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**336.5:551.583(497.711)**  
**(Original scientific paper)**

## **ESTIMATING PUBLIC CLIMATE FINANCE USING OBJECTIVE-BASED COST COMPONENT APPROACH**

**Abstract:** In this paper, we estimate the climate budget of the City of Skopje, the capital of the Republic of North Macedonia, by applying the objective-based cost component approach of the Climate Budget Tagging (CBT) methodology. CBT is a budget tool for monitoring and tracking climate-related public expenditures in the national/subnational budget system. In this approach, relevance level of the climate budget is calculated as the percentage of total expenditure for each climate intervention minus the share of the expenditure that would take place under a business-as-usual (BAU) scenario. Using the budget data for the representative year 2018, we estimated that the total budget of the climate-relevant programmes is 585 mil. MK denars, of which 311 mil. MK denars is allocated for mitigation while 41 mil. MK denars is allocated for adaptation purpose. Accordingly, about 48.6 percent of the budget is allocated for highly relevant programmes, 28.6 percent for medium relevant programmes, and 22.7 percent for low relevant programmes. This method also acknowledges that some programmes already have climate functions built-in, and when these programmes are implemented to contribute to climate functions, the additional benefits they would provide also need to be considered.

**Keywords:** climate change, tracking climate finance, climate budget tagging (CBT), public climate expenditures, North Macedonia

**JEL:** H72, Q51, Q54

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## Introduction

Climate change is the single greatest threat facing humanity. Achieving the primary objective of the Paris Agreement to limit global average temperatures to well below 2°C, while pursuing efforts to stay within 1.5°C, requires serious and strong climate action by all stakeholders. Since climate change is a cross-sectoral, long-term environmental issue facing development, it needs to be addressed by mitigation and adaptation programmes implemented through various sectors funded by private and public sources mobilized at both the global and national levels. Climate change is often considered as the “greatest investment opportunity in history” valued at about 10 percent of global GDP, providing an unprecedented opportunity to unlock massive economic and social benefits that can help achieve the Sustainable Development Goals (SDGs).

As climate change impacts the whole of the economy, mainstreaming climate change in the annual development plans is thus imperative to tackle climate change-led problems. Mainstreaming helps governments take informed actions in allocating budget to priority areas. Tracking climate budget helps decision-makers build understanding of how much funding has been allocated to address climate change-led problems and what climate benefits (adaptation or mitigation or both) are being achieved to enhance the country’s climate resilience. In the last few years, great progress has been made in the expansion and popularization of the concept of budgeting for climate change and its integration into the budget process of public financial management. Most developing countries use existing budget lines to target finance towards climate change objectives, but only five countries track public expenditure on the basis of dedicated budget codes (Bhandary, 2022).

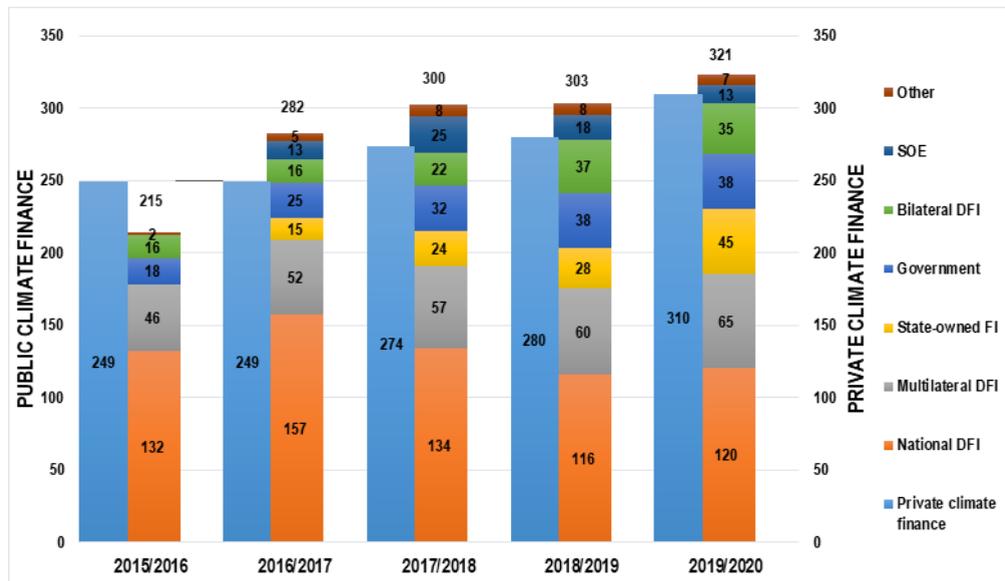
Budgeting for climate change is a new concept worldwide aiming at integrating, tracking, and monitoring public climate expenditures into government budgets. It’s also known as climate budgeting, green budgeting, climate budget tagging, climate change budgeting, climate budget tagging. The development of this concept experienced expansion in 2021 (UNDP, 2021; OECD, 2021; Battersby et al, 2021; Pizarro et al., 2021), when it was also developed as Macedonian national methodology for CBT that is fully consistent with the world-renowned methodologies (Upadhya, 2021).

