



FINANCING OPTIONS FOR SECTORAL ADAPTATION PROGRAMMES

CONTEXT

Development mandate

To support the integration of climate risks into long-term economic and adaptation planning as well as evidence-based policymaking for adaptation to climate change in Georgia, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMUV) has commissioned the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) with the project Climate Resilient Economic Development (CRED) to support the Ministry of Economy and Sustainable Development (MoESD) and other governmental institutions of Georgia with modelling the macroeconomic effects of selected adaptation programmes.

Selection of two adaptation programmes

The Green Werk has been contracted to analyse climate adaptation finance flows to Georgia, to identify financing options for selected adaptation programmes, and to develop two Project Idea Notes (PINs) that can be promoted to bilateral and multilateral development and financing partners by the beneficiaries of the project (i.e., Ministry for Environment and Agriculture - MEPA, Ministry of Economy and Sustainable Development - MoESD, the National Agency for Sustainable Land Management and Land Use Monitoring (NLA), UNDP Georgia etc.). Project partners in Georgia have selected to develop options for several policy scenarios, including investments in windbreaks, sustainable forest management and river flood protection (see Table 1). Two policy scenarios were further followed and concerted into Project Idea Notes (PINs): (i) rehabilitation and restoration of windbreaks and (ii) investment in river flood protection measures.

CONTENTS

- 1. ADAPTATION PRIORITIES AND FINANCING NEEDS IN GEORGIA 1
 - 3.1. Selected adaptation priorities in Georgia 1
 - 3.2. Adaptation funding needs in Georgia 3
- 4. IDENTIFYING FINANCING OPTIONS FOR SELECTED ADAPTION PROGRAMMES 4
 - 4.1. Overcoming key barriers for adaptation programmes in selected priority sectors 4
 - 4.1.1. Windbreaks 4
 - 4.1.2. Flood protection 6
 - 4.2. Opportunities of international climate finance for adaptation programmes in Georgia 7

1. ADAPTATION PRIORITIES AND FINANCING NEEDS IN GEORGIA

1.1. Selected adaptation priorities in Georgia

Georgia faces significant climate risks, including extreme weather events such as heatwaves, droughts, extreme precipitation events and floods, which are projected to intensify under future climate scenarios. These hazards threaten key economic sectors, particularly agriculture, forestry, and other land use (AFOLU) by reducing productivity, damaging infrastructure, and increasing costs for adaptation.

Published by:



Supported by:



based on a decision of the German Bundestag

Table 1: Brief description of relevance and scope of selected adaptation policy scenarios.

Adaptation programmes	Brief description of relevance and scope
Windbreaks	The installation of windbreaks and ensuring their efficient operation could be a solution for reducing the impact of wind erosion in Georgia. Windbreaks can decrease wind speed over crops. By acting as natural barriers, they can provide several benefits, including soil protection, improved crop yields, reduced crop damage, increased water use efficiency, biodiversity, and other environmental benefits. One of the main threats to the maintenance of windbreaks is the traditional residue burning, which needs to be addressed to ensure the effective functioning of windbreaks as a tool to reduce the impact of climate hazards on the agricultural sector.
Flood Protection	The primary goal of flood protection measures is to reduce private and public losses from flooding, aiming to maximise net economic benefits and to reduce the social and economic costs caused by flooding. In general, flood management measures are divided into structural and non-structural categories. Structural measures, such as dams, gabions, dikes, levees, reservoirs, embankments, diversion channels, etc., aim to keep water away from the population to reduce flood risks. Non-structural measures, including policies, public awareness campaigns, flood warnings, education, evacuation, land use adjustment, aim to keep people away from the water to reduce flood vulnerability.

Source: GIZ, CRED scenario documentation

Agriculture, a vital sector employing over 40% of Georgia's workforce, is highly vulnerable to shifting climatic conditions. Extreme weather events are already shifting agricultural climatic zones, reducing crop yields, and increasing irrigation demands. The investment in the rehabilitation and replanting of windbreaks has been identified as an effective solution to counteract these challenges. This measure not only reduces damage to crops through strong winds but also enhances agricultural productivity.

