expert judgment on a case-by-case basis. Finally, some countries employ the benefits-based approach whereas the benefits of particular activity implementation are compared to the costs implied by the do-nothing scenario. The higher the incremental benefits achieved by the expenditure, the higher (i.e., closer to 100%) the relevance would be.

Recommendation for Serbia: It is recommended that Serbia follows the objectives-based approach used by the CPEIR methodology. Practically, this calls for MoEP to draft instructions which would be used by climate change experts across line ministries and other public institutions in determining relevance of their expenditure in terms of climate change. Such instructions should be transposed to the local (i.e., non-central government) level.

Step 6: Determine how climate change expenditure will be identified in the PFM system

Here, the CBT implementing agency usually determines how climate change expenditure will be identified in the PFM system by deciding the most relevant and feasible dimension of the chart of accounts for tagging or coding climate change budget/expenditure, and the desired level of detail.

Recommendation for Serbia: Formulation of the way in which CBT should be implemented within the budget classification framework is already described within technical recommendations within Step 4.

4.3. Phase III: Determining the implementation design

Step 7: Determine the overall modality of the system

Within this step it is necessary to make a decision on the two important features of the CBT design and architecture. One relates to whether climate budget tagging should be performed by each budget user, their superior line ministries, MoF, MoEP or another relevant institution. The other feature is related to how integrated and automated into FMIS the budget tagging should be.

Recommendation for Serbia: In case of the responsibility for climate budget tagging, the decision is implied by the practical aspect of the budget preparation process in Serbia and the technical options suggested under Step 4. Since program and project/program activity codes are determined within the draft budget formulation process managed by each direct budget beneficiary, it is thus recommended that the responsibility for climate tagging (i.e., assigning the appropriate code to their programs and projects) rests with them. Of course, a corresponding instruction including a thorough narrative (possibly as an annex to the Instructions for program budgeting issued by MoF) should be prepared jointly by MoF and MoEP which is the end-user of the climate-tagged data.

The other aspect of this step relates to the integration of CBT into FMIS. The only way for the suggested changes described under Step 4 (depending on the option chosen) to take effect is through their full incorporation into the budget information system (BIS). Also, the budget execution system (ISIB) should accommodate these changes to enable monitoring of climate related expenditure. Since both information systems are internally developed and managed, it is assumed that the financial and human resources required to implement necessary changes are significantly lower than if commercial vendors were involved. FMIS solutions at the local level are also capable of adjusting these relatively minor program classification modifications.

Step 8: Design the tagging procedure

The purpose of this step is to define the procedure for assigning climate tags that is in line with the existing budget process and institutional mandates.

Recommendation for Serbia: This step is practically contained in the previous one meaning that the recommendation from the Step 7 applies here as well. The existing budget procedure is such that direct budget users are in charge of assigning codes to their programs and projects in line with the instructions issued by MoF. These instructions should be amended to

include guidance on how to assign the climate tag and the responsibility for implementing it should stay with the budget users.

Step 9: Determine the format for CBT reporting

The objective of this step is to formulate the reporting mechanism for climate expenditures which should correspond to the objectives of CBT introduction.

Recommendation for Serbia: It is understood that MoEP should be the primary user of climate-tag data as the institution which drives the climate change policy agenda. Since all the budgetary financial data are flowing within the information systems managed by MoF, MoEP should be granted access to these systems limited to extracting and analysing the expenditure data of projects which are tagged as relevant for climate change. All local governments submit their financial reports to the Treasury Administration as part of routine year-end procedure. These reports will, by definition, contain the budget tags implemented through the modified program classification. In order to gain full insight in the climate change financing at the national level, MoEPP should be granted access to the expenditure with climate tags that is administered by subnational governments in Serbia. This could be resolved by technical agreement between MoF and MoEPP with participation from the SCTM.

Step 10: Assign roles and responsibilities for CBT development and implementation

Recommendation for Serbia: The CBT design process should be agreed between the MoEP and MoF by one of the existing working groups, with support at expert level from the international partners. The design should ideally be focused around the options laid out in this report, while implementation should again be led by joint efforts from these institutions with technical assistance support.

5. Concluding remarks

This study is a pioneering attempt to analyse climate change related financing in Serbia. It provides an overview of institutional, strategic and legal background of climate change and pointed to the current status of the budgetary framework in Serbia.

Limitations of this analysis (relevance)

The levels of climate change expenditure cannot be credibly compared to the expected values stated by the draft LCDS because of the weaknesses in measurement approach and all the limitations presented above (i.e., in terms of identification and scope).

The key takeaways from the assessment include:

- Total climate change relevant financing coming from the budget stood at the level of RSD 6.2 billion in 2016, RSD 6.9 billion in 2017 and RSD 9.4 billion in 2018[15]. Total expenditure is increasing at a fast pace in the recent years - 10% in 2017 and as much as 35% in 2019. When Traffic sector and PIMO managed projects are added to the total expenditure it rises to RSD 6.6 billion in 2016, RSD 19 billion in 2017 and as much as RSD 21.1 billion in 2018.
- In total, the climate change related expenditure reached 0.57% of the budget in 2016, 0.62% in 2017 and 0.80% in 2018.
- Sectoral breakdown is dominated by the Environmental protection sector with over two thirds (i.e., 65%) of climate change expenditure in the 2016-2018 period. Agriculture is the second most represented with average share of around 20%.
- The leading spender is the Budgetary Fund for Water managed by the MoAFWM with over 22% of total climate change related expenditure. The picture changes significantly when traffic projects and those managed by PIMO are included.
- When it comes to individual projects, the structure in terms of expenditure volume is expectedly dominated by large road infrastructure projects (i.e., mostly highway construction). Excluding these, the largest project in the period was the dealing with Watercourse management and flood protection accounting for RSD 3.9 billion spent over the three-year period while Flood damage recovery project managed by the Water Directorate is the second with nearly RSD 2 billion spent.

[15] Approximately EUR 55 million, EUR 58 million, and EUR 79 million, respectively

- Climate change related projects are implemented as planned by the budget. The average amount of money spent on climate change (i.e., budget execution) is at 86.5% of the money approved to be spent on climate change (i.e., budget appropriation).