CBT is a budget tool for monitoring and tracking of climate-related public expenditures in the national budget system (UNDP, 2015, 2021). CBT can help governments integrate climate change considerations into the planning and budget process (World Bank, 2021). It’s a government-led process

of identifying, measuring, and weighting such climate-related expenditures. It provides comprehensive data on climate relevant spending, enabling governments to make informed decisions and prioritize climate investments. By generating data on climate change investments, CBT enables public scrutiny on governments' and donors' spending on tackling climate change issues strengthening accountability and transparency. Practicing of CBT brings great benefits to the country which are described in detail by Upadhya (2021). Following the development and introduction of the first CBT systems in 2012, 19 national and subnational governments (SNGs) have developed CBT methodologies according to their needs (World Bank, 2021). This paper discusses a combined objective-based method of CBT in tracking climate finance at the national and subnational levels.

## **2. GLOBAL PUBLIC CLIMATE FINANCE AND THE IMPACT OF COVID-19**

Climate Policy Initiative's Global Landscape of Climate Finance provides the most comprehensive overview of global climate-related primary investments. In their annual reports, they provide two-year data, but use bi-annual averages to level the annual fluctuations in data. CPI (2021) report estimates that global climate finance in 2019/2020 reached a record USD 632 bn, which is an increase of 75% compared to 2011/2012, but only 10% compared to 2017/2018. In previous years, the average growth was 25% per year—this slowdown is an impact of the global COVID-19 pandemic on climate finance. They also estimate that for the climate objectives of limiting global temperature rise to well below 2° C and pursuing efforts to limit it to 1.5° C by 2030, annual climate finance must increase by 588% to USD 4.35 trillion, and 1,078% to USD 7.45 trillion (mean scenario) by 2050. Mitigation finance reached USD 571 billion in 2019/2020, while adaptation finance totaled USD 46 billion, and USD 15 billion went to projects with dual benefits (mitigation and adaptation).

**Figure 1. Global climate finance flows between 2015 –2020, public and private, biannual averages (USD bn)**

Source: adapted from CPI, 2021

The public sector plays a more prominent role in providing climate finance where, except in 2015/2016, their share in all years is about 52% of total climate finance. The public sector continues to provide almost all of adaptation finance, while the private sector mostly provides mitigation finance. Figure 1 shows the distribution of private and public climate finance from 2015–2020, where the public climate finances are listed alongside their sources. Most public climate finance is provided by Development Financial Institutions (DFIs) (68% in 2019/2020). Climate finance provided through government budgets accounts for 12% of public flows and 6% of the total climate finance. As in the previous years, growth is driven by low-carbon transport and delivered primarily through grants (CPI, 2021).