River flood risks, both pluvial and fluvial, pose a significant threat to Georgia's infrastructure, economy, and communities. Floods risks are exacerbated by climate change, which intensifies extreme precipitation events and alters hydrological patterns. Adverse impacts are particularly severe in urban areas and agricultural zones, where flooding disrupts livelihoods, damages critical infrastructure, and increases economic vulnerability. Adaptation programmes such as improved flood management (risk zoning) and early warning systems, enhanced infrastructure, and the integration of climate-resilient designs into urban planning (construction regulations) are crucial.

E3.ge climate macroeconomic modelling.

Adaptation programmes not only increase climate and disaster resilience, reduce loss and damage, but also enhance economic productivity by contributing positively to GDP and employment, as econometric modelling demonstrates. The e3.ge model serves as a critical tool for assessing the economy-wide impacts of climate change and adaptation programmes. By integrating direct, indirect, and induced effects within a dynamic input-output framework, it enables policymakers to quantify the benefits of resilience investments across sectors. Scenario analyses guide decision-making by comparing outcomes under varying assumptions about future climate events and adaptation strategies. Thus, e3.ge modelling suggests that adaptation programmes proposed in the Project Idea Notes (PINs) protect and stimulate the economic performance of Georgia by up to 0.4% (Windbreaks) and up to 0.3% (Flood Protection) annually, as climate change progresses.

Figure 1: Climate change scenario (SSP5-8.5) without windbreak measures.

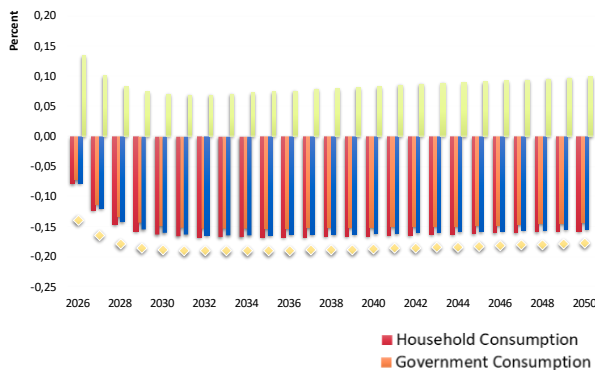
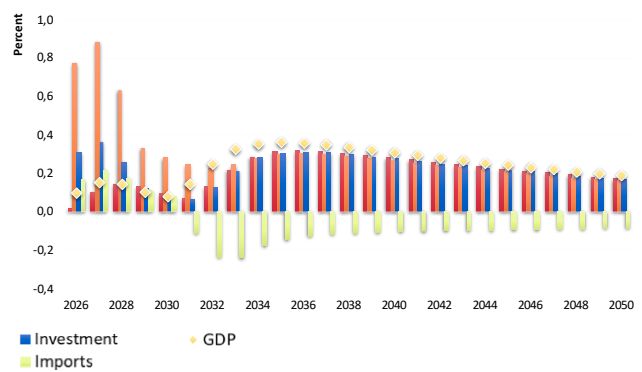


Figure 2: Climate change scenario (SSP5-8.5) with windbreak measures.



Source (Figure 1-2): GIZ, CRED/ GWS based on e3.ge, April 2025

Figure 3: Climate change scenario (SSP5-8.5) without flood risk management measures.

