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# Scaling up Climate Adaptation Finance in Europe and Central Asia

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# Contents

|                                                                                                                                      |            |
|--------------------------------------------------------------------------------------------------------------------------------------|------------|
| <i>Abbreviations .....</i>                                                                                                           | <i>v</i>   |
| <i>Acknowledgments.....</i>                                                                                                          | <i>vi</i>  |
| <i>Executive Summary .....</i>                                                                                                       | <i>vii</i> |
| <b>Section 1. Growing Climate Risks in Europe and Central Asia Call for Adaptation Investments .....</b>                             | <b>1</b>   |
| <b>Section 2. How Much Adaptation Finance Is Needed in Europe and Central Asia and How Do Needs Compare with Finance Flows?.....</b> | <b>5</b>   |
| 2.1. What are the adaptation investment needs in Europe and Central Asia?.....                                                       | 5          |
| 2.2. What have recent adaptation finance flows looked like in Europe and Central Asia? .....                                         | 8          |
| <b>Section 3. How Ready Is Europe and Central Asia to Close the Adaptation Finance Gap?.....</b>                                     | <b>11</b>  |
| 3.1. How well-prepared is Europe and Central Asia to enable A&R investment? .....                                                    | 12         |
| 3.2. How well-prepared is Europe and Central Asia to mobilize finance for adaptation? .....                                          | 15         |
| 3.3. What are the main barriers to adaptation investment in Europe and Central Asia? .....                                           | 18         |
| <b>Section 4. What Returns Can Be Expected on Adaptation Investments? .....</b>                                                      | <b>18</b>  |
| <b>Section 5. What Financing Modalities Exist? An Adaptation Finance Typology for Europe and Central Asia .....</b>                  | <b>22</b>  |
| <b>Section 6. How Can Adaptation Finance Be Increased in Europe and Central Asia? .....</b>                                          | <b>26</b>  |
| 6.1. Increasing demand for adaptation finance: establishing the conditions for adaptation investments.....                           | 26         |
| 6.2. Mobilizing public finance and private capital for adaptation investments.....                                                   | 33         |
| <b>Section 7. Conclusion and Country Priorities .....</b>                                                                            | <b>43</b>  |
| <b>References .....</b>                                                                                                              | <b>45</b>  |
| <b>Annex: Applying the Adaptation Finance Typology to Armenia and Türkiye.....</b>                                                   | <b>47</b>  |

## Boxes

|   |                                                                                                                        |    |
|---|------------------------------------------------------------------------------------------------------------------------|----|
| 1 | Limitations of adaptation investment needs assessments . . . . .                                                       | 7  |
| 2 | Overview of the A&R Readiness Assessment and overall Europe and Central Asia results. . . . .                          | 12 |
| 3 | Triple Dividends of Climate Resilience . . . . .                                                                       | 20 |
| 4 | Ireland's National and Sectoral NAP Process (2019–2025). . . . .                                                       | 32 |
| 5 | Switzerland's Ecological Direct Payments System - transforming agricultural subsidies for climate resilience . . . . . | 35 |
| 6 | Results-based financing for adaptation . . . . .                                                                       | 37 |
| 7 | EBRD Climate Resilience Bonds - pioneering dedicated adaptation finance . . . . .                                      | 39 |
| 8 | Natural Capital Finance Facility - Blending public and private capital for ecosystem resilience . .                    | 42 |

## Figures

|    |                                                                                                                                                                                |    |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1  | Count of climate-related natural disasters in Europe and Central Asia by 20-year period (1901–2022) . . . . .                                                                  | 1  |
| 2  | Share of population exposed to climate hazards (2021) . . . . .                                                                                                                | 1  |
| 3  | Climate impact on crop production under alternative composite climate scenarios in Armenia (left) and Poland (right). . . . .                                                  | 3  |
| 4  | Percent change in GDP from RCP 4.5 climate scenario relative to 2050 baseline in World Bank CCDRs. . . . .                                                                     | 5  |
| 5  | Adaptation investment needs as a percentage of GDP (left) and sectoral breakdown for Europe and Central Asia (right), as reported by official country communications . . . . . | 6  |
| 6  | Adaptation investment needs reported in World Bank Europe and Central Asia CCDRs . . . . .                                                                                     | 6  |
| 7  | Public-private share in adaptation investment needs as identified in selected CCDRs . . . . .                                                                                  | 8  |
| 8  | Average adaptation finance flows for Europe and Central Asia between 2021 and 2022. . . . .                                                                                    | 10 |
| 9  | Breakdown of adaptation finance in Europe and Central Asia by instrument 2021–22. . . . .                                                                                      | 10 |
| 10 | Sectoral breakdown of MDB adaptation finance in Europe and Central Asia . . . . .                                                                                              | 11 |
| 11 | BCRs of selected DRM and adaptation measures in literature. . . . .                                                                                                            | 19 |
| 12 | Benefit-cost ratio of investments in water resources, agriculture, and land restoration. . . . .                                                                               | 20 |
| 13 | Estimated indirect losses to households of Middle Corridor countries in 2030 due to a one-week disruption of Middle Corridor railway sections . . . . .                        | 21 |

## Tables

|    |                                                                                                                                                       |      |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1  | Summary of recommendations and priority countries . . . . .                                                                                           | xiii |
| 2  | Adaptation finance per region . . . . .                                                                                                               | 9    |
| 3  | Summary results for the subset of categories most relevant for adaptation finance from A&R Readiness Assessments in Europe and Central Asia . . . . . | 13   |
| 4  | Adaptation finance profile of countries of Europe and Central Asia . . . . .                                                                          | 16   |
| 5  | Eligibility criteria for multilateral climate funds . . . . .                                                                                         | 17   |
| 6  | Main barriers to adaptation investments in Europe and Central Asia . . . . .                                                                          | 19   |
| 7  | Adaptation Finance Typology for Europe and Central Asia . . . . .                                                                                     | 23   |
| 8  | Summary of recommendations and priority countries . . . . .                                                                                           | 44   |
| 9  | Armenia—Outline application of the adaptation investment framework on the 2021 NAP and 2024 CCDCR . . . . .                                           | 48   |
| 10 | Türkiye—Outline application of the adaptation investment framework on the 2024–2030 NAP and 2022 CCDCR . . . . .                                      | 51   |

# Abbreviations

|        |                                                       |           |                                                                                    |
|--------|-------------------------------------------------------|-----------|------------------------------------------------------------------------------------|
| A&R    | Adaptation and Resilience                             | IKI       | International Climate Initiative<br>(Internationale Klimaschutzinitiative)         |
| ADB    | Asian Development Bank                                | ILO       | International Labour Organization                                                  |
| AF     | Adaptation Fund                                       | KfW       | Kreditanstalt für Wiederaufbau                                                     |
| ATDF   | Armenian Territorial Development Fund                 | IMF       | International Monetary Fund                                                        |
| BCDP   | Bangladesh - Climate and Development Partnership      | ISSB      | International Sustainability Standards Board                                       |
| BCR    | Benefit-Cost Ratio                                    | LMICs     | Lower-Middle-Income Countries                                                      |
| CAIP   | Climate Adaptation and Investment Planning            | MDB       | Multilateral Development Bank                                                      |
| CBT    | Climate Budget Tagging/Tracking                       | NAMA      | Nationally Appropriate Mitigation Action                                           |
| CCDR   | Country Climate and Development Report                | NAP       | National Adaptation Plan                                                           |
| CFC    | Climate Finance Center                                | NCFF      | Natural Capital Finance Facility                                                   |
| CIF    | Climate Investment Fund                               | ND-GAIN   | Notre Dame Global Adaptation Index                                                 |
| CPI    | Climate Policy Initiative                             | NFIP      | National Flood Insurance Program                                                   |
| CSA    | Climate-Smart Agriculture                             | ODA       | Official Development Assistance                                                    |
| DFA    | Development Foundation of Armenia                     | OECD      | Organisation for Economic Co-operation and Development                             |
| DFI    | Development Finance Institution                       | PES       | Payments for Ecosystem Services                                                    |
| DRM    | Disaster Risk Management                              | PPCR      | Pilot Program for Climate Resilience                                               |
| DRR    | Disaster Risk Reduction                               | PPF       | Project Preparation Facility                                                       |
| EBRD   | European Bank for Reconstruction and Development      | PPP       | Public-Private Partnership                                                         |
| EC     | European Commission                                   | QALY      | Quality-Adjusted Life Year                                                         |
| ECA    | Europe and Central Asia                               | R&D       | Research and Development                                                           |
| EIA    | Environmental Impact Assessment                       | RRS       | Resilience Rating System                                                           |
| EIB    | European Investment Bank                              | RSF       | Resilience and Sustainability Facility                                             |
| EM-DAT | Emergency Events Database                             | SMEs      | Small and Medium Enterprises                                                       |
| ENA    | Electric Networks of Armenia                          | SOE       | State-Owned Enterprise                                                             |
| EU     | European Union                                        | TCFD      | Task Force on Climate-related Financial Disclosures                                |
| GCF    | Green Climate Fund                                    | TRANSLATE | Tool for Regional Assessment of Climate Impacts and Land Use Adaptation Strategies |
| GCM    | Global Circulation Model                              | TKYB      | Development and Investment Bank of Türkiye                                         |
| GDP    | Gross Domestic Product                                | UMIC      | Upper-Middle-Income Country                                                        |
| GEF    | Global Environment Facility                           | UNDP      | United Nations Development Programme                                               |
| GFC    | Green Finance Centre                                  | UNEP      | United Nations Environment Programme                                               |
| GPBP   | Geospatial Planning and Budgeting Platform            | UNFCCC    | United Nations Framework Convention on Climate Change                              |
| HIC    | High-Income Country                                   | WITS      | World Integrated Trade Solution                                                    |
| IBRD   | International Bank for Reconstruction and Development | WRI       | World Resources Institute                                                          |
| ICT    | Information and Communication Technology              |           |                                                                                    |
| IFRS   | International Financial Reporting Standards           |           |                                                                                    |

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# Executive Summary

**The frequency and severity of costly climate-related events such as droughts, desertification, floods, heatwaves, and wildfires are increasing in Europe and Central Asia.** For example, parts of Europe and Central Asia are projected to see average temperatures rise by 5°C or more by the end of the century—twice the global average. Such severe climate events damage infrastructure, decrease productivity, disrupt supply chains, and degrade people's health and work prospects. In addition, slow-onset events such as rising temperatures and shifting precipitation patterns carry their own impacts. The increase in climate impacts could have substantial economic implications, requiring strategic investments to adapt and increase resilience.

**Countries in Europe and Central Asia face high adaptation investment needs relative to their GDP but receive among the lowest levels of adaptation finance globally**

**Countries of Europe and Central Asia could protect and boost their development pathways by spending 1–5 percent of gross domestic product (GDP) annually on adaptation, mostly in resilient infrastructure and agriculture systems.** Estimates vary in their coverage and completeness and are therefore not easily comparable but range between 1.35 and 3.5 percent of annual GDP by 2030 in the United Nations Environment Programme (UNEP) Adaptation Gap Report (2023) and

1 and 5 percent of annual GDP by 2050 for most countries in the region in the World Bank Country Climate and Development Reports (CCDRs).<sup>1</sup> The investment needs expressed in Europe and Central Asia's National Adaptation Plans (NAPs) are the third-highest globally after South Asia and Sub-Saharan Africa. Both sources identify the water sector, agri-food systems, land restoration and forestry, and resilient cities and settlements as requiring the largest investments.

**Adaptation investments can reduce or eliminate climate impacts, generating high economic internal rates of return averaging 25–27 percent.** Most adaptation investments have been found to have benefit-cost ratios in the range of 2–10. Their high economic internal rates of return stem from avoided losses (such as reduced damage from climate-related disasters and slow-onset impacts) and economic gains (such as improved productivity or operational efficiency). In addition to these returns, adaptation can deliver substantial social (for example, enhanced community health, safety, and livelihoods) and environmental (for example, biodiversity protection and ecosystem resilience) dividends that are harder to monetize but valuable to society.

**However, since these high financial, economic, and noneconomic benefits do not typically accrue solely to the investor but**

1. Assessments of investment needs for adaptation cover different sectors, time horizons, and scopes, and slightly different country groupings. The UNEP estimates are based on NAPs while the CCDR estimates are the result of modeling exercises. For details, see Box 1.

**are spread over many beneficiaries, not all adaptation investments can be funded purely from private sources.** While private companies and households usually invest in adaptation to protect their own operations and well-being, governments invest in resilience to protect many people and businesses at once. For example, stronger water systems and transport networks help communities and companies. Because these projects have diffused benefits, they usually need public funding. On the other hand, CCDRs estimate that 90–100 percent of investments in resilient agri-food systems, for example, can be private as they mostly generate benefits for farmers and agri-business firms. In addition, regulatory frameworks do not require most firms to assess their adaptation needs, meaning total investment needs in adaptation are likely underestimated.

**In spite of high investment needs and high returns, the adaptation finance gap in Europe and Central Asia is significantly wider than in other world regions, with private investment only playing a minimal role.** Between 2021 and 2022, using Climate Policy Initiative (CPI) numbers, total recorded adaptation finance in Europe and Central Asia represented 0.01 percent of GDP, compared to the 1–5 percent of GDP needed based on World Bank and UNEP assessments. Adaptation finance in Europe and Central Asia, measured as a share of GDP, is thus 1/12 that in East Asia and the Pacific and 1/20 that in Latin America and the Caribbean, for example. About 98 percent of recorded adaptation finance in Europe and Central Asia is publicly sourced, and 86 percent comes from multilateral and bilateral development finance institutions (DFIs), mostly in the form of non-concessional debt. Private finance, even if recorded, is likely underestimated, as many privately financed adaptation investments—such as measures to reduce risks to firms’ assets and

supply chains—are not systematically reported or tracked as adaptation finance.