As a practical way forward, the study suggests implementation of the Climate Budget Tagging within the budget classification scheme in Serbia which would facilitate identification of climate expenditure across the entire public sector and enable more accurate and credible assessments of this type in the future. These assessments should feed into the policy agenda performance review and serve as the basis for shaping up future actions in the field. In this regard, we suggest that the 10-step procedure described in Chapter 4 above is implemented as described in one of the two presented options. The authorities should keep in mind that the suggested options can be implemented subsequently with Option 2 implemented first.

The responsibility for implementation of CBT should lie primarily with the MoEP as well as MoF as an institution responsible for the overall budget classification system and management of the legislative framework which defines it. The actions, as outlined in Table 9 below, should be implemented by one or both of these institutions depending on activity and phase (i.e., short-terms vs medium-term). The ministries could benefit from technical assistance (TA) support with different activities, such as formulation of draft changes to the Rulebook on budget classification and development of methodological guidelines for CBT which would describe how it would be implemented in practice.

Table 9. CBT implementation action plan

Action	Responsibility	Timing
1. Development of draft changes to the Rulebook on budget classification	MoEP & MoF (Treasury) with TA support	short-term
2. Adoption of changes in the Rulebook	MoF (Budget Dpt)	short-term
3. Integration of the modifications in the ISIB (FMIS)	MoF (Treasury)	short-term

4. Integration of the modifications in BIS	MoF (Budget Dpt)	short-term
5. Development of methodological guidelines for CBT	MoEP with TA support	short-term
6. CBT promotion	MoEP	medium-term
7. Development of capacities for CC financing assessment	MoEP with TA support	medium-term
8. Integration of CC strategic and budgetary framework	MoEP and MoF (Budget Dpt)	medium-term

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Annex 1 – Loss and Damage Analysis

Loss & Damage Analysis

2.1. Overall background

With its main purpose to stabilize emissions within a timeframe and at levels that would allow natural adaptation of ecosystem to inevitable climate changes, UNFCCC introduced loss and damage concept in assessments of climate change impacts. Although there is no formal definition, the loss and damage concept could be easily understood as a mix of negative effects caused by the climate change and variability that people have not been able to deal with (Warner et al., 2012). Most cited definitions of loss and damage can be found in the following box:

Box 1. Loss and Damage definitions[16]

Loss and damage refer to effects that would not have happened in a world without climate change, which have not been mitigated, and which cannot be (or have not been) adapted to (ActionAid, 2010: page 6)

Loss and damage refer to the actual and/or potential manifestation of climate impacts that negatively affect human and natural systems (UNFCCC SBI, 2012: page 3)

[16] For closer reference, please see https://cop23.unfccc.int/topics/adaptation-and-resilience/workstreams/loss-and-damage-ld/warsaw-international-mechanism-for-loss-and-damage-associated-with-climate-change-impacts-wim#eq-1

The Paris Agreement represents a call for action to take collective efforts to keep global average temperatures below 2°C and to limit the increase in global average temperatures to 1.5°C. However, submitted collective efforts translate into global average increase of temperatures closer to 3°C (UNFCCC, 2016). It is widely recognized that the current lack of mitigation ambition will increase the losses and damages induced by the climate change trends and that this is particularly true in case of countries with weak policy and institutional structure which are relatively unresponsive to the global climate trends[17]. It also seems that the potential harm will be proportional to the ability of those countries to monitor, recognize, formulate and finance appropriate actions in a timely manner (Roberts & Zakieldeen, 2018).

Serbia is still in the process of developing an appropriate framework for collecting and storing information related to loss and damages. The information available is collected in an ad hoc manner and is usually methodologically inconsistent. The main source of information for loss and damage related data is the Service for Emergency Situation at the Ministry of Interior, that populates the data of the project DESINVENTAR. However, the information contained in this database is discontinuous. Appropriate methodology for loss and damage assessment and information mechanisms are yet to be established in the Republic of Serbia.

The following subsections within this chapter provide details on the climate change stimulated loss and damage organized in five thematic areas (i.e., slow-onset events, extreme events, non-economic losses, risk management approaches, human mobility and action and support), as suggested by the latest assessment report of the Intergovernmental Panel on Climate Change. The data and information were drawn primarily from the DESINVENTAR database, web pages of the Public Investment Management Office, Statistical Office of the Republic of Serbia, Hydrometeorological Institute of Serbia and the UNDP managed website which consolidates information on climate change[18]. In addition, due to mentioned data limitations and lack of centralized comprehensive loss and damage database, alternative sources were consulted in an attempt to grasp and assess the situation in Serbia. The focus was put on the reports Serbia already submitted as part of its UNFCC obligations (the 2010 Initial National Communication, the 2016 First Bi-Annual Update Report, the 2017 Second National Communication) and other locally-focused climate change-oriented reports and studies that provide good baseline for assessment of loss and damage implications. Some of these reports are: Climate changes observed in Serbia and future climate projections based on different scenarios of future emissions (2018), The Effect of Climate Change on Agriculture in Serbia (2019), Study on nature-based climate solutions in Serbia (2019) and the Study on Socio-Economic Aspects of Climate Change in Serbia (2019).

[17] Loss and damage concept raised a lot of publicity and is widely recognized and used as quite an effective method to access negative impacts of climate change. For example, Climate Action Tracker reported that costs of economic damages in developing countries due to climate change could sum up to approximately $ 399 billion per year if temperature rises by 2°C by 2030, and 1.07 trillion by 2050 (Baarsch et al.,2015).

[18] www.klimatskepromene.rs

2.2. Slow-onset events

According to the Cancun Adaptation Framework slow onset events include the following events: increasing temperatures, desertification, loss of biodiversity, land and forest degradation, glacial retreat and related impacts, ocean acidification, sea level rise and salinization. Slow onset events caused by climate change are already manifesting in significant losses and damages worldwide. For example, economic losses from weather and climate-related events in EU, on aggregate level, reached EUR 23 billion in the year 2012 (see Table 1).