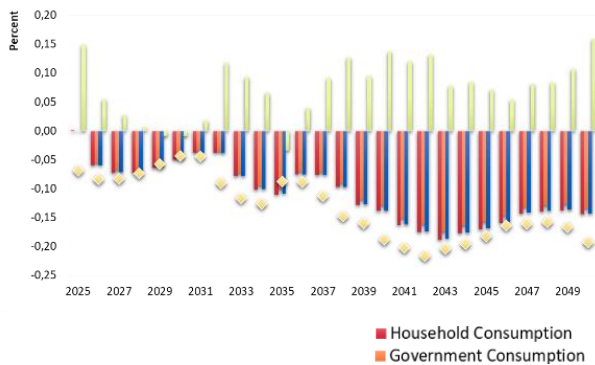
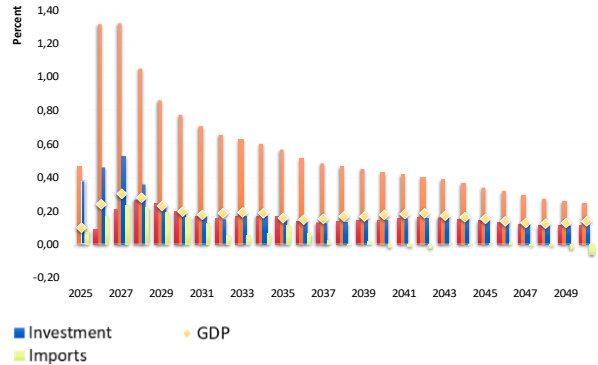


Figure 4: Climate change scenario (SSP5-8.5) with flood risk management measures.



Source (Figure 3-4): GIZ, CRED/ GWS based on e3.ge, April 2025

1.2. Adaptation funding needs in Georgia

Climate adaptation finance falls short in critical sectors. According to the analysis done by The GreenWerk, Georgia's adaptation finance landscape reveals critical funding gaps within the AFOLU (Agriculture, Forestry, and Other Land Use) sector and flood disaster risk management. Between 2017 and 2022, Georgia received approximately USD 3.5 billion in international public climate finance, with 27% (USD 918 million) allocated to adaptation programmes. The agricultural sector received USD 57 million, primarily through debt instruments (48%), while forestry received USD 44.2 million exclusively via grants. Georgia's NDC Financing Strategy requires USD 174 million for agriculture and USD 58 million for forestry by 2030 to meet unconditional climate goals. Current flows fall utterly short, highlighting a reliance on international grants and debt mechanisms ill-suited for long-term resilience. Moreover, disaster risk reduction and flood-related sectors – requiring an annual average loss (AAL) financing of USD 36 million

and structural investment measures like embankments and early warning systems – received no direct international climate finance during this period, despite UNDP's recent initiatives in flood risk management.

Private sector contributions to adaptation globally are negligible, and Georgia mirrors this trend, with minimal private finance directed towards largely perceived public goods like windbreaks or flood protection infrastructure: green bonds and loans totalled USD 1.39 billion (2020–2023) but focused on energy rather than AFOLU or flood resilience. International providers like the Asian Development Bank (ADB) and World Bank predominantly provide mitigation financing, while adaptation projects in agriculture and forestry rely on smaller grants from entities like the Adaptation Fund or other bilateral development partners.

Innovative financing mechanisms are proposed as potential solutions to bridge these gaps. These include blended finance models and certification schemes for carbon

sequestration. Public-private partnerships could also play a role in sustainable agricultural practices and sustainable land management.

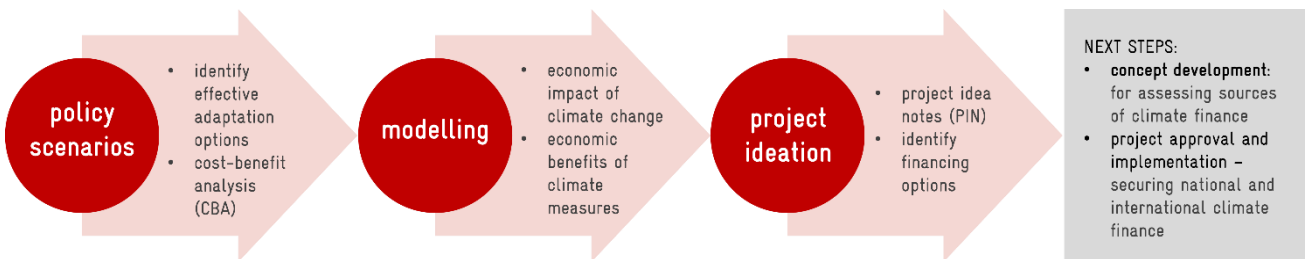
A **gap assessment** synthesised from a published regulatory impact assessment¹ and the research conducted by The GreenWerk underscores systemic challenges. Flood management lacks dedicated funding pipelines, relying on reactive disaster response rather than proactive and ex-ante infrastructure investments. AFOLU sectors struggle to attract private investment due to low returns and regulatory gaps, despite their critical role in GDP and employment. Recommendations emphasise scaling concessional finance and exploring innovative mechanisms like climate risk insurance, contingent disaster finance, and blended finance models to bridge the USD 1.8 billion conditional NDC funding gap. Strengthening coordination between ministries and aligning sector strategies with adaptation goals² will be vital to securing Georgia's climate resilience.