**The mismatch between adaptation needs and finance flows stems from both a lack of expressed demand for finance and a lack of supply.** On the one hand, countries may not have put in place the institutions, regulations, and incentives that effectively support the *demand* for adaptation investments, with the result that an insufficient quantity of adaptation investment projects are planned and prepared, whether by the public or by the private sector. On the other hand, investments may have been defined and packaged but are not (all) being implemented because of an insufficient *supply* of adaptation finance—that is, the financial and public sectors fail to make sufficient capital available. In practice, both are relevant to some degree in most countries.

**Europe and Central Asia has made progress in building readiness for adaptation investments, but significant gaps remain**

**Despite progress, Europe and Central Asia’s ability to catalyze adaptation investment is still emerging and fragmented, with macro-fiscal risk management particularly lagging.** An assessment of readiness of 15 countries of Europe and Central Asia to enable adaptation investments scored the overall region as ‘emerging’, with considerable variation across countries. Across Europe and Central Asia, readiness to support private adaptation investment is slightly more advanced than readiness to support public investment. Notably, the weakest area is the capacity to manage climate-related financial and macro-fiscal risks, representing a critical barrier to scaling finance for adaptation.

## Six primary barriers limit adaptation investment

### Barriers that limit the demand for adaptation finance

- 1. Lack of granular, localized climate risk data and economic models.** Countries of Europe and Central Asia have made progress at the national level (for example, hydromet systems and disaster risk assessments), but gaps remain at the local scale. Many countries lack localized hazard maps, municipal-scale climate scenarios, and impact-based data. In Uzbekistan and Azerbaijan, weak real-time monitoring and limited human resources undermine forecasting capacity. In Central Asia more broadly, an absence of climate-smart agricultural data hampers investment planning. Without localized economic models, governments and firms struggle to price risk accurately, and investment flows are delayed or misallocated.
- 2. Weak regulatory frameworks and distorted price signals.** Regulations to mandate resilience in infrastructure and land use remain weak across Europe and Central Asia. Few countries have adopted comprehensive, government-wide resilience strategies. Land use and urban planning often do not incorporate climate risks; for instance, cities in the Western Balkans continue to approve development in flood-prone areas without risk-informed zoning. In addition, only Tajikistan has begun defining acceptable levels of residual risk for hazards such as urban flooding. In most other countries, ambiguity over whether the state, firms, or households should bear responsibility reduces incentives for proactive risk reduction. In addition, pricing structures in key
- sectors often disincentivize private sector adaptation. In Central Asia, heavily underpriced water reduces the returns on climate-smart irrigation. In the Western Balkans, underdeveloped and highly subsidized crop and flood insurance markets discourage risk-aware planning. For example, in Serbia and Bosnia and Herzegovina, subsidized agricultural insurance covers losses without incentivizing preventive measures, which discourages farmers from investing in resilient practices. Such distortions keep households and firms dependent on post-disaster assistance rather than proactive adaptation.
- 3. Limited fiscal preparedness and contingent liability management and weak integration of adaptation into budget processes.** Readiness to manage climate-related macro-fiscal impacts is lower in Europe and Central Asia than in any other World Bank region. Few countries have adopted green budgeting or climate budget tagging/tracking. Contingent liabilities from climate shocks are rarely incorporated into fiscal frameworks, leaving governments exposed to large post-disaster expenditures. For example, Moldova and Georgia still rely heavily on ad hoc budget reallocations or international emergency assistance after floods and droughts. The absence of financial strategies, such as catastrophe reserves, contingent credit lines, or climate risk insurance, limits the ability of governments to align fiscal policy with adaptation goals and to crowd in private capital. In addition, most European and Central Asian countries' NAPs' connections to investment and fiscal strategies are poor. Ministries of environment lead planning but often have weak links to finance ministries, undermining integration into public investment programs. This results in fragmented and uncoordinated

investments, such as climate-sensitive infrastructure projects without alignment to national adaptation priorities. Only a handful of countries—including Albania, Armenia, Bulgaria, Croatia, Moldova, and Serbia—have attempted to link NAPs to cost estimates and financing sources.

### Barriers that limit the supply of adaptation finance

4. **Shrinking budgets, fragmented concessional finance access, and high cost of capital due to weak credit ratings.** Rising debt levels, tightening fiscal space, and competing priorities have shrunk available public budgets. In addition, most countries of Europe and Central Asia have only limited access to concessional climate finance, since many are classified as upper-middle-income. Access is further fragmented across multiple multilateral climate funds (Global Environment Facility, Green Climate Fund, Adaptation Fund, and Climate Investment Fund) but with little adaptation funding mobilized compared to mitigation. For example, only the Kyrgyz Republic and Tajikistan have benefited from the CIF's Pilot Program for Climate Resilience. This limited and fragmented access makes it difficult to build consistent financing pipelines for adaptation investments. In addition, most countries of Europe and Central Asia that are not members of the European Union lack investment-grade sovereign credit ratings, raising the cost of sovereign bond issuances. Countries such as Bosnia and Herzegovina, Kosovo, Kyrgyz Republic, Moldova, North Macedonia, Tajikistan, and Turkmenistan currently face particular challenges in accessing capital markets at sustainable costs. This constrains governments' ability to finance resilience investments and limits crowding in of private investors.
5. **Limited financial sector capacity to manage climate risks.** Financial systems in Europe and Central Asia are at an early stage of readiness to incorporate climate risks. Few regulators require banks, insurers, or institutional investors to quantify exposures to climate and natural hazards, or to run climate stress tests. As a result, climate risks remain opaque, discouraging investment flows. Only five non-EU countries (Azerbaijan, Georgia, Kazakhstan, Uzbekistan, and Serbia) have developed or are developing sustainable finance taxonomies, but these often provide narrow or unclear definitions of adaptation. Insurance markets are underdeveloped, offering households and firms limited access to risk management instruments.
6. **A limited enabling environment to allow for the development and adoption of financing instruments that can aggregate adaptation investments and share risks.** Only a handful of sovereigns (for example, Romania, Türkiye) have green bond frameworks that adequately include adaptation as an eligible use of proceeds. Serbia and Uzbekistan provide only partial coverage. This limited integration into mainstream capital market instruments leaves adaptation financing outside the reach of larger pools of capital. Adaptation investments across the region remain fragmented and small in scale, often implemented as isolated projects without aggregation or structuring to meet institutional investor requirements. Finally, adaptation projects often have long lifetimes, uncertain and indirect returns, and high perceived risks, characteristics that make them a poor fit for existing private financial instruments. In the absence of tailored risk-sharing mechanisms, guarantees, or blended finance structures, private capital remains hesitant to enter adaptation finance.

## Priorities to increase adaptation investments in Europe and Central Asia

The following recommendations can be deployed to lift some of the main barriers to increasing adaptation investments in Europe and Central Asia. Where they have not been completed yet, the recommendations marked as 'High Priority' should be pursued first, as they determine the success of other recommendations.

### Strengthen the Climate and Economics Information Base (High Priority)

#### Challenge

Lack of granular, localized climate risk data and economic models impedes risk assessment, pricing, and investment planning.

#### Recommendations

- Improve national climate data infrastructure and public access to high-resolution hazard maps and forecasts.
- Support public-private platforms that convert climate projections into sector-specific decision support tools.
- Build public sector capacity to assess and quantify the economic benefits of adaptation, using tools such as the World Bank's Geospatial Planning and Budgeting Platform and Resilience Rating System.

### Reform the Policy and Regulatory Environment and Align Prices and Incentives to Support Adaptation

#### Challenge

Weak regulatory frameworks fail to mandate resilient infrastructure or incentivize risk reduction. Price signals in sectors such as water and insurance often disincentivize resilience investments.

#### Recommendations

- Integrate climate resilience into land use planning, building codes, and infrastructure standards.
- Require climate risk assessments in environmental impact assessments and public-private partnerships.
- Require business continuity planning in key sectors.
- Reform water tariffs to encourage efficiency while protecting vulnerable groups.
- Link insurance rates or deductibles to compliance with risk reduction measures (for example, France's CatNat system).
- Offer proactive incentives such as tax relief, fast-track permitting, or green bond support for adaptation investments.

### Strengthen Institutional Coordination for Adaptation Investment Planning and Integrate Adaptation into Fiscal Planning and Management (High Priority)

#### Challenge

Adaptation planning is led by ministries of environment, which have weak links to budget and investment processes managed by ministries of finance or center-of-government agencies. Without fiscal preparedness and assessment of climate-related contingent liabilities, adaptation investments remain fragmented, underfunded, and misaligned with national priorities.

#### Recommendations

- Link NAPs and other adaptation planning processes to national public investment management.
- Involve ministries of finance and planning more centrally in adaptation planning processes and include the private sector in the identification of investment priorities. Coordination can be led by a high-level government body, such as Armenia's Inter-Agency

Council or Singapore's National Climate Change Secretariat, to ensure cross-sectoral alignment and financing integration.

- External technical support, such as the Climate Adaptation and Investment Planning approach of the Asian Development Bank, can help facilitate interministerial coordination.
- Integrate climate risks into fiscal policy and macroeconomic planning through an assessment of climate-related contingent liabilities. Examples include Georgia's climate fiscal risk reporting to Parliament and Albania's International Monetary Fund Article IV assessment that prompted fiscal adaptation measures.
- Introduce climate budgeting to identify and track adaptation expenditures across sectors. Georgia and Serbia have begun tagging adaptation in national budgets; Austria's green budgeting approach offers a mature model that identifies ineffective or maladaptive spending.

### **Mobilize Domestic Public Resources and Optimize Access to International Concessional Finance**

#### **Challenge**

Public investment in adaptation is constrained by shrinking budgets, structural disincentives, and fragmented access to concessional finance. Many NAPs rely solely on grants, and concessional resources are not strategically deployed.

#### **Recommendations**

- Repurpose subsidies: Shift agricultural or energy subsidies toward ecosystem-based services and resilience investments. Switzerland's ecological direct payment system offers a scalable model, with 88 percent of farms receiving performance-based adaptation payments.
- Empower subnational governments: Provide cities and local authorities with funding, technical support, and the tools (for example, land value capture and local green bonds) to drive bottom-up investments.

- Prioritize concessional finance for non-revenue-generating or high-risk adaptation projects: Instruments such as the IMF's Resilience and Sustainability Trust or development policy lending of the International Bank for Reconstruction and Development can align reform incentives with finance. Concessional resources from the Global Environment Facility, the Green Climate Fund, or the Adaptation Fund should be used strategically.

### **Create Regulatory and Supervisory Enabling Environments for Adaptation Finance (High Priority)**

#### **Challenge**

Private capital is constrained by a limited capacity of the financial sector to manage climate risks, absent or unclear taxonomies, and narrow definitions of adaptation.

#### **Recommendations**

- Develop comprehensive sustainable finance taxonomies that include adaptation (for example, Climate Bonds Resilience Taxonomy).
- Promote sector-specific adaptation standards.
- Integrate adaptation into green and sustainable bond frameworks (for example, the European Bank for Reconstruction and Development's Climate Resilience Bond and UK Green Gilts).

### **Establish Investment Platforms and Project Preparation Support and Scale Blended Finance and Risk Mitigation Instruments**

#### **Challenge**

Adaptation investments are fragmented, small-scale, and not structured to meet investor requirements. Adaptation projects often have long time horizons, uncertain returns, and high-risk profiles.

## Recommendations

- Create national adaptation investment platforms to coordinate, package, and channel finance for resilient projects (for example, the Kyrgyz Republic Climate Finance Center and Kazakhstan Green Finance Centre).
- Support project preparation facilities to develop pipelines of bankable adaptation investments (for example, Bangladesh Climate and Development Partnership).
- Use blended finance and guarantees to crowd in private capital (for example, Natural Capital Finance Facility and Financing Adaptation for Growth in Türkiye).
- Pilot results-based financing for adaptation, building on models such as the Adaptation Benefit Mechanism and Ethiopia's Productive Safety Net Programme.
- Support local-level public-private initiatives for nature-based solutions and urban climate resilience.