Table 1. EU economic losses from weather and climate-related events

Year	2010	2011	2012	2013	2014	2015	2016	2017
Losses (total, mil EUR)	19,539	7,471	4,870	22,976	11,667	11,465	9,769	12,052
Losses by meteorological events	6,026	3,531	600	11,111	5,485	4,808	2,973	4,433
Losses by hydrological events	9,014	3,403	739	11,124	5,380	4,485	6,061	1,090
Losses by climatological events	4,499	537	3,531	741	802	2,172	735	6,529

Source: Eurostat

When it comes to Serbia, the severity of slow onset events can be seen through temperature changes and its negative impact on GDP level. Based on data from Hydrometeorological Institute of Serbia (RHIS) the average annual temperature rose above 1,5°C from year 2008 to year 2017 compared to average annual temperature between year 1961 and 1990 (RHIS, 2019). Extreme temperatures have most severe impacts on lowlands, especially the ones in southern and central parts of Serbia. Dry periods and lack of precipitations are most often coincided with extreme temperatures during the summer. The following table captures change in climate indices in the period 2008-2017 compared to the period 1961-1990:

Table 2. Change in climate indices in Serbia

Climate index	Change
No of frost days	20 – 30 days less
No of summer days	3 – 9 days less
No of tropic days	20 – 30 days more
No of heat wave days	20 – 30 days more
No of extreme heat wave days	30 days more 2-4 days more per year

Source: Đurđević et al., 2018

Based on RHIS data, thirteen out of fifteen warmest years in the period 1951 to 2019, are recorded in the new millennium, with 2019 as the warmest year. Based on the deviation of middle air temperature per annum in the same period, there is a clear upward trend.

Božanić and Mitrović (2019) estimate the assessment of temperature changes on Serbian GDP and express the magnitude of potential damages in USD. Even the smallest increase of temperature has significant impact on Serbian GDP and economy losses. Temperature rise of 1°C would result in a 1.2% and 4.19% decrease of Serbian GDP level compared to projected GDP level during the next 20 and 80 years respectively. Calculations of other temperature rise scenarios demonstrate more severe negative impact of global warming on Serbian GDP level. For example, if temperature increases 4°C, the Serbian GDP level would be almost 7% lower than projected during the period 2020-2040, while the downfall would reach astonishing 17% for the period 2020-2100.

Table 3. Temperature rise and GDP

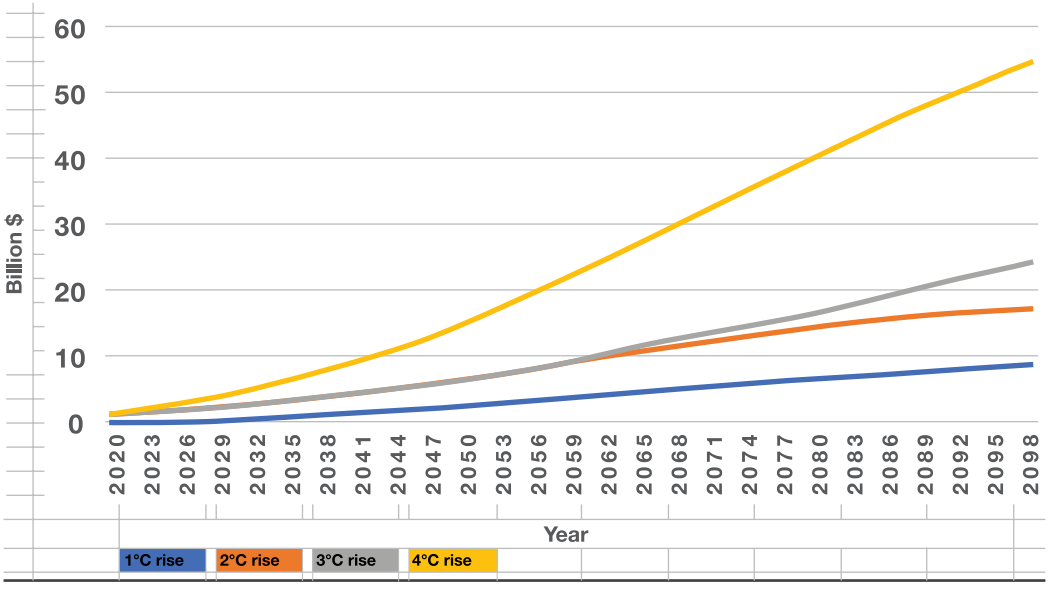
	Decrease of Serbian GDP compared to the projected GDP level in case of no climate changes for a given period in a $ billion (%)		
Rise of Temperature	Year 2020-2040	Year 2040-2100	Year 2020-2100
1°C	15,465 (1.20%)	328,899 (4.74%)	344,364 (4.19%)
2°C	58,124 (4.53%)	708,193 (10.20%)	766,317 (9.32%)

3°C	59,107 (4.97%)	831,296 (12.88%)	890,403 (11.65%)
4°C	97,536 (6.87%)	1.904,874 (18.46%)	2.002,410 (17.06%)

Source: Božanić and Mitrović (2019)

Scenario analysis done by OECD also demonstrates that there is an exponential impact of temperature rise as slow onset event on Serbian GDP level and economy. Four scenarios that assume average temperature increase by 1°C, 2 °C, 3 °C and 4 °C in the period from 2020 to 2100 result in annual budget decrease of 0.089%, 0.15%, 0.205% and 0.318% respectively (Figure 1).

Figure 1. Serbian GDP implications of temperature increase scenarios in the period 2020-2100



Source: OECD

Apart from the overall impact on Serbian GDP level, temperature increase loss and damages could be analysed from the perspective of the specific sectors influenced by climate changes. According to the analysis presented in 2nd National Communication, on average, a change of median annual temperature by +1°C produces 7% less precipitation annually and decreases median annual flows by 20%. This means that rise of average annual temperature by 2°C leads to 40-50% less water in rivers on average compared to average figures for the past 60 years. Lack of water, agricultural production, energy production and consumption, as well as losses and damages in forestry are just some of many perspectives in which severe impacts of temperature increase can be seen.