2. IDENTIFYING FINANCING OPTIONS FOR SELECTED ADAPTION PROGRAMMES

2.1. Overcoming key barriers for adaptation programmes in selected priority sectors

The **GIZ CRED programme in Georgia**, through detailed assessments and stakeholder consultations, has identified the critical intervention areas: (1) the rehabilitation and restoration of windbreaks, (2) the investment into river flood protection measures, and (3) sustainable forest management, based on the result from preliminary economic modelling and related policy scenario development. The GreenWerk had been tasked to integrate intervention areas (1) and (2) into the assignment. For each, a PIN aiming to access international climate finance has been developed (see Figure 5). This section outlines the key barriers, proposed outputs, and the financial structure needed to deliver transformational change.

Figure 5: Process of developing the PINs



Source: GIZ, CRED own figure

2.1.1. Windbreaks

Challenges. Climate change without adaptation programmes is expected to adversely affect the agricultural sector in Georgia. The annual loss in crop yields due to wind erosion will be significant and extreme winds could eradicate up to 5% of harvest once in five years. Further, unsustainable agricultural practice like the burning of crop residue in field further deteriorate the quality and fertility of soil. The restoration and rehabilitation of windbreaks in exposed municipalities in Georgia is an impactful measure to avert those negative climate impact. However, this faces several key challenges, including regulatory, technical, institutional, economic, and financial barriers. The lack of clear ownership

and legal status for windbreaks complicates their management and protection. Coordination issues arise from unclear distribution of responsibilities among government entities, municipalities, and private landowners. Additionally, a systematic national inventory has not yet been finalised and planning frameworks for windbreaks on national and municipal levels often lack the technical and financial resources to implement rehabilitation measures. Farmers' limited awareness of windbreak benefits and sustainable agricultural practices further exacerbates the problem, as does the fragmented nature of land ownership, which hinders cohesive strategies across larger areas. Financial constraints, such as limited state budget allocations and farmers'

¹ Published by the ISEP Policy Institute in February 2019.

² At the time of report writing, the Government of Georgia (via MEPA) has not yet commenced the development of an updated NAP, while the only NAP for the agricultural sector dates to 2017.

restricted access to long-term financing, also impede progress.

Outputs. To address these challenges, the project emphasises a multi-layered approach. Regulatory refinements will enhance the regulatory framework for windbreaks, including their registration and management status. A national inventory system shall be finalised using advanced technologies like remote sensing and artificial intelligence to facilitate planning and monitoring. Capacity building initiatives will target both public institutions and farmers to enhance technical expertise and foster sustainable agricultural practices. These efforts aim to shift attitudes toward windbreaks by demonstrating their economic and ecological benefits.

Financing requirements. Financing requirements for this initiative are substantial and need to be strategically structured. The project involves a mix of public and private investments estimated at USD 406–411 million, with an