**TABLE 1: Summary of recommendations and priority countries**

| Country                | Increasing demand                       |                        |                              |                                                           | Increasing supply                  |                                                 |                                                                                     |
|------------------------|-----------------------------------------|------------------------|------------------------------|-----------------------------------------------------------|------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------|
|                        | Strengthen the climate information base | Regulatory environment | Price signals and incentives | Institutional coordination/fiscal planning and management | Mobilize domestic public resources | Regulatory and supervisory enabling environment | Investment platforms/project preparation facilities/blended finance/risk mitigation |
| Albania                |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Armenia                |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Azerbaijan             |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Bosnia and Herzegovina |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Croatia                |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Georgia                |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Kazakhstan             |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Kosovo                 |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Kyrgyz Rep.            |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Moldova                |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Montenegro             |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| North Macedonia        |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Poland                 |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Serbia                 |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Tajikistan             |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Türkiye                |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Ukraine                |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |
| Uzbekistan             |                                         |                        |                              |                                                           |                                    |                                                 |                                                                                     |

Yellow = Recommendations that should be pursued first in countries that have not completed them yet, since they are preconditions for the success of other the recommendations (blue)



# 1. Growing Climate Risks in Europe and Central Asia Call for Adaptation Investments

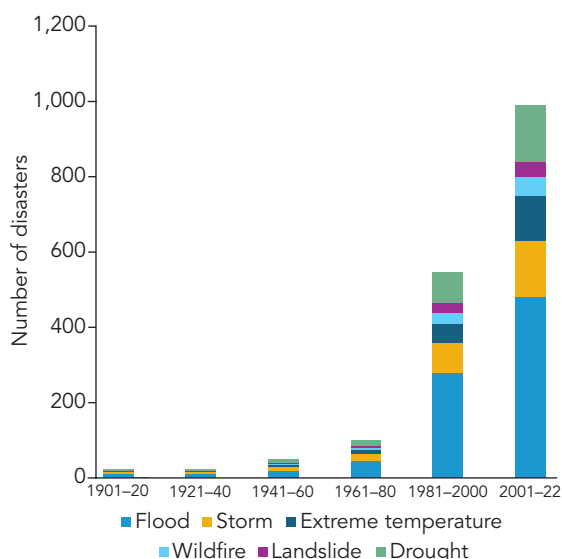
A significant share of Europe and Central Asia’s population is exposed to a rapidly growing number of climate-related natural disasters. The average annual number of severe climate-related disasters reported in the region in the last 20 years has increased 60 percent over the previous 20 years, which had already seen exponential growth over earlier periods (Figure 1). Similarly, average annual losses from extreme climate events in Europe doubled in the period 2010–19 relative to the 1980s and then tripled again since 2020 (EEA n.d.). More than one in four people in Europe and Central Asia (27 percent) are highly exposed to climate hazards; in some

countries—Bosnia and Herzegovina, Croatia, Moldova, and Romania—more than half the population is at high risk from climate-related hazards (Figure 2).

The frequency and intensity of both sudden and slow-onset events are expected to grow across the region. On current pathways, parts of Europe and Central Asia are likely to see average temperatures rise by 5°C or more over the next century—twice the global average. While impacts vary widely across the region, several climate challenges are of most prevalence and concern:

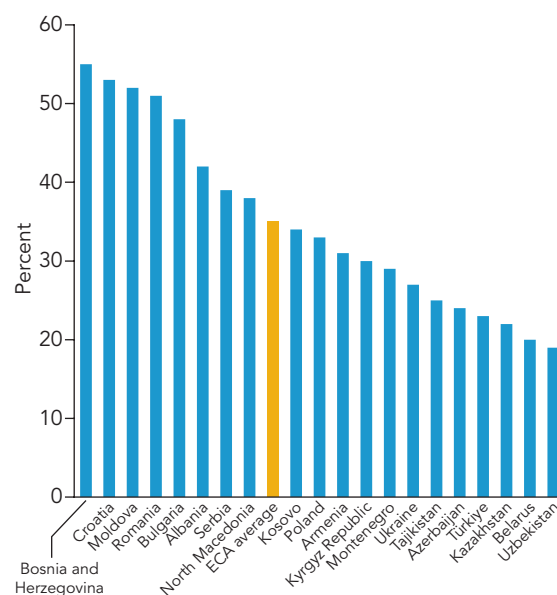
- **Drought and water scarcity:** Changing rainfall patterns and rising heat increase the frequency, intensity, and length of droughts. Already, 28 percent of the Europe and Central Asia population is exposed to significant drought risk, with

**FIGURE 1: Count of climate-related natural disasters in Europe and Central Asia by 20-year period (1901–2022)**



Source: Emergency Events Database (EM-DAT), the International Disaster Database. Centre for Research on the Epidemiology of Disasters/UCLouvain 2023.

**FIGURE 2: Share of population exposed to climate hazards (2021)**



Source: World Bank Group, Corporate Scorecard Indicator—Population at high risk from climate-related hazards.

the highest exposure in Central Asia, the Western Balkans, and Central Europe. Moldova, where more than half of the population is exposed to drought and just 0.2 percent of arable land is irrigated (World Bank Group 2024a), has experienced a devastating cycle of droughts in recent decades,<sup>2</sup> with the 2007 drought alone responsible for more than US\$1 billion in losses. In Central Asia, prolonged dry spells are threatening water supplies, agriculture, and hydropower generation, leading to cascading effects on food security and energy systems.

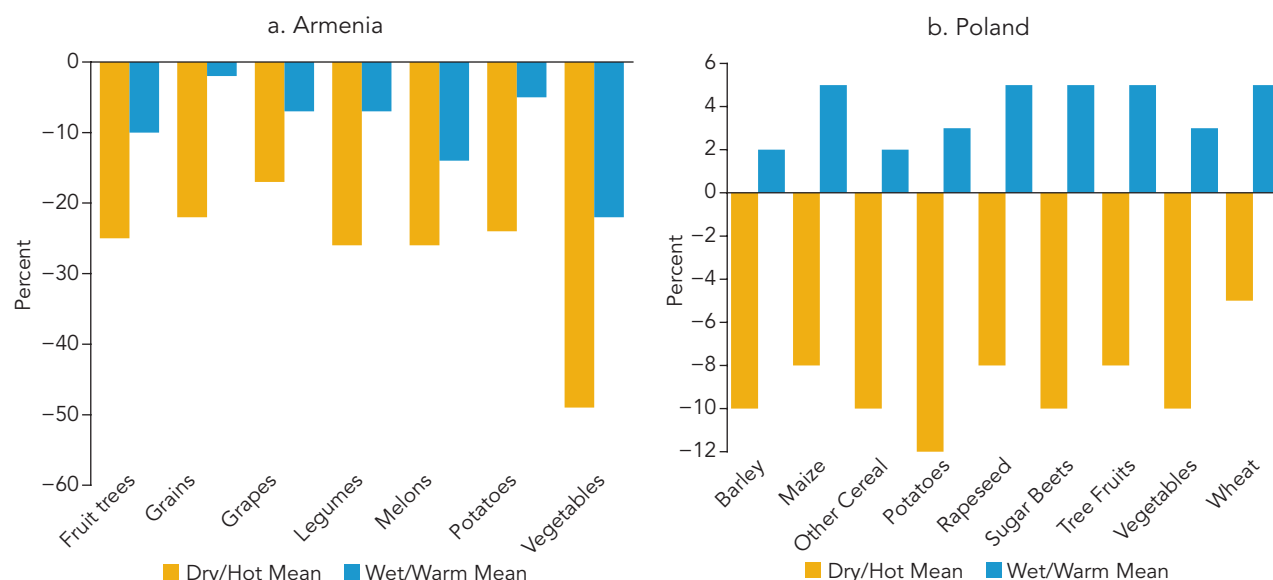
- **Floods:** Flooding has historically been the most common climate hazard to affect Europe and Central Asia, even if a relatively small share of the population is exposed to direct flood risk (7 percent, on average, across the region). Since 2020, flooding has accounted for 40 percent of all hazard events in Europe and Central Asia, and together with storms, it accounted for two-thirds of recorded climate events. Intense storms have become more prevalent in recent years, with flash floods and riverine flooding increasingly affecting the Western Balkans, Türkiye, Armenia, and Kazakhstan, as well as Central Europe. In North Macedonia, flood events increased by nearly 30 percent in the past 20 years, while in Poland, flood-related damages to infrastructure are estimated to rise by more than 80 percent by 2050 (World Bank 2024c). Urban areas are particularly vulnerable across Europe and Central Asia, as inadequate infrastructure and unplanned urbanization exacerbate flood risks (Rentschler, Lemke, and Avner 2025).
- **Extreme heat and wildfires:** While Europe and Central Asia stands out globally for its cold rather than its heat, the frequency and

intensity of heatwaves has surged in recent years. Central Asia, Azerbaijan, and Türkiye are experiencing prolonged periods of extreme temperatures, which are stressing agricultural systems, reducing water availability, and exacerbating health issues, particularly for vulnerable populations such as the elderly and young children. Cities in Europe and Central Asia, notably in the Western Balkans, are experiencing more extreme heatwaves, intensified by urban heat island effects (World Bank 2025a). Wildfires, once confined to southern Europe, are now affecting regions across Europe and Central Asia and have markedly increased in scale and intensity, particularly during extended periods of dry, hot weather. Türkiye, parts of Eastern Europe, and the Russian Federation have experienced large-scale forest fires in recent years, which harm forest production, threaten ecosystems, reduce biodiversity, and cause severe air pollution. As temperatures continue to rise, fire seasons are expected to lengthen, and the risk of wildfires spreading to new areas will grow (World Bank 2025b).

**Growing physical climate effects will translate into significant economic impacts, through destruction or degradation of physical, human, natural, and financial capital.** In the absence of adaptation, key impact channels for Europe and Central Asia include the following:

- **Declining agricultural productivity:** Long-term temperature and precipitation changes will result in a sharp decline in agricultural output in most parts of Europe and Central Asia (Figure 3), even though productivity increases are possible in some regions and under some scenarios. Effects will be sectoral and spatially concentrated, with potentially devastating impacts on poor, rural populations, particularly in countries with high

2. Droughts were recorded in 2000, 2003, 2007, 2012, 2015, 2020, 2022, and 2024.

**FIGURE 3: Climate impact on crop production under alternative composite climate scenarios in Armenia (left) and Poland (right)**

Sources: World Bank (2024) Armenia Country Climate and Development Report (CCDR); World Bank (2024) Poland CCDR.

Notes: GCM = Global Circulation Model. Armenia shows combined effects on rain-fed and irrigated crops while Poland shows effects on rain-fed crops only.

shares of employment in agriculture—notably Armenia and Moldova (with greater than 50 percent of employment in agriculture<sup>3</sup>) as well as Tajikistan, Georgia, Azerbaijan, and Albania (with greater than one-third of employment in agriculture). Importantly, irrigated agriculture can also be affected (sometimes worse than rain-fed agriculture) when water scarcity hits inefficient irrigation systems.

- **Destruction and disruption of critical infrastructure:** Europe and Central Asia's large infrastructure stock means the region faces significantly higher average annual damages from natural hazards than other regions, relative to their gross domestic product (GDP). For example, the transport sector suffers higher damages per unit of GDP than in any other region in the world, even when excluding earthquakes. When aggregating all

climate-related damages to buildings (such as residential, health, and education facilities) and infrastructure (including energy, ports, roads, railways, and water systems), losses amount to 2.4 percent of Europe and Central Asia's GDP—about three times the damages anticipated in non-Europe and Central Asia. Beyond direct damage, significant economic costs arise from disruptions and underutilization of critical infrastructure, including power, water, and transport. Many countries of Europe and Central Asia also face significant risks to social infrastructure. For instance, in Kosovo, educational and health care infrastructure is highly vulnerable to climate impacts, with one-third of schools and one-fifth of health care facilities highly exposed to floods (World Bank Group 2024b), while many cities in Central and Eastern Europe have 80 percent or more of hospitals at risk of extreme heat (European Environment Agency 2022).

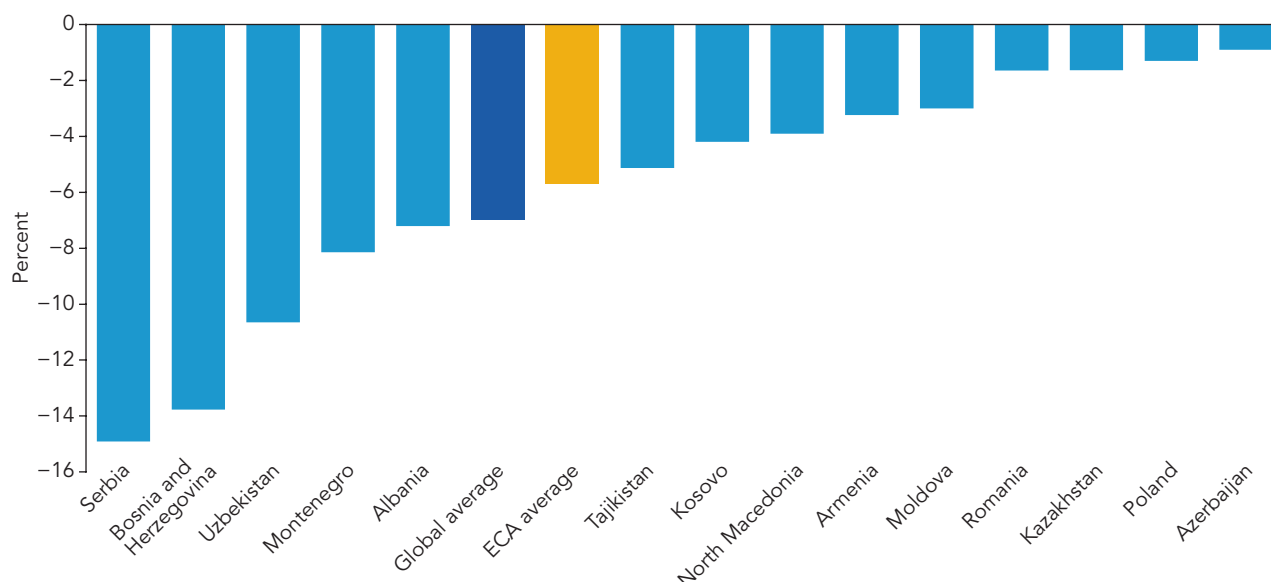
3. Modeled International Labour Organization (ILO) estimate 2023 (source: World Development Indicators, World Bank).