Extreme droughts and high temperatures are becoming more frequent events in the Republic of Serbia. Since 1996 Serbia had 4 autumn droughts and 8 summer droughts (Djurdjević et al, 2018). From the perspective of multiannual crops, the biggest negative effects are driven by successive occurrence of autumn/spring and summer droughts, which Serbia experienced in years 2006, 2007, 2011 and 2012. Based on drought losses methodology, presented in the National Adaptation Plan, it is calculated that crop losses due to droughts reached $ 4.6 billion from 1994 to 2014. It is expected that corn production is Serbia will be the most affected culture in Serbia by climate changes. According to Djurdjević et al. (2018) it is estimated that corn losses were about $ 2.2 billion in the period from 1994 to 2014. Annual corn production in Serbia already demonstrates strong variations - from 4 t/ha in year 207 to 7.7 t/ha next year (see Table 4). Rather large fluctuations also exist in case of other cultures (wheat, reap seed, sugar beet and soy).

Table 4. Annual agricultural production in Serbia

Period	Agricultural production (yield t/ha)								
	Wheat	Barley	Corn	Oats	Rye	Triticale	Rapeseed	Sugar beet	Sunflower
2015	4.1	3.8	5.4	2.7	2.3	4.1	2.7	51.8	2.6
2016	4.8	4.3	7.3	3	2.9	4.3	2.9	54.5	3.1
2017	4.1	3.3	4	2.4	2.4	3.7	2.5	46.7	2.5
2018	4.6	3.9	7.7	2.9	2.8	4.2	3	48.3	3.1
2019	4.4	3.7	7.6	2.5	2.6	4	2.7	54.2	3.3

Source: The National Statistical Office of Serbia

Although these variations are a result of numerous interrelated factors and cannot be fully associated with climate change, it could be reasonably argued that temperature increase is one of the key drivers to majority of factors underlying the observed variations (droughts, heavy rains, floods, frost, land pollution etc.).

Annual agricultural production is influenced by numerous variables which are not all climate related and as such not a focus of this research. It is not possible to precisely isolate climate related factors influencing agricultural production based on existing data. Nevertheless, when observing droughts, as one of the most devastating climate related aftermaths in the context of agriculture, along with the annual crop production data, it seems evident that Serbian agri-

culture production is suffering significantly due to the global warming. For instance, corn production experienced the loss of RSD 34 million during the drought years 2012 and 2017 alone.

Mitrović and Božović highlight the effects of climate changes on Serbian GDP measured throw agricultural contribution to total GDP. They show that the Serbian GDP level would decrease by 0.47% during the period 2020 – 2040 if temperature rises by 1°C solely due to the reduction of cereal production. With the prediction of higher temperature rise, the GDP losses due to the cereal production cutbacks is cause for even more concern.

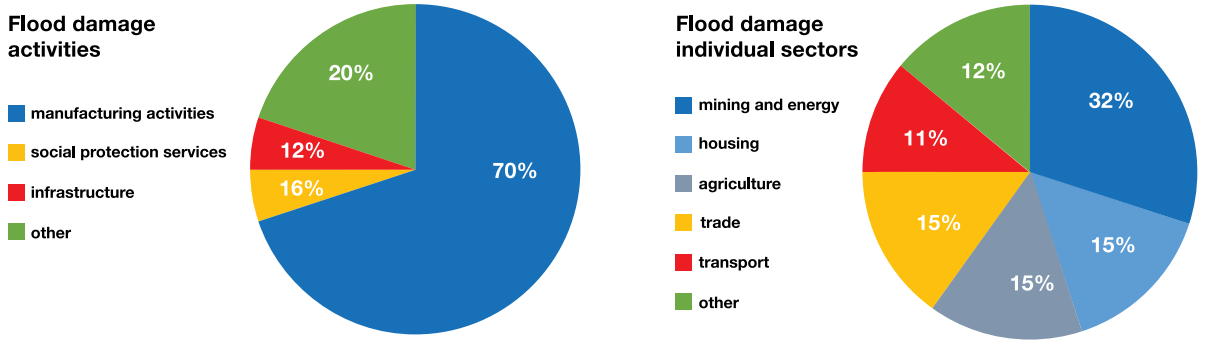
2.3. Extreme events

Loss and damage related studies in Serbia are dominantly focused precisely on extreme events. Total material damage in the Republic of Serbia caused by extreme events in the period between 2000 and 2015 amounted to more than UER 5 billion. It is believed that over 70% of these damages were caused by droughts and high temperatures, while the 2014 floods alone produced damages of EUR 1.5 billion in the 24 most affected municipalities.

Due to its severity, the most comprehensive analysis of loss and damage caused by extreme events was conducted for the heavy flood in 2014. As stipulated in the Second National Communication there are 99 identified flood areas in the Republic of Serbia, the biggest ones along the river coasts of Danube, Sava, Drina, Great Morava, South Morava and West Morava. The catastrophic flood, caused by heavy rains from 2014, affected 44 identified flood areas, putting at risk 1.6 million people.

As calculated by the Serbian Flood Report (2014), EUR 855 million of damages is related to destroyed tangible goods, while EUR 645 million is related to losses in production. If all affected municipalities are considered, the total effect of flood sums up to EUR 1.7 billion with mining and energy, housing, agriculture, trade and transportation as the most effected sectors (Ministry of Environmental Protection, 2020).

Figure 2. Flood damage charts – activities and sector



Source: Serbia's Second Biennial Update Report to the UNFCCC, 2020

2.4. Non-economic losses

Apart from more tangible losses such are loss of assets, production or revenues, climate changes also produce losses that are not easy to express in economic terms. These adversities include health degradation, mobility obstacles, degradation of territory, cultural heritage, indigenous knowledge, societal/cultural identity, biodiversity, ecosystem services or even loss of human lives (UNFCCC, 2013).

Data about non-economic losses are quite limited in case of Serbia. Most comprehensive non-economic loss data are available for health degradation and losses of human lives.