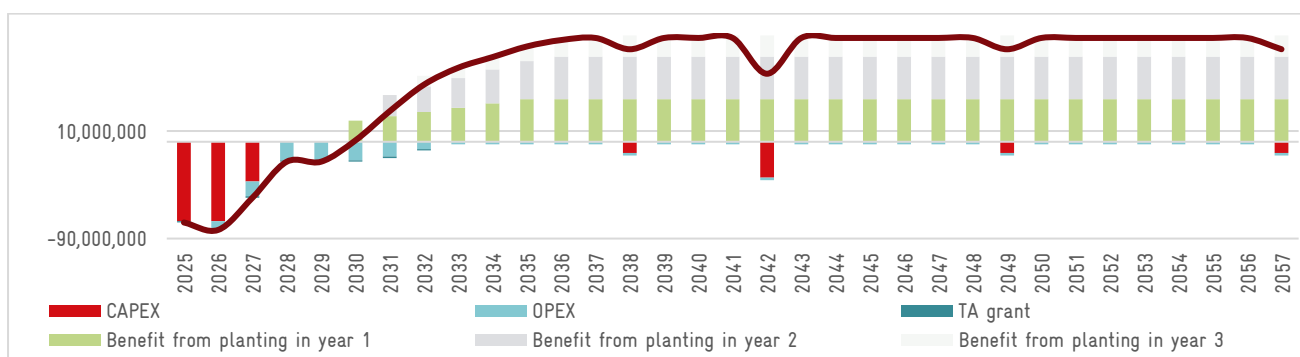
additional USD 7–10 million allocated for technical assistance. Public funds will primarily support infrastructure investments in windbreak rehabilitation and operational expenditures, while private sector contributions will focus on private windbreak investments and sustainable agricultural practices. Innovative financial mechanisms, such as carbon market certification for sequestration potentials, will generate additional revenue streams. These certificates can be traded on international markets in line with Paris Agreement Articles 6.2 and 6.4 or used to access green finance options like concessional loans or thematic bonds.

Results. Overall, the project aims to protect approximately 200,000 hectares of agricultural land through the rehabilitation of ca. 12,000 hectares of windbreaks in 18 highly exposed municipalities. By addressing systemic barriers and leveraging both public and private financing, it seeks to enhance agricultural resilience against climate change while contributing to economic growth through improved land productivity and access to green financial markets.

Table 2: High-level cost estimation for components in million USD

Component	Component name	Optional / essential	Cost estimation in USD
C1	Institution building on national level	Essential	0.75-1.25
C2	Capacity building on sub-national level	Essential	0.75-1.25
C3	Public and private investment	Essential	400
C4	Sustainable farm practice	Optional	2-3
C5	Economic incentives financing transition	Optional	3-5
Total			406 - 411

Figure 5: Cost-benefit-analysis and theoretical cashflow of investment in USD.



CAPEX = capital expenditures (investment costs), OPEX = operational expenditures (operational and maintenance costs), TA = technical assistance (trainings, capacity building, institution building)

Table 3: Key project parameters.

Number of municipalities	18	Total TA costs in million USD	7-10
Protected area (ha)	196,294	Total benefit in million USD	2,539
Windbreak area (ha)	11,914	Cost/Benefit ratio	0.16
Number of farmers	78,500	Av. CAPEX per ha windbreaks in USD	20,900
Duration of investment and rehabilitation phase (in yrs)	8	Av. annual OPEX per ha windbreak for yrs 2-8 in USD	1,120
Repayment after year	6	Av. annual OPEX per ha windbreak for yrs 9-33 in USD	190
Total CAPEX in million USD	249	Av. benefit over 33 years / protected hectare in USD	12,935
Total OPEX in million USD	151	Av. cost over 33 years / protected hectare in USD	2,038

CAPEX = capital expenditures (investments), ha = hectares, OPEX = operational expenditures (operations and maintenance), yrs = years

2.1.2. Flood protection

Challenges. The enhancement of river flood protection through effective and climate-sensitive disaster risk management in Georgia faces several key challenges, including institutional, financial, and technical barriers. Institutional challenges stem from fragmented responsibilities across agencies, limited technical capacity, and the absence of unified methodologies for flood risk assessment and management. Financial constraints are significant, with high costs associated with infrastructure investments, data collection, and sustained funding for flood risk zoning measures. Technical barriers include outdated Soviet-era infrastructure, insufficient high-resolution topographic data, and limited computing capacity for advanced flood modelling. Additionally, gaps in hydrological and meteorological data and hardware hinder effective forecasting and early warning systems.