- Disruption of supply chains from nonlocal shocks:** With much of Europe and Central Asia integrated in global value chains, shocks in any part of the world may be ‘imported’ into countries of Europe and Central Asia through supply chain relationships—for example, delayed shipments of parts or components needed for production and higher prices due to shortages. A comparison of countries’ climate vulnerability to the climate vulnerability of their import baskets suggests that while the imported trade risk may be lower on average than country-specific climate risk, the majority of countries that experience higher climate risk through trade are indeed located in Europe and Central Asia.<sup>4</sup> Although most of these are high-income countries (HICs), they also include the Kyrgyz Republic and Kazakhstan, for example.
- Degradation of human capital:** While the ILO estimates that 2.2 percent of working hours will be lost globally in 2030 due to productivity losses from excessive heat, their estimated average across countries of Europe and Central Asia is less than 0.1 percent, with only Azerbaijan (0.4 percent) showing any notable impact in the medium term (ILO 2019). But as temperatures increase further by mid-century, productivity impacts will be more significant across the region. Moreover, the relatively higher impacts of extreme temperatures on older populations will have an outsized impact on Europe and Central Asia given the region’s demographics (Carleton et al. 2022). Finally, the effects of climate shocks on learning and health outcomes will aggravate longer-term productivity impacts.
- Increased variability of hydropower production and water supply.** A changing climate is expected to increase the variability of water supply across Europe and Central Asia, with particularly stark implications for hydropower-dependent countries. In Tajikistan, glacier retreat and shifting precipitation patterns are already altering river flow seasonality, undermining the reliability of hydropower output and heightening the risk of shortages in dry years. In Georgia, climate projections point to growing variability in inflows to reservoirs, threatening both power generation and irrigation supply. The Western Balkans are also seeing more frequent droughts and erratic rainfall, which reduce hydroelectric generation and strain water availability for industrial use. As snowpack and glaciers diminish, the natural buffer they provide during dry periods will disappear, requiring deliberate strategies to smooth seasonal and inter-annual variability.

**The cumulative impacts of disruption, productivity declines, and asset degradation will result in reduced economic output across Europe and Central Asia, but adaptation investments can offset a significant share of losses.** Results from World Bank CCDRs indicate average estimated losses from subsets of climate impacts *in the absence of adaptation* across countries of Europe and Central Asia of close to 6 percent of GDP by 2050. But impacts vary significantly across countries (Figure 4). In such a scenario, countries will also face growing fiscal risks, as governments and households incur additional costs in responding to disruptions to economic activities. However, adaptation investments can mitigate a significant share of losses. For example, in Armenia, Georgia, and Tajikistan, investments modeled in the CCDR are expected to fully eliminate climate losses and even generate net economic gains.

4. Imported climate risk calculated as trade-weighted climate risk of import partners (using total trade; no consideration of heterogeneity of risk across sectors). Source for trade data: Comtrade (via World Integrated Trade Solution), 2023 trade data; Source for climate risk: Notre Dame Global Adaptation Index (ND-GAIN) climate vulnerability index: <https://gain.nd.edu/our-work/country-index/>.

**FIGURE 4: Percent change in GDP from RCP 4.5 climate scenario relative to 2050 baseline in World Bank CCDRs**



Source: World Bank (2024); the global average is based on 41 CCDRs and excludes results from small island developing states.

Note: Country estimates are not always consistent in the scope of impact channels analyzed; moreover, CCDRs in the Western Balkans (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia) adopted a different flood model from that used in other countries, resulting in considerably higher impact estimates.

## 2. How Much Adaptation Finance Is Needed in Europe and Central Asia and How Do Needs Compare with Finance Flows?

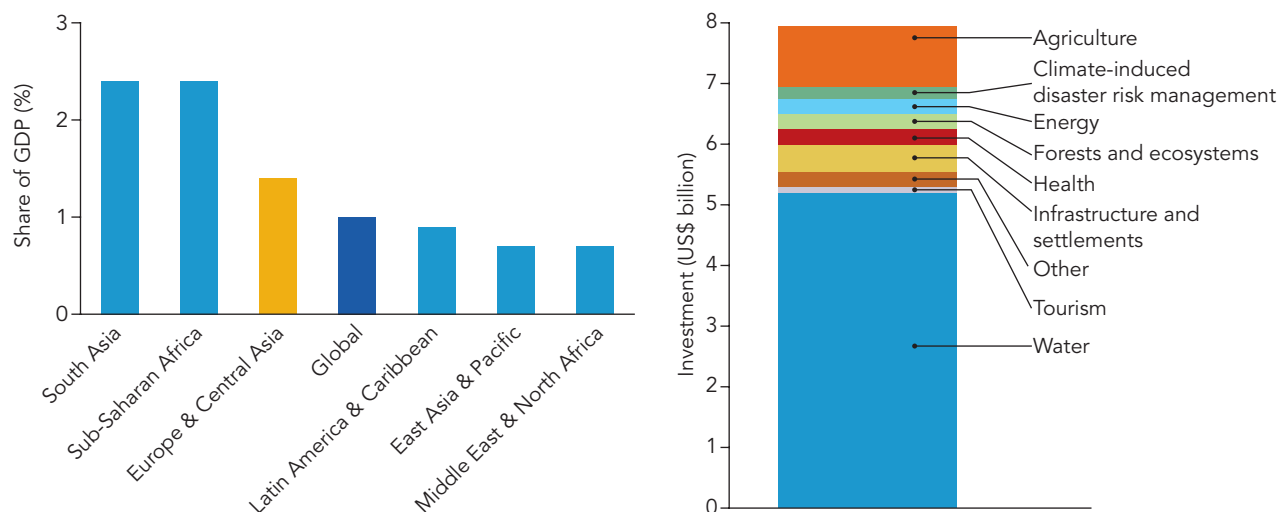
### 2.1. What are the adaptation investment needs in Europe and Central Asia?

Europe and Central Asia is the region with the **third-highest adaptation investment needs relative to its GDP, above the global average of 1 percent of GDP per year (Figure 5, left)**. The United Nations Environment Programme (UNEP) Adaptation Gap Report analyzes the needs expressed in Nationally Determined Contributions and National Adaptation Plans (NAPs) and reports midpoint adaptation needs

of around 1.4 percent of GDP annually by 2030 for the Europe and Central Asia region. This places the region above the global average of 1 percent of GDP and in the third position after South Asia and Sub-Saharan Africa in terms of adaptation needs per unit of GDP. Total estimated needs range from US\$2 to US\$20 billion (1–5 percent of GDP per year), depending on scenario choices.

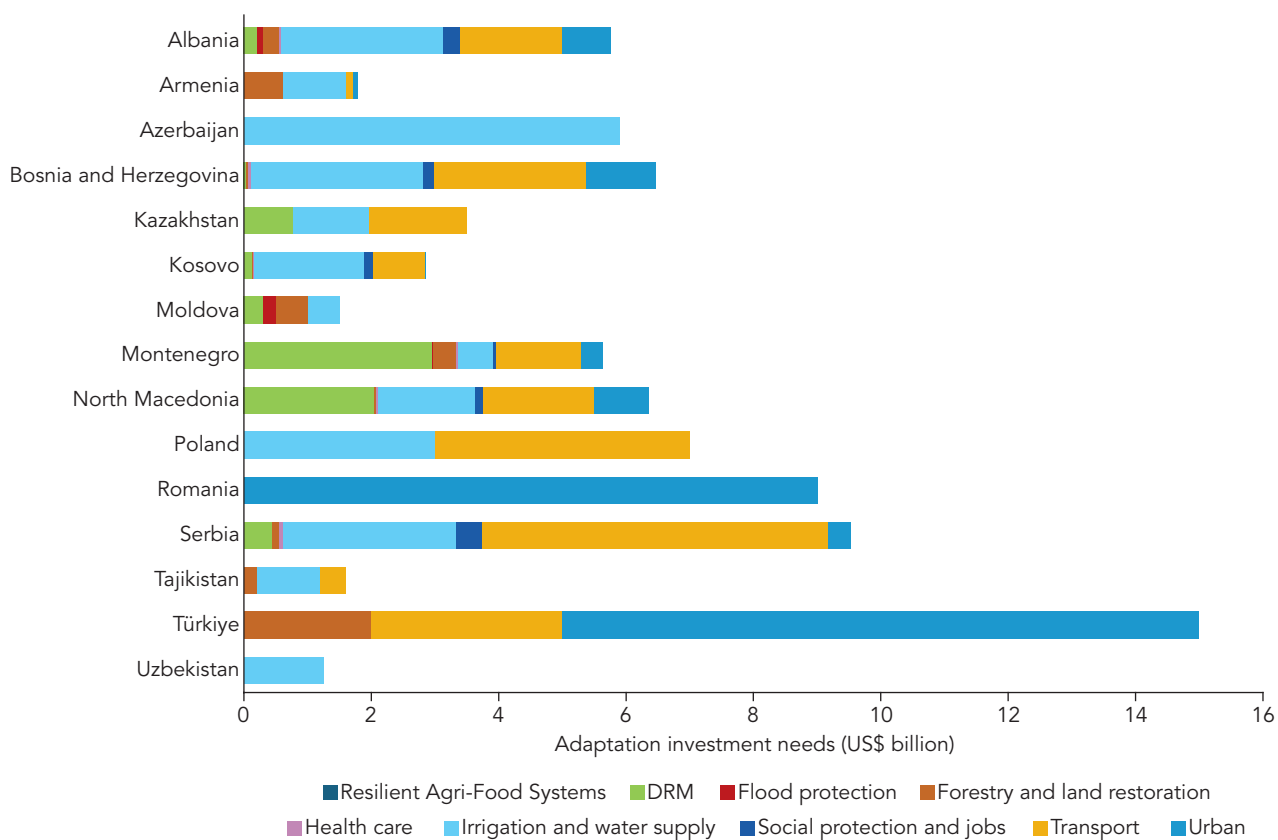
**According to World Bank CCDRs, the largest adaptation investment needs in Europe and Central Asia are in infrastructure and urban resilience.** The CCDRs identify investment needs across all the categories presented in Table 6 except for the ‘Resilient Industry and Commerce’ category (Figure 6). The largest needs (and the only one identified in every country) are in resilient infrastructure, with large needs in water (irrigation modernization and resilient water supply) and transport. These are

**FIGURE 5: Adaptation investment needs as a percentage of GDP (left) and sectoral breakdown for Europe and Central Asia (right), as reported by official country communications**



Source: World Bank, based on UNEP Adaptation Gap Report (2023).

**FIGURE 6: Adaptation investment needs reported in World Bank Europe and Central Asia CCDRs**



Source: World Bank CCDRs.

Note: DRM = Disaster risk management. Assessed investment needs depend on CCDR modeling choices and coverage, and do not allow for cross-country comparisons.

followed by resilient agri-food system investments, land restoration and forestry, and resilient cities and settlements. The needs identified in health and social systems are comparatively much lower. The sectoral shares are broadly consistent with quantification in the UNEP Adaptation Gap Report (Figure 5, right). It is important to note however that assessments of investment needs for adaptation are not easily comparable between countries and sources, as

they might cover different sectors and use different data and methods (Box 1).

**In most countries, adaptation investment requirements represent a substantial portion of the economy.** For most countries, they represent between 1 and 5 percent of GDP, but reach 8 percent of GDP for Montenegro, driven by high urban resilience needs.

### BOX 1. Limitations of adaptation investment needs assessments

Adaptation investment needs depend heavily on the framing of the analysis, which varies widely from one assessment to the next. CCDR assessments are not directly comparable across countries because each analysis is shaped by different objectives: some emphasize protecting GDP growth, while others prioritize reducing poverty or safeguarding critical infrastructure. Even for the same hazard and objectives (for example, flood protection), some countries might want to protect at any cost against extreme events (such as the Netherlands) while others might choose lower levels of protection combined with post-disaster response, resulting in very different cost profiles.

Another difficulty is that assessments vary in scope and methods. Some cover only certain sectors, such as agriculture, water, or power systems, while others attempt to provide an economy-wide picture. Almost no assessment looks systematically at the private sector's needs for adaptation investments, for example, how firms must adapt supply chains, cooling systems, or industrial water use, although these costs are likely to be substantial and critical for competitiveness. Finally, differing country coverage between the UNEP Adaptation Gap Report and CCDRs means that results cannot be directly compared.<sup>a</sup>

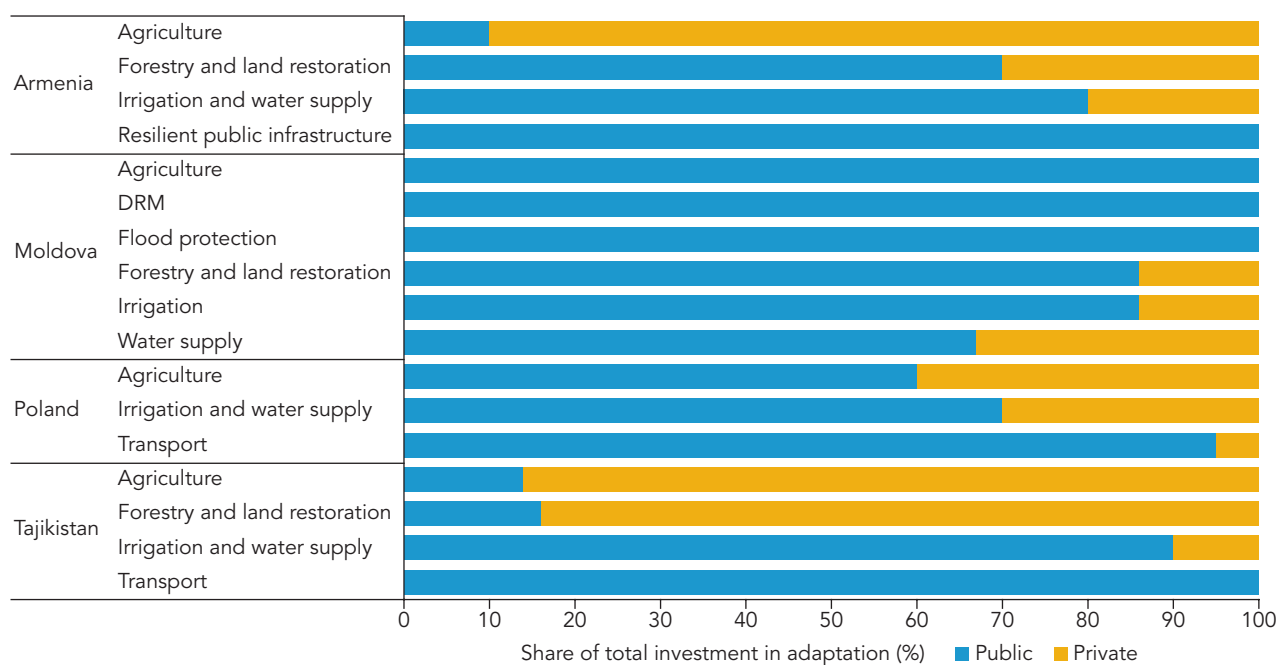
Infrastructure provides a telling example. Many estimates focus only on the extra cost of making new assets resilient, since this is relatively easy to model and integrate into project pipelines. Yet

this leaves out the potentially much larger costs of retrofitting or replacing existing vulnerable infrastructure, which in many countries represent the bulk of the risk exposure. Other assessments emphasize public infrastructure while neglecting the vast array of household-level or small-scale investments needed for adaptation in housing, drainage, or on-farm irrigation.