Negative health impacts of heat waves were explored during the summer months in year 2007, when 167 people died out of which 151 were older than 75, which was a 76% increase compared to the reference death rate (Ministry of Environmental Protection, 2017). Some studies stated that increase of daily middle temperature above 90, 95 and 99 percentile cause increase of average number of deaths by 15.3%, 22.4% and 32% respectively. Risks of infectious diseases is also influenced by temperature increase and hot waves. The Serbian Public Health Institute introduced West Nile virus (WNV) monitoring in the year 2012. The monitoring revealed that there was four times more infected people with WNV in 2013 than 2012 (2012: 71 infections/7 deaths; 2013: 302 infections/35 deaths) and this trend continued in subsequent years (Ministry of Environmental Protection, 2017).

On the other hand, extreme events unfortunately left their mark as well. Heavy floods during May 2014 resulted in 51 human casualties, out of which 23 people drowned. In addition to direct casualties, the flooding caused contamination of surface water, groundwater and soil. Most relevant data and information related to non-economic loss and damage in the Republic of Serbia from 1980 to 2020 can be found at DESINVENTAR website. Based on these data it can be concluded that during the last 40 years the most human casualties were caused by fire while the most houses were damaged due to the flood (see Table 5).

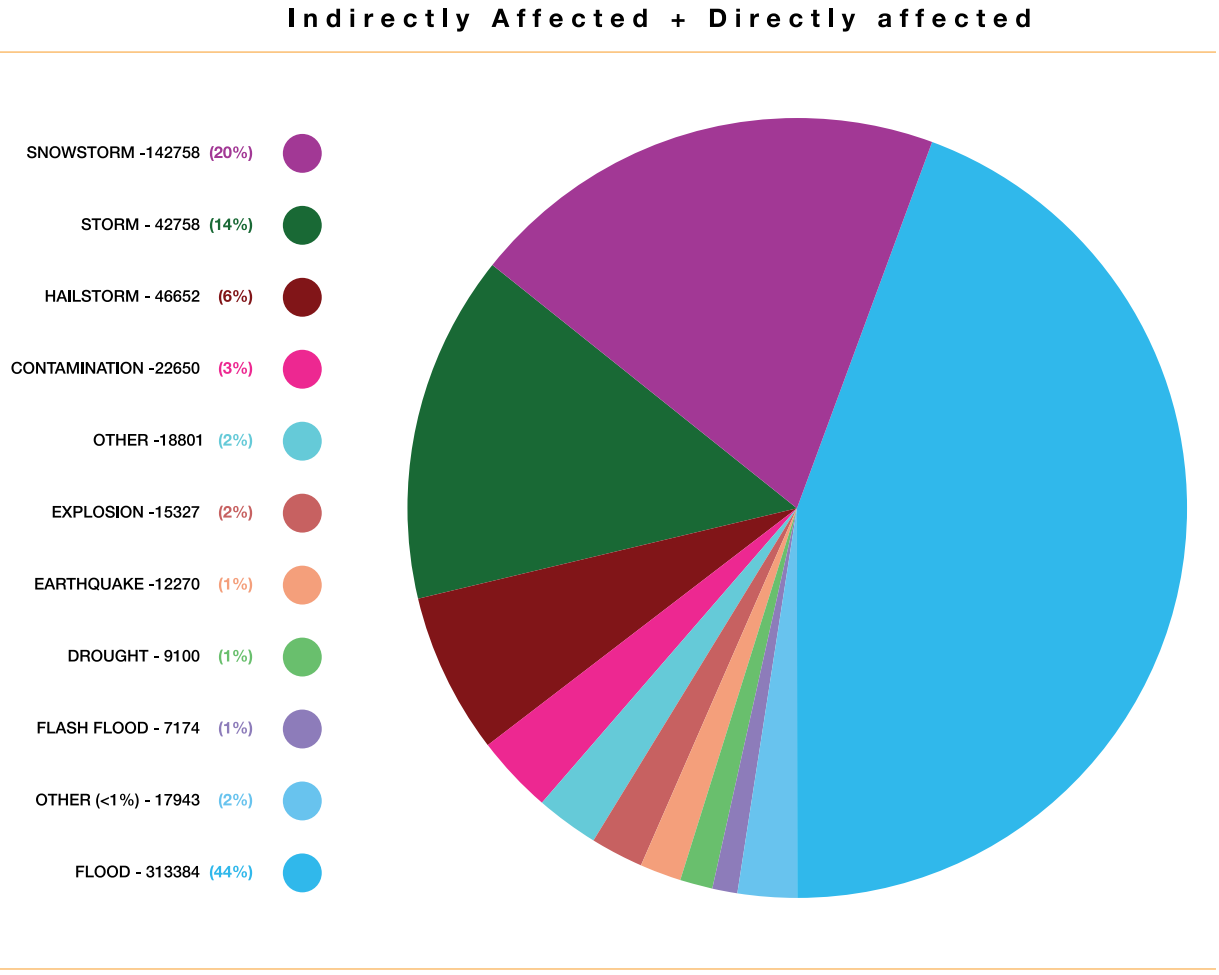
Table 5. Mortality and damaged houses due to the natural disasters in the period 1980-2020

Mortality		Housing Damages	
Fire	130 Deaths	Flood	58.633 Houses
Explosion	59 Deaths	Earthquake	14.992 Houses
Flood	52 Deaths	Hailstorm	11.824 Houses

Source: Desinventar

As shown in Figure 3, apart from the most fatal outcomes, in the period from 1980 to 2020 climate changes affected around 720,000 people, either directly or indirectly.

Figure 3. Population affected by climate changes from 1980 to 2020



Source: Desinventar

As presented above, floods are the consequence of climate change that, by far, had the most widespread effect on the Serbian population during the last 40 years. About 44% of people who are recorded as effected by climate changes in the period 1980-2020 suffered from floods. Snowstorms and storms effected 20% and 14% of population who experienced negative impacts of climate changes in mentioned period respectively, while other events effected less people.