The COVID-19 pandemic has drastically altered the context for international climate finance. It has resulted in the most damaging humanitarian and economic crisis since the Second World War and its impacts have been particularly severe on emerging markets and developing economies (EMDEs). They have suffered large losses of revenue with knock-on effects on their fiscal and debt positions (IEGCF, 2020). The COVID-19 pandemic negatively affected the growth of global climate finance in 2020 and lowered the level

of public climate finance in many developing countries. They were impacted negatively since the implementation of their NDCs mostly rely on international support. International climate finance decreased during the pandemic since many developed countries cut these flows. For example, in July 2020 the United Kingdom announced a total cut of £2.9 billion in its planned Official Development Assistance (ODA) budget for 2020 (FCO, 2020). This caused the proportion of ODA to projects with a significant focus on climate adaptation or mitigation to fall from 25% in 2019 to 17% in 2020, while ODA to projects with climate as a principal objective fell from 18% to 14% (DI, 2021). Most of the funding of domestic climate finance in developing countries took the form of loans, and they have reallocated or decreased their domestic climate flows because of the high costs of responding to the pandemic (Alayza and Caldwell, 2021). As a result, climate-related projects have been delayed.

In 2020, International Development Finance Club (IDFC) institutions committed USD 185 billion in green finance (of which USD 178.5 billion relate to climate finance), representing a 6% decrease from 2019, primarily due to the unprecedented challenges posed by COVID-19 and the need to reallocate public resources to emergency response and economic recovery efforts. While the pandemic may have negatively impacted green finance flows in 2020, in 2021 IDFC members have made strong pledges to climate action and green finance (IDFC, 2021).

The economic and financial impacts of COVID-19 have exacerbated the challenges developing countries were already facing to scale up climate action. These countries would need to ensure that climate action and economic recovery are mutually supportive, scale up investment without increasing the debt burden, attract large-scale private financial flows in the context of perceived higher investment risk, and secure access to long-term affordable finance at a time of rising capital costs (Hourcade, 2021).

Amidst international promises for a growing portion of development aid to take the form of budgetary support, even the largest provider of budget support, the European Union, delivered only around 24% of aid in the form of budget support in 2020 (Custer et al., 2021; European Commission, 2020). This trend is valid for climate finance as well. Most of the climate finance routed to developing countries hasn't been in the form of budgetary support, rather it's been project- or programme-specific, which are similar in trends for both mitigation and adaptation (Bhandary, 2022).

### **3. DATA AND METHODOLOGY**

#### **3.1. Data**

Financial statements of the budgets and programmes of the City of Skopje for the year 2018 were taken to assess the public climate budget for the City for that year. Climate-related programmes were identified based on their climate objective and grouped under various typologies. Then, activities related to climate change mitigation, adaptation or both, under each climate-related programme were listed. This process helped filter out those activities that had no links to climate objectives. Grouping under typologies helps budget officials understand why a particular programme has been identified as climate-related before tagging the activities under that programme.

Table 1 shows details of the sub-programmes and the climate-related activities of one of the key programmes – the Environment and Nature Conservation, along with code numbers and budget as they appeared in the budget sheet for the city of Skopje. In 2018, the City had a total of seven climate-related programmes that had climate-related activities. These activities were also listed.

**Table 1: Climate-related activities under the Environment and Nature Conservation Programme (Source: Budgets and programmes of the City of Skopje, 2018)**

<b>Programme/ Sub- programme</b>	<b>Code</b>	<b>Item</b>	<b>No.</b>	<b>Name of the activities</b>	<b>2018 Budget in MKD</b>
Environment plans	R1	425	5	Preparation of a Gazi Baba Nature Park Management Plan	300,000
	R1	425	6	Preparation of a Green Cadastre of the City of Skopje	1,000,000
	R1	425	8	Preparation of an overview of Ripar habitats with special review of the river Lepenec	1,000,000
	R1	425	10	Development of expertise for determining the boundaries of the Rasce spring and protection measures	2,500,000
Environment capital expenditure	R1	464	30	Subsidizing for the purchase of pellet stoves	10,600,000
	R1	464	11	Subsidies for the purchase of bicycles, electric bicycles and electric scooters	10,000,000
	RA0	482	35	Construction of Green Roofs	35,000,000
	W0	421	6	Garbage collection	850,000
	W0	421	7	Central heating	3,000,000
	RA0	482	41	Landscaping of the Gazi Baba Nature Park	1,000,000
	RA0	482	42	Landscaping of Vodno Forest Park	1,250,000
	RA0	482		Biodiversity protection Vodno	200,000