In the UNEP Adaptation Gap Report, the sources of costing are NAPs, which are not all costed. As a result, the real investment needs for Europe and Central Asia may well be higher than the aggregate number reported. In addition, even where investment needs are reported, sectoral coverage levels, costing methodologies, and levels of accuracy will vary across countries.

Assessments should therefore be understood as scenario-based ranges that inform strategy, rather than definitive price tags. The methodological differences and choices mean it is neither possible nor advisable to collapse adaptation needs into a single number (Rozenberg and Fay 2019). Infrastructure costs could vary by trillions of dollars depending on service goals, technology choices, and efficiency assumptions. The same applies to adaptation: investment needs are not fixed but a range that reflects trade-offs, priorities, and deep uncertainties. Presenting a single number risks giving a false sense of precision while obscuring the real choices policy makers and private actors must confront.

a. In addition to the World Bank countries whose CCDRs were published by June 2025, UNEP data include Andorra, and San Marino. The CCDRs cover Kosovo, Poland, Romania, and Türkiye, which are not included in UNEP data. In addition, the World Bank's Europe and Central Asia region includes Belarus, Bulgaria, Croatia, and Ukraine, which are also included in UNEP data.

**FIGURE 7: Public-private share in adaptation investment needs as identified in selected CCDRs**

Source: World Bank CCDRs.

**A large share of adaptation investment needs identified in CCDRs is public, but this only paints a partial picture.** Although CCDRs identify high private investment needs in agri-food systems, the assessments omit 'Resilient Industry and Commerce' needs, which would increase the share of private investments needed. Similarly, the 'Cities and Settlements' category mostly focuses on public buildings. In addition, CCDRs do not provide the split between public and private investments for all investment categories or countries. While investments in resilient agri-food systems are 90–100 percent private in most countries, resilient infrastructure is mostly public. Due to the capital-intensive nature of the latter, a large share of the investment needs appears as public (Figure 7). Finally, CCDRs provide only a partial assessment of total adaptation investment needs and do not assess adaptation investment needs for most businesses.

## 2.2. What have recent adaptation finance flows looked like in Europe and Central Asia?

**Adaptation finance represented a relatively small portion of total climate finance in Europe and Central Asia between 2021 and 2022.** Of the estimated US\$34.7 billion in overall climate finance in the region, the Climate Policy Initiative (CPI) estimates that only US\$6.1 billion—about 18 percent—was directed toward adaptation. Out of the US\$6.1 billion for adaptation, a large share represented financing with dual benefits of mitigation and adaptation (for example, through resilient energy investments), while only US\$2.5 billion focused exclusively on adaptation.<sup>5</sup> UNEP puts adaptation

5. Climate Policy Initiative 2024. <https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2024/>. Note that CPI's Central Asia and Europe region differs somewhat from the World Bank's Europe and Central Asia region, with CPI including six countries in addition to the World Bank's 23: Cyprus, Estonia, Hungary, Latvia, Lithuania, and Slovakia.

**TABLE 2: Adaptation finance per region**

| Region                          | Adaptation finance per capita (US\$) <sup>a</sup> | Adaptation finance as % of GDP <sup>b</sup> | Adaptation finance as a % of total climate finance per region | Private adaptation finance as a % of total adaptation finance per region |
|---------------------------------|---------------------------------------------------|---------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------|
| Eastern Europe and Central Asia | 4.2                                               | 0.01                                        | 5.9                                                           | 2.3                                                                      |
| East Asia and Pacific           | 13.8                                              | 0.12                                        | 5.2                                                           | 7.3                                                                      |
| Latin America and Caribbean     | 11.9                                              | 0.2                                         | 13.9                                                          | 29.1                                                                     |
| Middle East and North Africa    | 5.8                                               | 0.08                                        | 13.8                                                          | 0.2                                                                      |
| Other Oceania                   | 2.6                                               | 0.0                                         | 0.6                                                           | 12.7                                                                     |
| South Asia                      | 2.8                                               | 0.14                                        | 12.1                                                          | 3.3                                                                      |
| Sub-Saharan Africa              | 10.0                                              | 0.6                                         | 32.8                                                          | 5.8                                                                      |
| US and Canada                   | 2.7                                               | 0.0                                         | 0.6                                                           | 55.1                                                                     |
| Western Europe                  | 9.6                                               | 0.0                                         | 1.2                                                           | 5.7                                                                      |

Source: CPI (2024).

a. Population calculation source: World Bank Data, Our World in Data, Regional Classification: CPI definition.

b. Nominal GDP (current US\$), World Bank Data.

finance in Europe and Central Asia even lower, at an estimated US\$2.8 billion over 2021–22 (see Box 1 for a discussion of the limits to comparing adaptation finance numbers from different sources).<sup>6</sup> The majority of these finance flows support cross-sectoral areas such as policy and national budget support, capacity building, biodiversity and ecosystem conservation, and DRM. These investments strengthen institutional readiness and enable integrated, system-wide resilience planning.

**Europe and Central Asia has one of the lowest levels of adaptation finance per unit of GDP (0.01 percent),<sup>7</sup> despite being the region with the third-highest reported needs.<sup>8</sup>** When counting climate finance with dual benefits for mitigation and adaptation, it has the lowest share of adaptation finance per unit of GDP (Table 2).

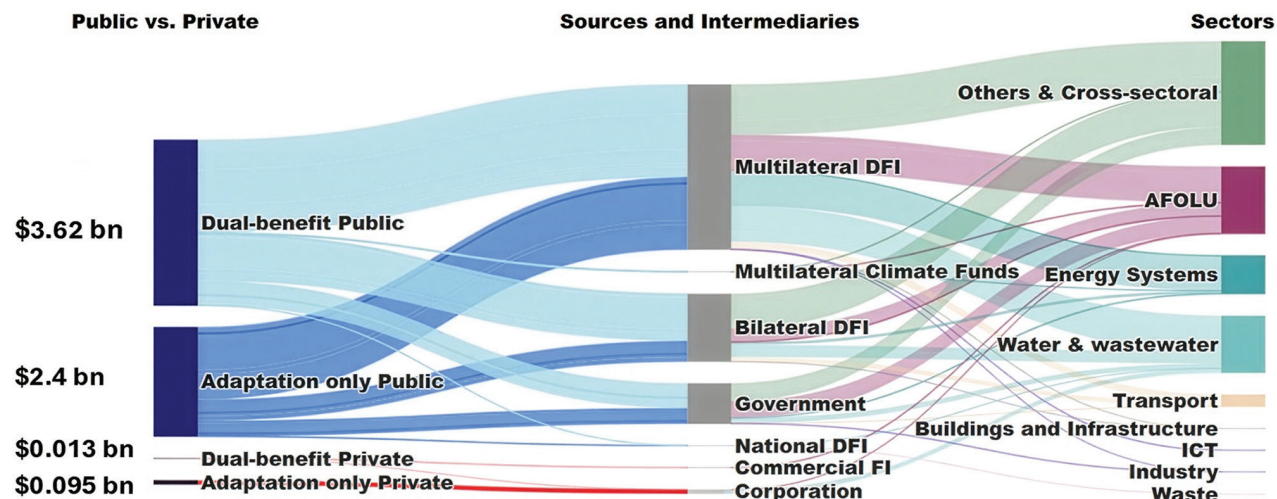
6. UNEP Adaptation Gap Report 2024, using UNEP's definition of Europe and Central Asia.

7. Climate Policy Initiative 2024. <https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2024/>.

8. UNEP Adaptation Gap Report 2024.

**While CPI identifies mostly public investments in adaptation, recent evidence shows that private investment in adaptation is growing in Europe and is being crowded in by public investment.** According to CPI data, the adaptation finance landscape in Europe and Central Asia is dominated by public financing, with only a minor contribution from the private sector (2 percent), mainly in the form of project-level equity. It should be noted that there is large uncertainty over reported private adaptation finance flows, with CPI acknowledging that it is very difficult to track and that reported flows likely underestimate actual private finance flows for adaptation (Figure 8).<sup>9</sup> Complementary approaches are therefore needed, and a recent academic paper presents new data on adaptation investments across 28 European countries (2018–2022), revealing increasing investments (0.2–0.9 percent of national GDP, annually increasing by 31–37 percent), with private investments representing 75

9. Tracking and Mobilizing Private Sector Climate Adaptation Finance—CPI.

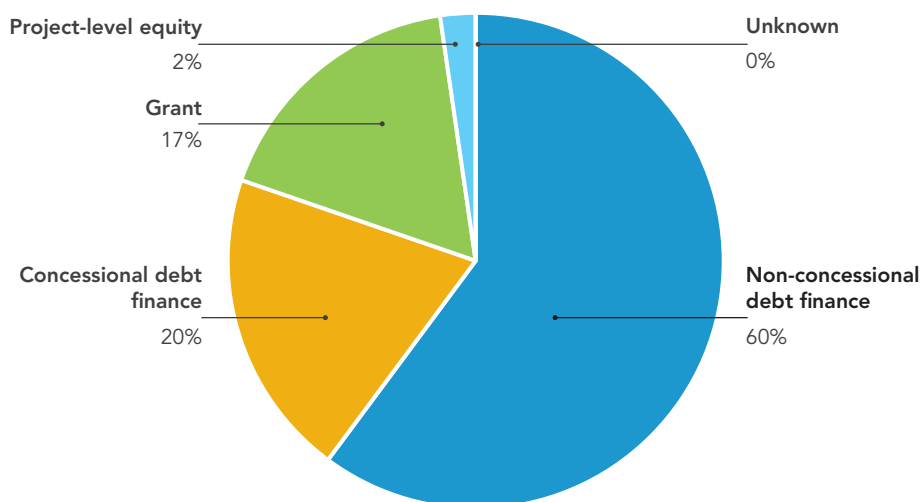
**FIGURE 8: Average adaptation finance flows for Europe and Central Asia between 2021 and 2022**

Source: Climate Policy Initiative (2024): Global Landscape of Climate Finance Database.

percent of the total (Arbués et al. 2025). The paper also finds that public investments in adaptation crowd in private investments: in this sample, if public adaptation spending increases by 1 percent, private adaptation investments rise by 0.3 percent.

**Over 2021–22, the main sources of public adaptation finance in Europe and Central Asia were multilateral development finance**

**institutions (DFIs) (64 percent), followed by bilateral DFIs (22 percent) and national governments (12 percent), with smaller amounts from multilateral climate funds (0.5 percent) and national DFIs (0.13 percent).** The majority of the adaptation finance provided was in the form of non-concessional debt financing (60 percent), with smaller proportions provided as concessional debt financing (20 percent) and grant financing (17 percent) (Figure 9). This seems

**FIGURE 9: Breakdown of adaptation finance in Europe and Central Asia by instrument 2021–22**

Source: CPI 2024.

aligned with the fact that, as mainly upper-middle-income (with some lower-middle-income) countries, most development finance made available by DFIs in Europe and Central Asia is provided on non-concessional or at best blended finance terms. However, CPI does not provide information on the recipients of this finance, so it is not possible to report on the breakdown of public and private organizations that have received adaptation finance in Europe and Central Asia. While the proportion of blended climate finance deals in the region increased to 9 percent between 2021 and 2023 (from 6 percent between 2018 and 2021), the vast majority of these transactions focused on mitigation, with only 6 percent of transactions deployed to adaptation deals (Convergence 2024).