2.5. Risk management approaches

In general, all risks need to be identified and assessed (probability impact as well) if they are to be properly managed. Risk management approaches can be grouped into four major categories:

- Risk avoidance (eliminate the risk, withdraw from or not become involved)
- Risk reduction (optimize and minimize risk)
- Risk sharing (transfer risk by outsourcing or insurance)
- Risk accepting.

Climate related loss and damage can be usually avoided and/or minimized by relying on appropriate mitigation and adaptation efforts. A wide range of risk management approaches is already implemented across the globe, depending on risk awareness, risk appetites, political will, funding sources etc. Lack of mitigation ambition still leaves some space for the adaptation efforts to avert or minimize occurred loss and damage. It is widely believed that mitigation efforts are the best way to tackle loss and damage preventively, while adaptation efforts are the best option when negative climate impacts are inevitable.

The Intergovernmental Panel on Climate Change (IPCC) emphasized that, globally, current efforts have not been successful so far. Comprehensive risk management in the context of addressing loss and damage from climate change consists of addressing the entire gamut of possibilities from reducing loss and damage before it occurs, to addressing loss and damage that cannot be avoided (UNFCCC, 2012).

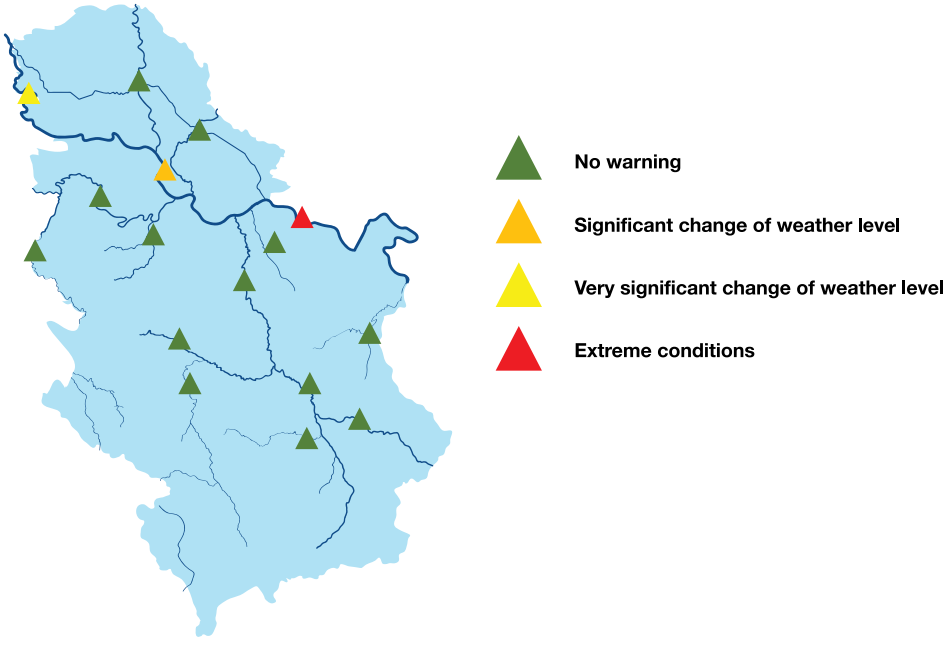
When it comes to Serbia, the Ministry of Interior operates the Sector for Emergency Situations. The jurisdiction of the Sector is framed in a number of laws and regulations, the most important one being the Law on Emergency Situations, adopted back in 2009, followed by the Law on Fire Protection, the National Strategy for Protection and Rescue in Emergency Situation, the Serbian National Disaster Risk Reduction Program and many other bylaws. These documents represent the pillars of the Serbian regulatory risk management framework in terms of loss and damage. However, the Republic of Serbia is missing a full-scale measurement, reporting and verification system as an essential tool to track progress made in achieving the country's obligations under the UNFCCC (Ministry of Environmental Protection, 2020).

In order to respond to negative impacts of climate changes, Serbia uses both mitigation and adaptation efforts. Still, as recognized by the National Program for Natural Disaster Management, Serbia remains focused on reactive response, while preventive mechanisms are yet to be fully applied. At the end of 2018, the new Law on Disaster Risk Reduction was adopted by the Parliament. However, its full implementation is yet to be achieved.

There is an early warning system for extreme temperatures in place thanks to the joint efforts of the Institute of Public Health and the Republic Hydrometeorological Institute of Serbia. By utilizing a wide network of local health institutions, the system allows prompt warning of expected extreme temperatures (primarily tropic waves) across the country. Urgent warning massages are distributed via Meteo alarm, internet, public information broadcasters and, in case of extremely dangerous events, by sending SMS massages. According to Disaster Risk Assessment in the Republic of Serbia (Ministry of Interior, 2019) droughts and hot ways, heavy rains and blizzards are three riskiest extreme weather conditions in Serbia.

The 2014 heavy flooding raised the awareness and accelerated the work around climate change risk management approaches, and although the flood resulted in a number of adaptation efforts focused on minimising severity and damage, the legal framework of the Republic of Serbia was enriched with very important laws and bylaws with mitigation measures integrated within them. The General Flood Protection Plan, as a preventive measure, defines obligatory daily reporting by the RHIS. Big data from a wide network of hydrometeorological stations (1.468 stations) is processed in real-time by program "Prognoza" and if there is a high likelihood of dangerous events the hydro alarm is activated. The hydro alarm covers 16 watercourses (river basins) and it is updated daily with two-day prediction (Ministry of Interior, 2019).

Figure 4. Hydro alarm layout



Source: Disaster Risk Assessment in the Republic of Serbia (Ministry of Interior, 2019)

On the other hand, the Serbian flood protection land system dominantly relies on passive protection enhanced by protective structures and riverbanks. The Danube-Tisa-Danube system of canals is the most advanced system for water regulation in Northern Serbia. In 2017 the

overall Serbian flood protection system was composed of 3,600 km of embankments and other protective structures, 53 damns, 413 melioration systems in public property with network of cc 25,000 km of canals and many pumping stations (Ministry of Interior, 2019). Still these assets are not fully maintained due to lack of funding for this purpose, which is reflected in their efficiency and reliability. Historically, flood occurrence in Serbia has become more frequent with the new millennium. Apart from the severe 2014 flooding, Serbia suffered from big floods in 1999 and 2005 as well, while less significant floods occurred during the years 2001, 2002, 2007, and 2009.