Environment research	R1	425	23	Preparation of technical document to solve the problem with torrents from Skopska Crna Gora	3,000,000
	R1	425	26	Research on the consequences of air pollution on human health	300,000
	R1	425	4	Preparation of biotopes map for the Skopje region	2,000,000
	R1	425	21	Extended analysis/testing of alternative sources of water supply Kadina Reka, Patishka Reaka and spring Vrelo	2,500,000
	R1	425	22	Preparation of a Groundwater Study-Skopje region	3,000,000
	RA0	482	37	Preparation of project document for shaping and editing of green corridors along the Serava and Lepenec rivers	2,750,000
	RA0	482	38	Preparation of a horticultural project for protection of the slopes on Samoilova Street	300,000

Environment monitoring	R1	425	3	Update of the Integrated Polluters Cadastre of the City	300,000
	R1	425	27	Extended ambient air pollution testing by wood burning	2,000,000
	R1	425	7	Program for mesometeorological measurements in the Skopje valley	600,000
	R1	425	24	Establishment of a system for monitoring of ambient air pollution with Skopski planning region	2,000,000
	R1	425	28	Extending ambient air pollution tests from traffic	2,500,000
Environment awareness	R1	425	16	Information campaign on the negative consequences of the ignition of waste, use of unsuitable fuels for heating	600,000
	R1	464	18	Creating conditions for the establishment/ functioning of the Intersectoral Committee on Health and Climate Change	90,000
	R1	464	20	Awards - Ecological competition of the City of Skopje	215,000

*Source: authors' own presentation*

Table 2 provides the number of climate-related activities under each programme/subprogramme. Climate-related activities were identified based on the OECD (2011) definition of mitigation and adaptation activities. Accordingly, a total of 58 activities were identified as climate-related of which 22 were related to mitigation, while 20 were adaptation activities and 16 contributed to both mitigation and adaptation.

**Table 2: Number of climate-related activities for the City of Skopje (Source: Budgets and programmes of the City of Skopje, 2018)**

Programme	Subprogramme	Number of activities	Climate functions		
			Mitigation	Adaptation	Both
Environment and nature conservation	Environment plans	4	-	-	4
	Environment capital expenditure	8	4	4	-
	Environment research	7	2	3	2
	Environment monitoring	5	-	5	-
	Environment awareness	3	-	-	3
Energy efficiency	Energy efficiency	2	2	--	-
	Water management	4	-	4	-
Urban planning	Urban planning	1			1
Communal activities	Waste management	3	3	-	-
	Greenery promotion	7	7	-	--
	Reconstruction of bicycle lane	1	1	-	-
	Lighting	1	1	--	-

Social and child protection	Social protection and child protection	4	-	3	1
Education	School programme	1	-	-	1
Local economic development	Local economic development	7	2	1	4
Total activities		58	22	20	16

*Source: authors' own presentation*

### **3.2. Methodology**

Generally, budget tagging is done at the programme level or at the activity level. At the programme level, budget tagging is relatively straightforward and easy to apply. However, there is an element of risk of overestimating the amount of climate budget, because not all activities under a climate-related programme may contribute to the climate objective. Whereas, tagging at the activity level filters non-climate activities and helps calculate more accurate climate budget.

Two technical approaches to weighing the relevance of the climate budget have been used—the objectives-based approach and the benefits-based approach widely elaborated by Upadhy (2021).