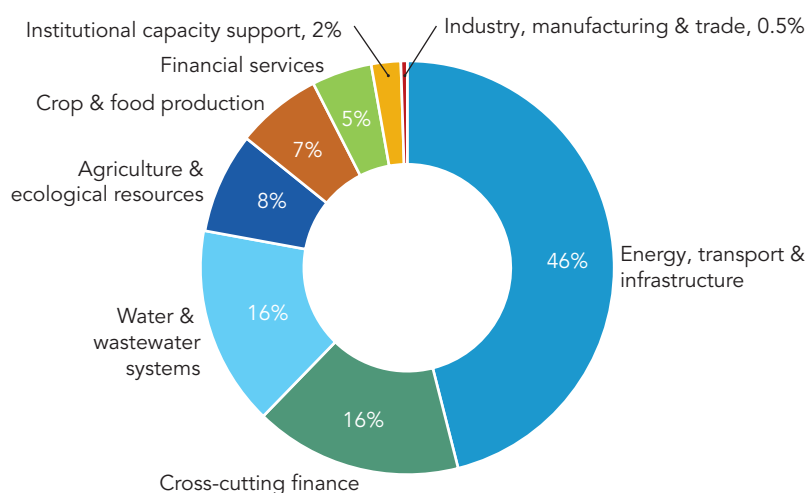
**Adaptation finance from multilateral development banks (MDBs) has been growing in Europe and Central Asia.** In 2023, adaptation finance accounted for approximately 32 percent (US\$4.3 billion of US\$13.5 billion) of total MDB climate finance in the region. This funding was split almost evenly between low- and middle-income economies in Central Asia and non-European Union (EU) Europe (US\$2.1 billion)

and HICs (US\$2.2 billion) (African Development Bank et al. 2024). Adaptation finance flows from MDBs have grown significantly since 2020 (+56 percent in 2020, +48 percent in 2022, and +25 percent in 2023), except for 2021 where it showed a reduction of 22 percent relative to 2020. Almost half of the total adaptation flows went to resilient energy and transport systems, followed by water and wastewater and cross-cutting sectors (institutional capacity building, policy development, and technical assistance initiatives that address climate challenges holistically) (Figure 10).

### 3. How Ready Is Europe and Central Asia to Close the Adaptation Finance Gap?

**The gap between adaptation finance needs and actual funding flows arises from a range of underlying factors.** On the one hand, countries may not have put in place the institutions, regulations, and incentives that effectively support the *demand* for adaptation investments, with the result that an insufficient quantity of

**FIGURE 10: Sectoral breakdown of MDB adaptation finance in Europe and Central Asia**



Source: Joint MDB Report on Climate Finance 2023.

adaptation investment projects is planned and prepared. On the other hand, it may be that investments have been defined and packaged, but they are not (all) being implemented because there is an insufficient *supply* of adaptation finance—that is, the financial and public sectors fail to make sufficient capital available. In practice, both are relevant to some degree in most countries.

**This section provides a brief assessment of the readiness and barriers to adaptation investment in Europe and Central Asia from the perspective of both demand for investment and supply of finance.** The analysis draws on two main sources:

1. An assessment of 15 countries of Europe and Central Asia for which the World Bank's Adaptation and Resilience (A&R) Readiness

Assessments have been completed, tailored specifically to assess adaptation finance. Box 2 describes the assessment and Table 3 summarizes the results.

2. New analysis carried out for this report profiling all 22 countries of Europe and Central Asia alongside key parameters for mobilizing adaptation finance (Table 4).

### 3.1. How well-prepared is Europe and Central Asia to enable A&R investment?

**Public investment in adaptation is a key driver for broader resilience, as it both safeguards critical assets and catalyzes private sector engagement.** By ensuring the A&R of critical public assets and infrastructure, land use, and natural environments, public investments can not

#### **BOX 2: Overview of the A&R Readiness Assessment and overall Europe and Central Asia results**

The A&R Readiness Assessment provides a whole-of-government, whole-of-economy assessment of countries' A&R policy, institutions, capacity preparedness, and implementation. The assessment follows the approach developed in the World Bank's Adaptation Principles (Hallegatte et al. 2020).

The analysis used for this report covers a subset of the 180 A&R assessment indicators that are most relevant for facilitating adaptation investments and their public and private financing. The assessment uses a traffic light system to rate the country's progress against each A&R indicator and preparedness area. Each is assigned a score of 1 (nascent), 2 (emerging), or 3 (established), using available data and information and a wide range of sources and methods, including benchmarking against peer countries and expert judgment.

The 15 countries of Europe and Central Asia that have completed the A&R Readiness Assessment exhibit a still-nascent level of readiness (nearing 'emerging' level) for adaptation finance, broadly in line with the average readiness based on the 45 countries globally that have completed the assessment. However, the overall results hide large variations in readiness across countries and categories. Poland exhibits by far the strongest capacity to support adaptation among the countries of Europe and Central Asia, with an average score of 2.5 (out of 3.0). Azerbaijan is the only other country in the region to score above 2.0 (the threshold for a rating of 'emerging' readiness). By contrast, Kosovo rates as having the lowest capacity to support adaptation among the countries of Europe and Central Asia (score of 1.4), followed by Armenia and Georgia.

**TABLE 3: Summary results for the subset of categories most relevant for adaptation finance from A&R Readiness Assessments in Europe and Central Asia**

|                                                                                                                        | Poland      | Azerbaijan  | Uzbekistan  | Montenegro  | Serbia      | Tajikistan  | Turkiye     | Croatia     | Albania     | North Macedonia | Moldova     | Bosnia and Herzegovina | Armenia     | Georgia     | Kosovo      | ECA average | Global average |
|------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------------|-------------|------------------------|-------------|-------------|-------------|-------------|----------------|
| <b>Enabling A&amp;R investment in public infrastructure and services</b>                                               |             |             |             |             |             |             |             |             |             |                 |             |                        |             |             |             |             |                |
| Identify critical public assets and services                                                                           | 3.00        | 2.25        | 2.33        | 1.93        | 2.20        | 1.75        | 2.25        | 1.50        | 1.93        | 1.47            | 1.50        | 1.47                   | 2.00        | 1.50        | 1.40        | 1.90        | 1.80           |
| Design and implement a government-wide strategy to increase the resilience of infrastructure systems and public assets | 2.33        | 1.83        | 1.83        | 1.00        | 1.00        | 2.00        | 1.57        | 1.50        | 1.00        | 1.00            | 2.17        | 1.00                   | 2.00        | 1.50        |             | 1.55        | 1.67           |
| Make land use plans and urban development strategies risk-informed                                                     | 2.43        | 2.38        | 1.40        | 1.80        | 2.07        | 1.71        | 2.00        | 2.00        | 1.53        | 1.40            | 1.43        | 1.13                   | 1.75        | 1.50        | 1.40        | 1.73        | 1.77           |
| <b>Enabling A&amp;R investments by households and firms</b>                                                            |             |             |             |             |             |             |             |             |             |                 |             |                        |             |             |             |             |                |
| Assess disaster and climate change risks, and make this information available                                          | 2.50        | 2.13        | 2.78        | 1.90        | 2.40        | 2.25        | 2.00        | 2.67        | 1.50        | 1.90            | 2.38        | 1.60                   | 2.25        | 1.63        | 1.20        | 2.07        | 2.09           |
| Clarify responsibilities and align incentives with resilience and adaptation objectives                                | 2.25        | 2.50        | 2.00        | 1.80        | 1.80        | 2.50        | 1.50        | 2.00        | 1.40        | 1.80            | 1.75        | 1.60                   | 1.50        | 1.25        | 1.20        | 1.79        | 1.59           |
| Facilitate risk management of private sector and firms                                                                 | 2.33        | 1.83        | 1.67        | 2.50        | 2.50        | 1.80        | 2.25        | 1.67        | 2.50        | 2.50            | 1.67        | 1.50                   | 1.60        | 1.83        |             | 2.01        | 1.90           |
| Put in place effective hydromet, early warning and emergency management systems                                        | 3.00        | 1.75        | 2.43        | 2.20        | 1.60        | 2.00        | 2.11        | 2.75        | 1.80        | 1.80            | 2.00        | 1.60                   | 2.57        | 2.25        | 1.60        | 2.10        | 2.10           |
| Provide all firms and households with risk management instruments                                                      | 3.00        | 2.00        | 1.67        |             |             | 1.67        | 1.50        | 2.33        |             |                 | 1.67        |                        | 1.00        | 1.33        |             | 1.80        | 1.77           |
| Develop the insurance sector, building on public-private partnerships                                                  | 2.33        | 2.00        | 1.33        |             | 2.00        | 1.50        | 2.00        | 1.33        | 2.00        | 2.00            | 1.67        | 3.00                   | 1.33        | 2.33        |             | 1.91        | 1.85           |
| Help firms develop business continuity plans and financial preparedness                                                | 2.25        | 2.00        | 1.75        | 2.67        | 2.00        | 2.25        | 1.75        | 1.75        | 2.67        | 2.00            | 1.75        | 2.33                   | 1.50        | 1.75        | 2.00        | 2.03        | 1.95           |
| <b>Mobilizing A&amp;R finance</b>                                                                                      |             |             |             |             |             |             |             |             |             |                 |             |                        |             |             |             |             |                |
| Include contingent liabilities from natural disasters and environmental shocks in the planning and budgeting process   | 3.00        | 2.00        | 2.67        |             |             | 1.67        | 1.67        | 1.50        |             |                 | 1.67        |                        | 1.67        | 1.67        |             | 1.94        | 1.88           |
| Develop a financial strategy to manage contingent liabilities, combining multiple instruments                          | 2.25        | 2.25        | 2.25        | 2.00        | 1.60        | 2.25        | 2.00        | 1.00        | 1.80        | 2.20            | 1.25        | 1.80                   | 1.50        | 1.50        | 1.40        | 1.80        | 1.89           |
| Anticipate and plan for long-term macroeconomic impacts                                                                |             | 1.67        | 1.33        |             |             | 1.00        | 1.33        | 1.00        |             |                 | 1.67        |                        | 1.67        | 1.00        |             | 1.33        | 1.40           |
| Communicate and mitigate the disaster and climate risk exposure of the financial sector and pension systems            | 1.60        | 1.50        | 1.33        | 1.00        | 1.00        | 1.00        | 1.25        | 2.00        | 1.00        | 1.00            | 1.50        | 1.80                   | 1.20        | 2.20        | 1.00        | 1.36        | 1.43           |
| <b>AVERAGE—ADAPTATION FINANCE READINESS</b>                                                                            | <b>2.48</b> | <b>2.01</b> | <b>1.91</b> | <b>1.88</b> | <b>1.83</b> | <b>1.81</b> | <b>1.80</b> | <b>1.79</b> | <b>1.74</b> | <b>1.73</b>     | <b>1.72</b> | <b>1.71</b>            | <b>1.68</b> | <b>1.66</b> | <b>1.40</b> | <b>1.81</b> | <b>1.79</b>    |

Note: Red indicates 'nascent' capabilities; yellow indicates 'emerging' capabilities; green indicates 'established' capabilities.

only protect public assets but also play a catalytic role in unlocking or de-risking firms' and households' adaptation investments by reducing systemic risk, signaling long-term government commitment, and minimizing the risk of stranded assets. Government commitment to strengthening the resilience of public assets may also create opportunities for co-investments by the private sector.

**On average, countries of Europe and Central Asia face significant readiness gaps in identifying critical public assets and services, ensuring the resilience of infrastructure (including energy systems), and making land use and urban development plans risk-informed.**

Few countries in the region have put in place comprehensive government-wide strategies to strengthen the resilience of public assets. Countries of Europe and Central Asia do a better job of managing residual risks and responding to shocks when they occur, with the majority showing at or near 'emerging' readiness. They are the most advanced in their development of hydrometeorological, early warning, and emergency management systems.

**Lack of coordinated adaptation investment planning is a significant barrier to ensuring resilient infrastructure systems and public assets in Europe and Central Asia.** While almost all countries in the region have NAPs, most tend to be rather qualitative and lack the kind of in-depth financial analysis that is required for investment planning. Only a minority of countries of Europe and Central Asia<sup>10</sup> have so far explicitly linked their NAPs to adaptation investment planning (for example, cost breakdowns, potential sources of financing). Moreover, across most countries in the region, adaptation planning is led by ministries of environment, with generally weak links to budget processes and limited capacity for effective cross-ministerial

coordination. As a result, most lack a comprehensive, coordinated adaptation plan that is integrated with public investment plans.

**Firms and households have an incentive to invest in adaptation, but they face significant barriers.**

These are particularly pronounced in several countries in the Western Balkans (Albania, Bosnia and Herzegovina, and Kosovo) and Central Asia (Tajikistan and Uzbekistan). Access to information and appropriate price signals are critical to facilitate private adaptation investment and financing flows. While countries of Europe and Central Asia generally exhibit readiness in terms of assessing disaster and climate risks at the *national* level, including the development of hydrometeorological capacity, there are significant gaps in planning and information provision at the *local* level, including in the provision of local-scale hazard maps and the development of local climate scenarios. For example, in Azerbaijan and Uzbekistan, the lack of real-time monitoring and limited human resources undermine the effectiveness of the existing impact-based forecasting systems. On top of information gaps, price signals in many countries of Europe and Central Asia distort effective risk assessment and undermine incentives to invest in adaptation. For example, underpriced water—a particular problem throughout Central Asia—artificially lowers the expected returns to investments such as climate-smart agriculture (CSA) or efficient irrigation. Similarly, underdeveloped insurance markets as well as highly subsidized insurance in some countries (for example, crop or flood insurance) create disincentives for firms and households to invest in adaptation or prevent effective planning and assessment of risk and return.

**Clarifying responsibilities and aligning incentives for the private sector with A&R objectives is another challenge across in many countries of Europe and Central Asia.** For example, few countries in the region clearly

10. Including Albania, Armenia, Bulgaria, Croatia, Moldova, and Serbia.

define and communicate acceptable levels of residual risk—whether at the macro level or for specific hazards such as urban flooding. Tajikistan is a notable exception, having established residual risk targets and clarified responsibilities and liabilities for all relevant actors. Establishing such a residual risk target matters because it clarifies the risk-sharing boundary between public and private responsibility and provides a clear incentive for when and to what degree private investment in adaptation is expected.