2.6. Human mobility

Climate change and its adverse impacts cause migrations, displacement and planned relocation of people. Climate changes, environment and human mobility have always been interrelated. In general, migrations are multi-causal, but scholars argue that climate-related migrations are a consequence of a series of political and economic decisions.

Climate-triggered migrations are a relatively new field in the migration studies, and as such are yet to be fully explored. In the context of Serbia, although there are discussions about environment-related migrations they are not yet fully studies. Apart from some partial human mobility analysis due to the heavy flood, there is no comprehensive overview of this topic in Serbia. There are ad hoc studies conducted to analyse the adverse consequences of particular events such as the 2014 flood. These studies provide important insights and relevant data related to human mobility due to the flood disaster that occurred 2014.

According to the PIMO data (PIMO Report, 2015) there were 494 families that lost their homes during the 2014 flooding. All families received help, but due to the severity of the flood, 44% of them (216) were financially compensated for their damage. Although there are no available data or information, it would be reasonable to assume that the majority of these families emigrated locally most probably on a temporary basis. Apart from house damages, it could be assumed that some of the flood related migrations were motivated indirectly by infrastructure rehabilitation, agricultural incentives and employment issues. The Republic of Serbia has a long-lasting internal immigration trend of rural people moving to urban areas (primarily Belgrade) which leads to depopulation of rural communities. Although agriculture is believed to be one of the most promising sectors of Serbian economy, internal migrations are significantly influencing the labour market and work force available for agriculture. Having that in mind, environmental degradation and negative impact of climate changes could further enhance internal immigration to cities.

During the 2014 flood 31,879 people were evacuated from their homes (24,000 from the city of Obrenovac only). At least temporarily, flood evacuation resulted in duplication of internally

displaced citizens in the country (Serbian Flood Report, 2014). Costs of temporary accommodation amounted to EUR 0.9 million.

There were between 2.3% and 11% of Roma in the most affected flood areas. It is estimated that 6,032 Roma were affected by the flood. As a vulnerable category, about 93% of Roma population were the owners of their houses, although the majority of them lived in substandard housing and did not have house insurance.

2.7. Action and support

Action and support to tackle loss and damages due to climate changes require enhanced cooperation and facilitation of capacity building, technology and finance.

In order to set up a general framework for comprehensive protection from natural disasters, the Government of Serbia in 2014 adopted the National Program for Disaster Risk Reduction. The Program covers a 4-year period (2016-2020) and is financed from several sources: Multi-Donor Trust Fund, the Global Facility for Disaster Reduction and Recovery, the European Union (EU) Instrument for Pre-Accession Assistance (IPA) 2014, the World Bank – Austria Urban Partnership Program and the United Nations Development Program. The Program focuses on six components: institutional development and capacity building, risk identification and monitoring, risk mitigation, early warning systems and alerts, risk financing strategy and recovery.

Some of the results of the program per each component are presented in the following table:

Table 6. National program - components and actions

Component	Action
Institutional development and capacity building	• Regulatory framework changes • Harmonization with EU legislation
Risk identification and monitoring	• Data collection • Development of risk model • Improvement of hydrological and meteorological data • Risk assessment at regional level • Risk assessment at national level • Risk assessment at local level • Sectoral vulnerability assessment • Improvements of monitoring mechanisms • Information system for sharing and distribution of risk information

Risk mitigation	• Reconstruction, rehabilitation and modernization of existing risk mitigation structures • Development of new structures according to EU directives for flood mitigation • Construction of structures for flood protection (embankments) • Investments in active flood prevention • Stabilization of priority landslides • Equipment for monitoring and operative tracking and infrastructure maintenance • Integrating aspects of risk in assessment of new public investments • Integrating risk studies in land use planning at national and local level • Revision and improvement of construction regulation and practice • Strengthening mechanisms for risk information sharing and distribution
Early warning systems and alerts	• Improvement of early warning system at national and local level • Improvement of communication mechanisms at national and local level • Activities related to water level warnings • Simulations and evacuation drills • Improvement of interventions and readiness at national and local level • Support to National Protection and Rescue Plan in Emergencies • Capacity building at the National Headquarters for Emergencies • Awareness raising at local level (journalist, teachers and pupils, municipal officials/ombudsman) • Awareness building strategies and campaigns
Risk financing strategy	• Development of risk financing strategy • Insurance promotion (insurance against natural disaster risks for SE Europe and Caucasus (Europa RE) • Potential obligations and fiscal impact study • Analysis of administrative mechanisms after natural disasters • Ministry of Finance capacity building

Recovery	• Post-Disaster Needs Assessments methodology at national and local level • Recovery Framework Methodology at national and local level • Development of cash flow system for monitoring recovery

Source: National Disaster Risk Management Program

Apart from the National Program, a significant share of activities aimed at disaster risk reduction and recovery were implemented through the Public Investment Management Office (PIMO). During the year 2014 and 2015, PIMO appropriated over 332 million (EUR 357 mil) for post-flood recovery (PIMO Report, 2015). The structure of the ear-marked recovery investments is presented in the following table:

Table 7. Flood recovery costs

Action and support	Executed in 2014	Planned for 2015	Total (EUR)
Financial/material assistance for 20,059 households	40,502,660		40,502,660
Taking care of 421 homeless families	3,397,631		3,397,631
Cleaning 74 locations	45,659	4,750,000	4,795,659
Financial/material assistance for families with damaged houses	395,753		395,753
Infrastructure rehabilitation	5,977,950		5,977,950
Rehabilitation of 36 health institutions	393,935	299,149	693,084

Agriculture incentives	32,412,288	20,671,711	53,083,999
Communication rehabilitation	150,000		150,000
MSMEs grants	2,727,051		2,727,051
Rehabilitation of energy generation facilities	195,000,000		195,000,000
Rehabilitation of transport	51,000,000		51,000,000
Total	332,002,927	25,720,860	357,723,787

Source: PIMO Report, 2015

The Republic of Serbia also recently developed a draft Low-Carbon Development Strategy (LCDS) and an Action Plan with scenario analysis during 2016 – 2019. The Action Plan covered the flowing scenarios: the business-as-usual scenario, scenario with measures, and scenario with additional measures. These scenarios assumed that Serbia will become a part of EU in 2025, and thus would have additional climate related targets (addressed through the additional measures scenario).