Outputs. To address these challenges, the proposed intervention aims to develop comprehensive multi-hazard risk management plan (MHRP) for the Mtkvari river basin³, integrating flood risk zoning data and hazard-specific construction standards into public investment plans. Investments in physical infrastructure such as flood barriers, drainage systems, and early warning systems are prioritised. The project also emphasises capacity building for government entities to enhance technical expertise in flood risk modelling and management. Furthermore, it seeks to involve the private sector by promoting risk transfer solutions such as subsidised agricultural and real estate insurance products.

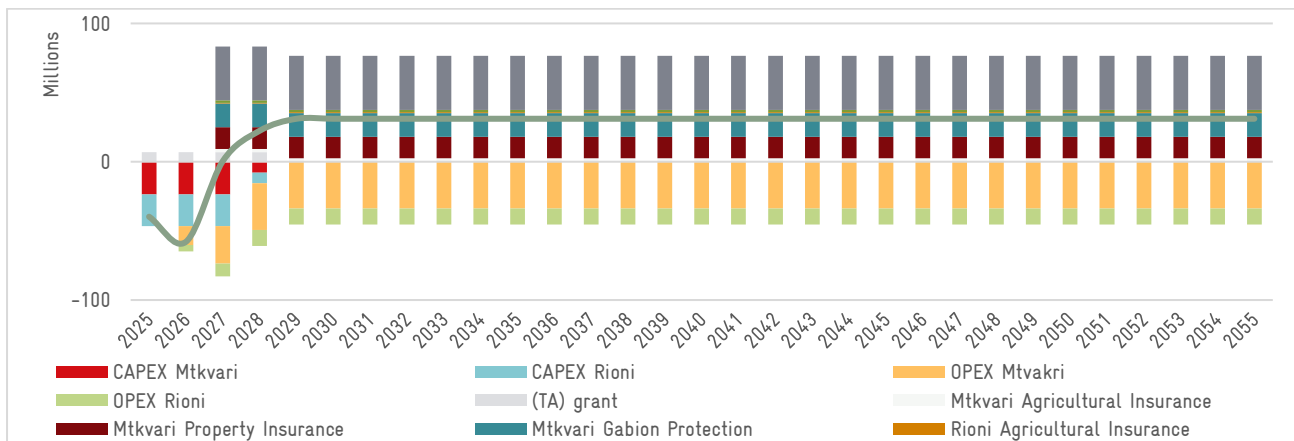
Financing requirements. Financing requirements are substantial, reflecting the scale of intervention needed to reduce vulnerability to flood hazards effectively. Investments on flood protection and early warning infrastructure require for both river basin USD 155 million with an investment period of four years. The accompanying technical assistance requires USD 27 million, and the operational costs require approximately USD 100 million for the 4 years.

Table 4: High-level cost estimation for components.

Component	Component name	Optional / essential	Cost estimation in million USD
C1	TA for institution and capacity building	Essential	27
C2	Infrastructure investment	Essential	155
C3	Operational cost (4-year project term)	Essential	100*
* further-on: \$45m annually		Total	282

³ A MHRP for the Rioni river basin has been developed by UNDP.

Figure 7: Cost-benefit-analysis and theoretical cashflow of investment in USD.



AAI = average annual loss, CAPEX = capital expenditures (investment costs), OPEX = operational expenditures (operational and maintenance costs), TA = technical assistance (trainings, capacity building, institution building)

Table 5: Key project parameters

Duration of investment phase (in yrs)	4
Repayment after year	7
Total CAPEX in million USD	155
Total 4-yr OPEX in million USD	100
Total TA costs in million USD	27
Total benefit in million USD	2,218
Cost/Benefit ratio	0.74
Return on Investment	0.35
IRR	23%

CAPEX = capital expenditures (investments), IRR = internal rate of return, OPEX = operational expenditures (operations and maintenance), TA = technical assistance, yr(s) = year(s)

2.2. Opportunities of international climate finance for adaptation programmes in Georgia

Innovative financing. The GIZ CRED project in Georgia identified two specific climate adaptation investment measures and developed implementation concepts (PINs) for those. Economic analyses of these interventions confirmed economic viability under certain conditions and underline a significant financial requirement

that need a coordinated support from multilateral and bilateral development partners. The two concepts recommend various innovative financing mechanisms, i.e.:

- › Seek partnerships between Multilateral Development Banks (commercial lending) and global environment or climate funds (grants) to attain blended concessional adaptation loans;
- › Integrate carbon sequestration certificates for windbreak investments and sustainable agricultural practice to generate financial incentives for government and private investors;
- › Promote subsidised idiosyncratic insurance solutions for agricultural or real estate flood risks to promote private sector risk transfer solutions;
- › Structuring infrastructure investment packages by regions or municipalities to achieve manageable investment sizes.