**Readiness is lowest for managing climate-related financial and macro-fiscal risks, underscoring financing risks and challenges.** While this is true at a global level it is especially pronounced in Europe and Central Asia. Indeed, the region's performance is not only the poorest on this pillar relative to other pillars, but its countries also trail significantly behind the average readiness of the rest of the world on this pillar. Use of 'green budgeting' and climate-linked budget tagging is emerging but still limited. Few countries in the region have well-developed approaches for incorporating contingent liabilities into fiscal plans or are developing a financial strategy to manage them. This matters, because it means that even as countries of Europe and Central Asia are beginning to develop their readiness to support adaptation investments, they are still lagging in supporting the flow of finance to enable these investments.

### 3.2. How well-prepared is Europe and Central Asia to mobilize finance for adaptation?

**Mobilizing public finance for A&R is constrained by both shrinking public budgets and ineffective planning.** Rising debt levels and increasing fiscal pressures across Europe and Central Asia limit the capacity of governments to meet rising A&R investment needs. The situation is exacerbated by weak

adaptation investment planning. With the exception of Kosovo, all countries in Europe and Central Asia have NAPs in place (13 countries) or under development (10 countries). But, as noted previously, few countries link their NAPs to adaptation investment planning. Moreover, while some NAPs give more attention to financing than others, in general, NAPs do not set out clear frameworks for financing adaptation priorities.

**Countries of Europe and Central Asia face limited and fragmented access to concessional finance for adaptation.** All countries of the region have some level of eligibility for multilateral climate funds,<sup>11</sup> but as most (with the exception of the Kyrgyz Republic, Tajikistan, and Uzbekistan) are upper-middle-income countries (UMICs), access to concessional funds is significantly limited. Moreover, the vast majority of financing from multilateral climate funds in Europe and Central Asia is for mitigation. All countries in the region (except EU member states) are eligible for the Global Environment Facility (GEF), and all UMICs and lower-middle-income countries (LMICs) in the region are eligible for the Green Climate Fund (GCF) and the Adaptation Fund (AF), except for Belarus, Kosovo, Türkiye, and Ukraine. Some countries in the region are eligible for the Climate Investment Funds (CIFs).<sup>12</sup> Table 5 summarizes the eligibility criteria for these respective multilateral climate funds.

11. In addition to multilateral climate funds, countries of Europe and Central Asia may also be able to access climate finance (including for adaptation) from MDBs (for example, Asian Development Bank [ADB], European Bank for Reconstruction and Development [EBRD], European Investment Bank [EIB], International Finance Corporation, International Fund for Agricultural Development, and the World Bank) as well as other DFIs (for example, EU, Germany's International Climate Initiative [*Internationale Klimaschutzinitiative*, IKI], *Agence Française de Développement*, Japan International Cooperation Agency, *Kreditanstalt für Wiederaufbau* [KfW] Development Bank, and Nationally Appropriate Mitigation Action [NAMA] Facility).

12. Armenia, Kazakhstan, the Kyrgyz Republic, North Macedonia, Tajikistan, Türkiye, and Ukraine, although only the Kyrgyz Republic and Tajikistan were selected for the CIF's AF, the Pilot Program for Climate Resilience. Financing Climate Actions in Central Asia. A Survey of International and Local Investments.

**TABLE 4: Adaptation finance profile of countries of Europe and Central Asia**

| Subregion                  | Country                | Income level | ODA eligible | Multilateral climate fund eligibility |     |     |     | NAPs         |                             | Sustainable/green finance taxonomy |                     | Sovereign access to bond markets | Investment grade | Sovereign sustainable bond FWs |                     |
|----------------------------|------------------------|--------------|--------------|---------------------------------------|-----|-----|-----|--------------|-----------------------------|------------------------------------|---------------------|----------------------------------|------------------|--------------------------------|---------------------|
|                            |                        |              |              | GEF                                   | GCF | AF  | CIF | NAP in place | Link to investment planning | Taxonomy in place                  | Adaptation coverage |                                  |                  | FW in place                    | Adaptation coverage |
| Caucasus                   | Armenia                | UMIC         | Yes          | Yes                                   | Yes | Yes | Yes | Yes          | Yes                         | Pending                            | n/a                 | Yes                              | No               | No                             | n/a                 |
|                            | Azerbaijan             | UMIC         | Yes          | Yes                                   | Yes | Yes | No  | Yes          | No                          | Yes <sup>a</sup>                   | Good <sup>b</sup>   | Yes                              | Unclear          | Pending                        | n/a                 |
|                            | Georgia                | UMIC         | Yes          | Yes                                   | Yes | Yes | No  | Pending      | n/a                         | Yes                                | Good                | Yes                              | No               | No                             | n/a                 |
| Central Asia               | Kazakhstan             | UMIC         | Yes          | Yes                                   | Yes | Yes | Yes | Pending      | n/a                         | Yes                                | Partial             | Yes                              | Yes              | Pending                        | n/a                 |
|                            | Kyrgyz Rep.            | LMIC         | Yes          | Yes                                   | Yes | Yes | Yes | Pending      | n/a                         | Pending                            | n/a                 | No                               | No               | No                             | n/a                 |
|                            | Tajikistan             | LMIC         | Yes          | Yes                                   | Yes | Yes | Yes | Yes          | n/a <sup>c</sup>            | No                                 | n/a                 | No                               | No               | No                             | n/a                 |
|                            | Turkmenistan           | UMIC         | Yes          | Yes                                   | Yes | Yes | No  | Pending      | n/a                         | No                                 | n/a                 | No                               | No               | No                             | n/a                 |
|                            | Uzbekistan             | LMIC         | Yes          | Yes                                   | Yes | Yes | No  | Pending      | n/a                         | Yes                                | None                | Yes                              | No               | Yes                            | Partial             |
| Central and Eastern Europe | Belarus                | UMIC         | Yes          | Yes                                   | No  | No  | No  | Pending      | n/a                         | No                                 | n/a                 | Yes                              | No               | No                             | n/a                 |
|                            | Moldova                | UMIC         | Yes          | Yes                                   | Yes | Yes | No  | Yes          | Yes                         | Pending                            | n/a                 | No                               | No               | No                             | n/a                 |
|                            | Ukraine                | UMIC         | Yes          | Yes                                   | No  | No  | Yes | Pending      | n/a                         | Pending                            | n/a                 | Yes                              | No               | No                             | n/a                 |
| EU                         | Bulgaria               | HIC          | No           | No                                    | No  | No  | No  | Yes          | Yes                         | Yes (EU)                           | Good                | Yes                              | Yes              | No                             | n/a                 |
|                            | Croatia                | HIC          | No           | No                                    | No  | No  | No  | Yes          | Yes                         | Yes (EU)                           | Good                | Yes                              | Yes              | No                             | n/a                 |
|                            | Poland                 | HIC          | No           | No                                    | No  | No  | No  | Yes          | Yes <sup>d</sup>            | Yes (EU)                           | Good                | Yes                              | Yes              | Yes                            | Partial             |
|                            | Romania                | HIC          | No           | No                                    | No  | No  | No  | Pending      | n/a                         | Yes (EU)                           | Good                | Yes                              | Yes              | Yes                            | Good                |
| Western Balkans            | Albania                | UMIC         | Yes          | Yes                                   | Yes | Yes | No  | Yes          | Yes                         | Pending                            | n/a                 | Yes                              | No               | No                             | n/a                 |
|                            | Bosnia and Herzegovina | UMIC         | Yes          | Yes                                   | Yes | Yes | No  | Yes          | Yes                         | No                                 | n/a                 | No                               | No               | No                             | n/a                 |
|                            | Kosovo                 | UMIC         | Yes          | Yes                                   | No  | No  | No  | No           | n/a                         | No                                 | n/a                 | No                               | No               | No                             | n/a                 |
|                            | Montenegro             | UMIC         | Yes          | Yes                                   | Yes | Yes | No  | Pending      | n/a                         | No                                 | n/a                 | Yes                              | No               | No                             | n/a                 |
|                            | North Macedonia        | UMIC         | Yes          | Yes                                   | Yes | Yes | Yes | Pending      | n/a                         | No                                 | None                | No                               | No               | Yes                            | None                |
|                            | Serbia                 | UMIC         | Yes          | Yes                                   | Yes | Yes | No  | Yes          | Yes                         | Yes                                | Good                | Yes                              | Unclear          | Yes                            | Partial             |
| Türkiye                    |                        | UMIC         | Yes          | Yes                                   | No  | No  | Yes | Yes          | No                          | Pending                            | n/a                 | Yes                              | No               | Yes                            | Good                |

Source: Background paper by Cadlas, *Identification of Barriers to Public and Private Investments in Climate Adaptation in Europe and Central Asia and a Set of Instruments to Lift Them*.

Notes: ODA = Official development assistance. Income level drawn from the World Bank Group Country Income Classification; ODA eligibility drawn from the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee list of ODA recipient countries; multilateral climate fund eligibility drawn from the websites of the respective multilateral climate funds; Sovereign access to bond markets refers to whether countries are currently accessing capital markets through sovereign bond issuances, based on information drawn from CBonds and from respective government websites; Investment grade based on sovereign credit ratings provided by Standard & Poor's Global, Moody's, and Fitch Ratings and marked unclear where there is disagreement between these ratings agencies.

a. Available in Azeri only.

b. The taxonomy is only available in Azeri, and the classification is based on a translated version.

c. The NAP is not available in English.

d. High-level recommendations only.

**TABLE 5: Eligibility criteria for multilateral climate funds**

| Multilateral climate funds | Eligibility criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GEF                        | Countries may be eligible for GEF funding in one of two ways: <sup>a</sup> <ul style="list-style-type: none"> <li>a. If the country has ratified the conventions the GEF serves and conforms with the eligibility criteria decided by the Conference of the Parties of each convention or</li> <li>b. If the country is eligible to receive World Bank (International Bank for Reconstruction and Development [IBRD] and/or International Development Association) financing or if it is an eligible recipient of United Nations Development Programme (UNDP) technical assistance.</li> </ul> |
| GCF                        | Developing countries having designated a National Designated Authority or Focal Point: Countries   GCF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| AF                         | Focused on countries that are part of the United Nations Framework Convention on Climate Change (UNFCCC) and are Parties to the Kyoto Protocol (non-annex I that is, developing countries) or Paris Agreement. Need to have National Implementing Entities <sup>b</sup>                                                                                                                                                                                                                                                                                                                        |
| CIF                        | Recipient countries may benefit from the Pilot Program for Climate Resilience (PPCR) provided they <ul style="list-style-type: none"> <li>• Meet ODA eligibility criteria according to OECD/Development Assistance Committee guidelines and</li> <li>• Have an active MDB country program (for this purpose, an active program means that an MDB has a lending program and/or ongoing policy dialogue with the country).</li> </ul> <p>Priority is given to highly vulnerable least developed countries eligible for MDB concessional funds, including the small island developing states.</p> |

Source: Background paper by Cadlas, *Identification of Barriers to Public and Private Investments in Climate Adaptation in Europe and Central Asia and a Set of Instruments to Lift Them*.

a. How Projects Work | GEF.

b. National Implementing Entities.

### Capacity for mobilizing private finance for A&R is weak across Europe and Central Asia.

Findings from the A&R Assessment show that except for Georgia and Croatia, no country assessed in Europe and Central Asia is even near an 'emerging' stage of readiness on communicating and mitigating the climate risk exposure of the financial sector (Table 2). For example, in almost no country of Europe and Central Asia do financial regulators require banks, insurers, and large investors to quantify estimates of exposure to natural hazards and implement stress testing around these risks. In the absence of such practices, investors are exposed to levels of uncertainty that preclude the flow of finance for adaptation investments. This is exacerbated by relatively underdeveloped insurance markets and limited access of firms and households to a variety of risk management instruments through which they can manage climate shocks.

The financial sector across the region remains in an early stage of development to enable financing of adaptation:

- **Sustainable/green finance taxonomies:** Leaving aside the EU member countries in Europe and Central Asia that use the EU Sustainable Finance Taxonomy, only Azerbaijan, Georgia, Kazakhstan, Uzbekistan, and Serbia have green or sustainable finance taxonomies in place or under development.
- **Sovereign access to capital markets:** While most countries of Europe and Central Asia are currently able to access capital markets through sovereign bond issuances, seven do not appear to be able to do so at present.<sup>13</sup> Of the countries of Europe and

13. Bosnia and Herzegovina, Kosovo, the Kyrgyz Republic, Moldova, North Macedonia, Tajikistan, and Turkmenistan.

Central Asia that are able to access capital markets, only those inside the EU are investment grade. All non-EU countries of Europe and Central Asia that issue sovereign bonds are non-investment grade, meaning that their sovereign bond issuances are subject to higher yields, making this capital source more expensive.

- **Sustainable/green bond frameworks:** Only a minority of countries of Europe and Central Asia have sovereign sustainable or green bonds frameworks in place, and even fewer have included adaptation as an eligible use of proceeds. Only Romania and Türkiye have good adaptation coverage, with partial coverage only in Serbia and Uzbekistan.

Table 3 presents an overview of arrangements for adaptation financing of countries of Europe and Central Asia.

### 3.3. What are the main barriers to adaptation investment in Europe and Central Asia?

Table 6 identifies 11 barriers to adaptation investments based on the preceding analysis.

## 4. What Returns Can Be Expected on Adaptation Investments?

**Economic returns on public adaptation investments are often high, particularly when considering the full range of benefits—the so-called ‘Triple Dividends’ of resilience (WRI 2022).** Meta reviews of the returns on adaptation have found typical benefit-cost ratios (BCRs) in the range of 2–10 for most adaptation investments (exceeding 50:1 for some nature-based solutions and even 100:1 for some early

warning systems) (Figure 11),<sup>14</sup> and economic internal rates of return averaging 25 percent (Systemiq 2025) and 27 percent (Brandon et al. 2025), respectively. Most investments in adaptation generate positive returns considering just ‘avoided losses’ on their own. But factoring in the ‘Triple Dividends’ of adaptation by accounting for avoided losses, induced economic benefits (including improved productivity or operational efficiency) and social and environmental benefits (Box 3) show that broader returns are often larger and that public resilience investments usually pay off even in the absence of a climate event.