For climate change mitigation activities, such as the promotion of electric vehicles in which the objective is clear, the objectives-based approach is helpful. The entire budget can be considered climate relevant. Whereas, for programmes that are climate-oriented but only a fraction of the budget helps address mitigation or adaptation, only those portions of the budget should be tagged. The benefits-based approach is helpful to segregate the climate part but it requires adequate data regarding the benefit which are often not available. To overcome this limitation, a combined approach has been used.

In this approach, relevance level is calculated as the percentage of total expenditure for each climate intervention minus the share of the expenditure under a business-as-usual (BAU) scenario. This method acknowledges that some programmes already have climate functions built in them, and will

contribute even if they are implemented as development programmes under a BAU scenario (GoB, 2018). When these programmes are designed and implemented to contribute to climate functions, there may be additional benefits they provide which need to be taken into account.

The baseline under a BAU scenario and the expected contribution or the added relevance weight in the climate change context is established for each activity using expert judgment. Then, the standard deviation of the relevance weights is determined which is then subtracted from the maximum relevance weight. This will improve the accuracy of the assessed climate budget and subsequently its relevance level.

Table 3 illustrates how it would work. The process has been shown by taking only three examples: one each of mitigation, adaptation, and both. For energy efficiency programmes, the climate relevance weight at BAU (a) was assumed to be zero, while additional contribution (b) would be 100 percent. For water management programmes, the climate relevance weight at BAU (a) was assumed to be zero for all four activities, whereas the additional contribution (b) was assumed to be 75 for construction of water supply systems and 60 for storm sewer systems.

The climate relevance weight (c) is calculated as [(b)-(a)]. The adjusted relevance weight (d) for the programme is calculated by subtracting the standard deviation of relevance (c) from the maximum relevance weight. Accordingly, the adjusted weight has been calculated as 100 for energy efficiency, 66 for water management, and 27 for environmental plans.

**Table 3: Calculation of adjusted weight of relevance for climate-related programme**

Programme/Sub-programme	Item	No	Activities	Mitigation	Adaptation	Both	Sensitivity at BAU (a)	Additional dimension (b)	Relevance weight (c)	Adjusted weight (d)
Energy efficiency	481	10	Projects for reconstruction of school buildings, gyms heating and lighting systems: Energy efficient schools	M			0	100	100	<b>100</b>
	481	12	Reconstruction of school buildings: Energy efficient schools	M			0	100	100	<b>100</b>
Water management	482	85	Construction of main water supply systems		A		0	75	75	<b>66</b>
	482	86	Construction of a water supply system in Suto Orizari		A		0	75	75	<b>66</b>
	482	88	Construction of storm sewer LISICE		A		0	60	60	<b>66</b>
	482	89	Construction of storm sewer on Boca Ivanova Street to A. Urdarevski		A		0	60	60	<b>66</b>

Envi- ron- ment plans	425	5	Preparation of a Gazi Baba Nature Park Management Plan			B	0	25	25	27
	425	6	Preparation of a Green Cadastre of the City of Skopje			B	0	25	25	27
	425	8	Preparation of an overview of Ripar habitats (water habitats)			B	0	25	25	27
	425	10	Development of expertise for determining the boundaries of Rasce spring and protection measures			B	30	60	30	27

Source: authors' own presentation

Climate budget is calculated using the adjusted relevance weight, which is shown in table 4.

**Table 4: Estimating climate budget using the adjusted relevance weight**

Activities	M	A	B	Ad-justed weight	Budget 2018 (in MKD)	Climate budget		Rele-vance
						Mitigation (in MKD)	Adaptation (in MKD)	
Projects for recon-struction of school buildings, gyms heating and light-ing sys-tems:	M			100	20,000,000	20,000,000		High

Reconstruction of school buildings	M			100	70,000,000	70,000,000		High
Construction of main water supply systems		A		66	15,000,000		9,900,000	Medium
Construction of a water supply system in Suto Orizari		A		66	2,300,000		1,518,000	Medium
Construction of storm sewer LISICE		A		66	1,500,000		990,000	Medium
Construction of storm sewer on Boca Ivanova Street to A. Urdarevski		A		66	10,000,000		6,600,000	Medium