As stipulated by Serbia's Second Biennial Update Report, if Serbia does not implement measures it is expected that GHG emission level will reach 64,650 ktCO2eq by year 2030. Implementation of measures would result in GHG emission of 54,396 ktCO2eq by 2030, while implementation of additional measures (required by EU accession) would help Serbia to reach GHG emission of 44,692 ktCO2eq by year 2030. Trend analysis per scenario indicates that additional measures could result in overall GHG emission reduction of 28.7% in 2030 compared to 2010.

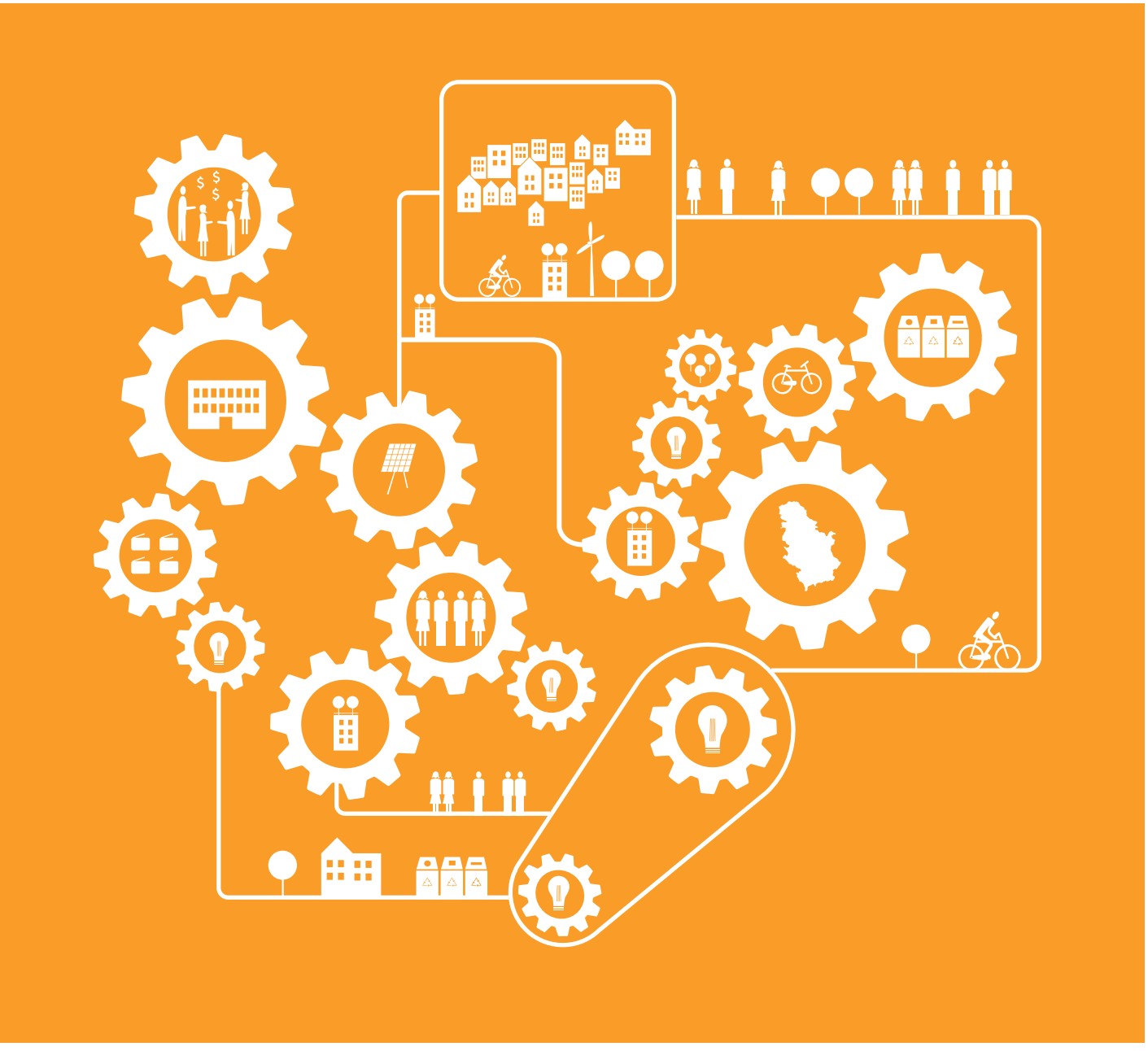
Implementation of the above-mentioned scenarios and actions formulated in the LCDS would require investments of EUR 6.5 billion in the period 2020-2030 for the scenario with measures, and EUR 19 billion for the scenario with additional measures (the business-as-usual scenario, without any measures, would not require investments) – Table 8.

Table 8. Costs of implementation of each scenario per sector

	2020-2025		2026-2030		2020-2030	
	With measures	With additional measures	With measures	With additional measures	With measures	With additional measures
TOTAL	1,893	6,650	4,618	12,589	6,511	19,239
Energy	1,825	6,531	4,510	12,388	6,335	18,919
IPPU	2	3	2	3	4	6
Agriculture	20	31	60	93	80	121
Waste	0	39	0	59	0	98
Forestry	46	46	46	46	92	92

Source: Serbia's Second Biennial Update Report to the UNFCCC

Based on the above presented figures it is clear that coping with climate change would require significant investments. Delayed implementation of actions to address environmental challenges necessarily implies additional risk which, if materialized, would multiply the associated costs. Awareness, responsiveness and timeliness in implementing these actions are directly proportional to the additional cost borne by the Government and society in general.



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