Validation meetings. The two project concepts were validated in the context of technical meetings with each of the following government institutions in April 2025: MEPA, NLA, and MoESD. The discussions confirmed a strong interest for the agriculture-PIN. In the future, the Ministry of Regional Development (MoRD) as well as Ministry of Infrastructure (MoI)⁴ will be responsible for river flood risks infrastructure investments and management, and should familiarise themselves with the results of the CRED project. Furthermore, the PINs should be validated by the Ministry of Finance (MoF) since sovereign borrowing and public

⁴ In April 2025, Parliament of Georgia has approved the reorganisation of the Ministry of Regional Development and Infrastructure, with the aim of establishing two separate entities: the Ministry of Regional Development and the Ministry of Infrastructure.

subsidy mechanisms for idiosyncratic insurance solutions are in the purview of the MoF.

National Adaptation Plan (NAP). The Government of Georgia at present embarks to develop an updated multi-sector National Adaptation Plan (NAP) with the support of GCF and UNDP. The process is envisaged to start in the second quarter of 2025. The Government of Georgia is strongly advised to integrate the two project concepts (PINs), the e3.ge macroeconomic model, and the developed policy recommendations into the formulation process of the NAP.

GCF Country Programme. Furthermore, the Government of Georgia through the MEPA is about to review the GCF Country Programme in 2025. In this context, the Climate Change Unit of MEPA is advised to integrate the developed PINs and policy recommendations into the updated country programme.

Sovereign investment. Finally, partner institutions within the Government of Georgia (i.e., MEPA, MoESD, MoRD, MoI, MoF) are encouraged to approach Multilateral Development Banks (ADB, WBG) expressing their interest into a cooperation according to the investment concepts to assure appropriate integration of such interventions into MDBs' investment pipelines. In addition, further feasibility assessments and capacity building measures are required to

be conducted, while MDBs avail over TA means (grants) to do so.

Limited GIZ support. Due to the ending of the GIZ CRED project in summer 2025, GIZ may eventually – through the mandate of other similar on-going projects – facilitate capacity building, technical assistance, and policy advice to Georgian partner institutions presumably until end of 2025. Relevant needs and requirements shall be discussed in near time to assure appropriate resource allocation.

The way forward. The Government of Georgia is recommended to take the following steps, aiming at converting the PINs into financed adaptation programmes:

- › Integrate the described adaptation programmes into the GCF Country Program;
- › Align and coordinate the PIN with all relevant government entities;
- › Approach multilateral development banks (i.e., WB and ADB), seeking alignment with their 3-year investment pipelines to solicit sovereign lending;
- › Approach GCF and other global environment or climate fund to solicit blended grant funding for concessional lending;
- › Development of full-project proposals encompassing all funding partners.

Published by
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn, Germany

Address
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Köthener Str. 2
10963, Berlin, Germany
T +49 61 96 79-0
F +49 61 96 79-11 15
E info@giz.de
I www.giz.de/en

Project description
Policy Advice for Climate Resilient Economic Development

Project manager
Dr. Sebastian Homm
sebastian.homm@giz.de

This project is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) supports this initiative on the basis of a decision adopted by the German Bundestag.

This factsheet was elaborated by the expert of the international consultancy "the greenwerk." eGbR within the global programme "Policy Advice for Climate Resilient Economic Development", implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV).

The contents of this factsheet are the sole responsibility of the authors and can in no way reflect the official opinion of the GIZ project.

Author
Branko Wehnert, Tbilisi



Editor
Mikheil Khuchua, Tbilisi

Design and layout
Alvira Yertayeva, Astana

Photo credits/sources
©pexels

Germany 2025