Preparation of a Gazi Baba Nature Park Management Plan			B	27	300,000	40,500	40,500	Low
Preparation of a Green Cadastre of the City of Skopje			B	27	1,000,000	135,000	135,000	Low
Preparation of an overview of Ripar habitats			B	27	1,000,000	135,000	135,000	Low
Development of expertise for determining the boundaries of Rasce spring			B	27	2,500,000	337,500	337,500	Low

*Source: authors' own presentation*

Using the same method, the climate budget of the city of Skopje for the year 2018 was calculated (table 5). The total budget of the climate-relevant programmes is MKD 585,795,000, of which MKD 311, 757,000 is allocated for mitigation while MKD 41,863,000 is allocated for adaptation purpose. Accordingly, about 48.6 percent of the budget is allocated for highly relevant

activities, 28.6 percent for medium relevant activities, and 22.7 percent for low relevant activities.

**Table 5. Climate budget of the City of Skopje**

Details	Budget (in MKD)	Percentage
Total budget of climate-related programmes	585,795,000	100
Budget allocated to mitigation activities	311,757,000	60
Budget allocated to adaptation activities	41,863,000	
Budget with high climate relevance	172,000,000	48.6
Budget with medium climate relevance	101,292,500	28.6
Budget with low climate relevance	80,327,500	22.7

*Source: authors' own presentation*

The following relevance index (table 6) has been used to further categorize the climate activities.

**Table 6: Relevant index**

Climate relevance weight	Relevance level
> 75	High
50 - 74	Medium
25-49	Low
< 25	Marginal

Accordingly, four activities in the City of Skopje are of high relevance, 30 are of medium relevance, and only 24 activities are of low relevance. The description of the programme with climate relevant activities is given in table 7.

**Table 7: Activities with climate relevance level**

Relevance level	Number of activities	Programme/subprogramme
High	4	Communal activities lighting, bicycle (2)
		Energy efficiency (2)
Medium	30	Environment monitoring (5)
		Environment awareness (3)
		Local economic development (7)
		Communal activities waste management (3)
		Water management (4)
		Environment capital expenditure (8)
Low	24	Communal activities greenery promotion (7)
		School programme (1)
		Social protection (4)
		Environment plans (4)
		Environment research (7)
		Urban planning (1)

*Source: authors' own presentation*

## Conclusion

The Paris Agreement calls for all financial flows to be consistent with low-carbon, climate-resilient development. Given the importance of avoiding runaway climate change, it's imperative for developing countries to address climate change through domestic action. Climate change is a whole-economy problem. Tackling it will require looking at every financial decision through a climate lens. As countries move to implement the Paris Agreement, they should consider whether their decisions result in greenhouse gas emissions or will they reduce them? Will they improve resilience to climatic shocks or worsen vulnerability? They need to track and understand domestic flows of finance so

they can better align them with their climate goals, identify gaps, and unlock the private investment needed for green, resilient development.

With the Enhanced Nationally Determined Contributions (ENDC), the Government of the Republic of North Macedonia aims to reduce GHGs emissions by 51% by 2030 for which 63 mitigation policies and measures (PAMs) have been foreseen, which require EUR 25.03 billion.

A national Climate Budget Tagging methodology was created to monitor and direct public climate finance (Upadhya, 2021). By applying the combined objective-based cost component approach of CBT methodology, we estimated that for the representative year 2018, the total budget of the climate-relevant programmes is 585,795,000 MK denars, of which 311, 757,000 MK denars is allocated for mitigation while 41,863,000 MKD is for adaptation purpose. Accordingly, about 48.6 percent of the budget is allocated for highly relevant activities, 28.6 percent for medium relevant activities, and 22.7 percent for low relevant activities. The City of Skopje is strictly committed to combating climate change, having the appropriate strategy for this.

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