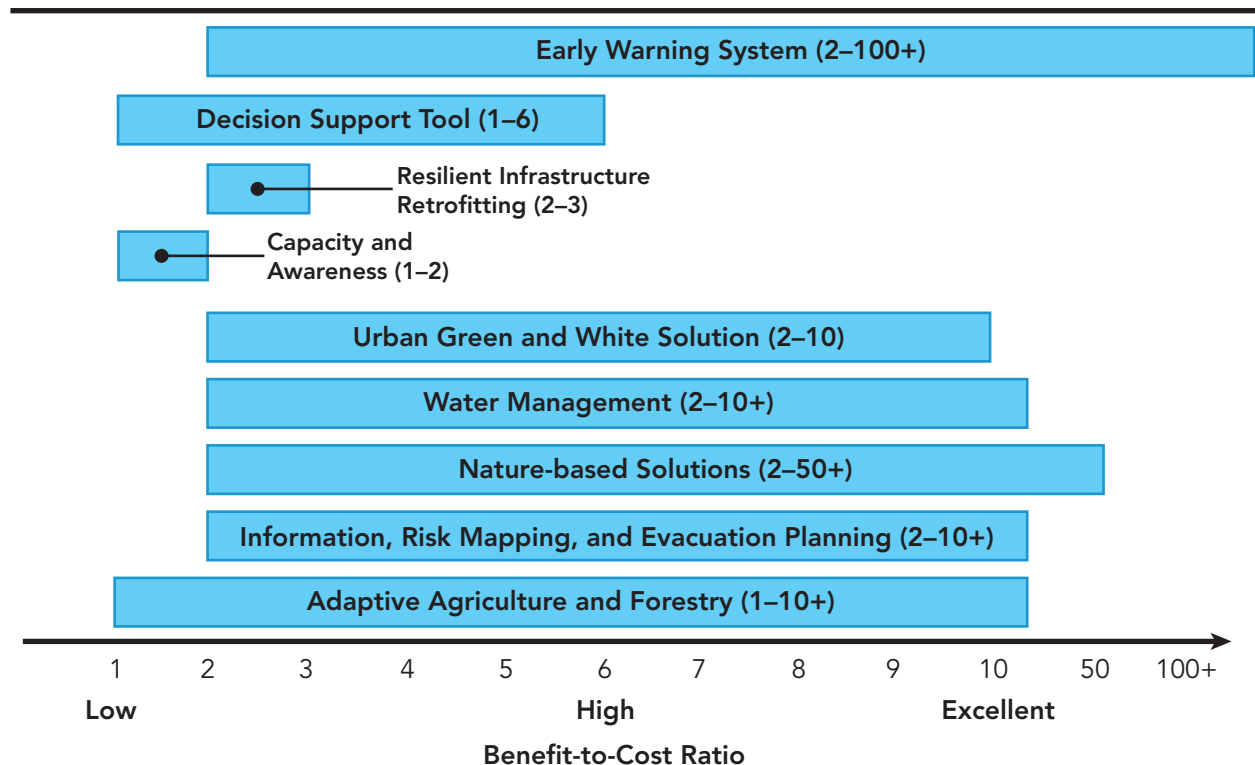
**Evidence is increasing that the financial returns on investments in adaptation can also be attractive for the private sector.** Of the more than 18,700 climate disclosures that companies filed with the Climate Disclosure Project in 2022, 25 percent identified the financial materiality of physical risks. Taking a lens that widens traditional definitions of return on investment from generating cash flow to protecting value at risk, a recent analysis of private investment found, for example, that cost savings and avoided losses from A&R investments amounted to BCRs for companies implementing water efficiency technologies, regenerative agriculture, and other resilience-building measures ranging from 2:1 to 15:1 and reaching as high as 53:1. Notably, interventions in emerging markets and developing economies generated some of the highest BCRs, with both multinational and local companies standing to benefit (Chau et al. 2023).

**Some A&R investments have cross-border benefits, creating opportunities for joint investments.** Climate shocks propagate across borders through supply chains, for example, when critical infrastructure or traded goods are

14. Note that BCRs of adaptation measures are highly site- and context-specific, and there is high uncertainty about the scale and type of climate impacts.

**TABLE 6: Main barriers to adaptation investments in Europe and Central Asia**

| Barriers that limit demand for adaptation finance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Barriers that limit supply of adaptation finance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Public and private investment</b></p> <ol style="list-style-type: none"> <li>1. Lack of granular, localized climate risk data and economic models impedes risk assessment, pricing, and investment planning.</li> <li>2. Weak regulatory frameworks fail to mandate resilient infrastructure or incentivize risk reduction.</li> </ol> <p><b>Private investment</b></p> <ol style="list-style-type: none"> <li>3. Price signals in sectors such as water and insurance often disincentivize private resilience investments.</li> </ol> <p><b>Public investment</b></p> <ol style="list-style-type: none"> <li>4. Adaptation planning is led by ministries of environment, which have weak links to budget and investment processes managed by ministries of finance or center-of-government agencies.</li> <li>5. Without fiscal preparedness and assessment of climate-related contingent liabilities, adaptation investments remain fragmented, underfunded, and misaligned with national priorities.</li> </ol> | <p><b>Public finance</b></p> <ol style="list-style-type: none"> <li>6. Limited public budgets</li> <li>7. Fragmented access to concessional finance.</li> </ol> <p><b>Private finance</b></p> <ol style="list-style-type: none"> <li>8. Most non-EU countries of Europe and Central Asia do not have investment-grade credit ratings, raising the cost of sovereign bond issuances and limiting access to international capital.</li> <li>9. There is limited capacity of the financial sector to manage climate risks, lacking/unclear taxonomies, and narrow definitions of adaptation.</li> <li>10. Adaptation investments are fragmented, small-scale, and not structured to meet investor requirements.</li> <li>11. Private financial instruments are not appropriate for adaptation projects that often have long time horizons, uncertain returns, and high-risk profiles.</li> </ol> |

**FIGURE 11: BCRs of selected DRM and adaptation measures in literature**

Source: World Bank. 2024. *Western Balkans 6 Country Climate and Development Report*. Washington, DC: World Bank.

### BOX 3: Triple Dividends of Climate Resilience

The Triple Dividend concept highlights how resilience investments do not only prevent harm but also drive economic growth and well-being. It encompasses three returns:

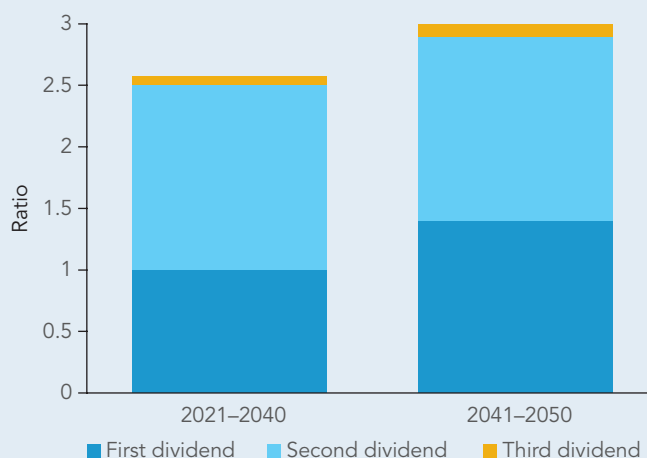
**First dividend: ‘avoided losses’.** Investing in climate adaptation saves lives, minimizes property losses and damage, protects human capital investments, and curtails productivity and financial losses resulting from climate and natural disasters.

**Second dividend: ‘induced economic benefits’.** By reducing background climate risks, adaptation investments stimulate business activity, facilitate human capital development, attract capital investment, and bolster labor productivity.

**Third dividend: ‘social and environmental benefits’.** Adaptation investments can yield far-reaching benefits that extend beyond economic or financial returns. These co-benefits encompass energy efficiency, enhanced aesthetics, greater agricultural sustainability, and enriched ecological diversity. Nature-based water and forest management measures, such as peatland restoration and floodplain renewal, have consistently shown favorable BCRs, emphasizing the multiple benefits such investments bring. Urban adaptation strategies, too, can enhance the well-being of communities and create more sustainable and climate-resilient cities.

Figure 12 below shows an example from Uzbekistan, where a series of adaptation investments was assessed through the Triple Dividends methodology. It shows that the greatest returns across both periods can be expected to derive from the second dividend (economic benefits), with the gains from the first dividend (avoided losses) growing over time as climate impacts worsen. Overall, by considering the full suite of returns, this approach makes a strong economic case for action and can help attract greater investment, particularly from the private sector, including, for example, through bond issuances or blended finance.

**FIGURE 12: Benefit-cost ratio of investments in water resources, agriculture, and land restoration**



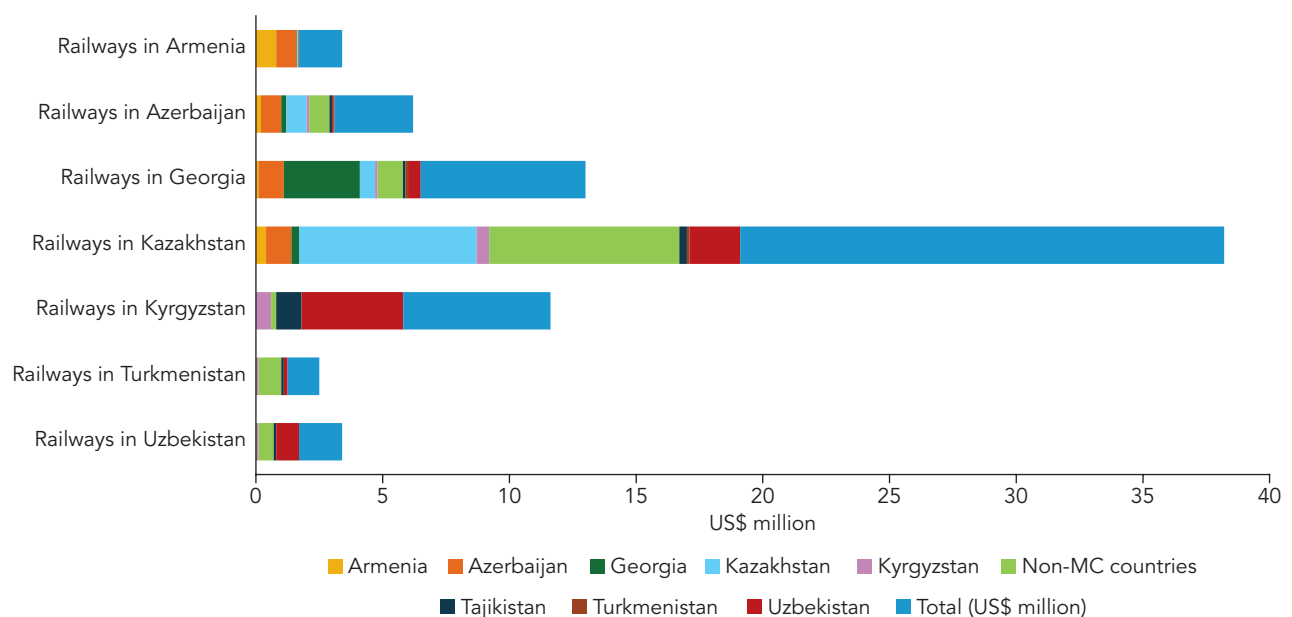
Source: World Bank. 2024. *Country Climate and Development Report: Uzbekistan*. Washington, DC: World Bank.

damaged. For example, modeling of the Middle Corridor transport network found that climate-related disruptions of one country's railways affect households in all countries along the corridor through supply chain links (Figure 13). As a result, investments in resilience in one country (for example, to make a railway section more resilient) benefit households and firms in all countries along the corridor. This raises opportunities to share investment costs between interdependent countries. For example, the government of Azerbaijan could be interested in investing in railway resilience in Georgia given the benefits in terms of avoided losses for its firms and households.

**Understanding the economic and financial profile of adaptation investments is important to identify appropriate financing modalities.** Despite the empirical evidence on returns, not all adaptation investments have the characteristics to attract investment, especially from the private sector. Structural factors inherent to adaptation investments—such as high

uncertainty over future climate patterns and events; reluctance to invest for avoided losses; the long time horizon over which risks and returns unfold; and a lack of appropriable revenue streams—can be particularly binding when it comes to financing adaptation. In this context, adaptation projects are more likely to attract private investment when they align with financial sector priorities and risk appetites. Moderately sized projects are easier to finance because they fall within the lending or investment capacity of commercial banks and institutional investors, without requiring exceptionally large consortia or complex risk-sharing arrangements. Short to medium time horizons (for example, 5–15 years) match better with the repayment periods and return expectations of most private financiers, whereas long horizons introduce excessive uncertainty and tie up capital. Projects that generate cash flows are particularly appealing, since investors can clearly identify revenue streams (such as user fees, energy savings, water tariffs, or higher land values) that can underpin repayment. Even indirect fiscal

**FIGURE 13: Estimated indirect losses to households of Middle Corridor countries in 2030 due to a one-week disruption of Middle Corridor railway sections**



Source: World Bank (forthcoming).

benefits, such as expanding the tax base, can support creditworthiness and reduce sovereign risk. Finally, projects based on models with a proven track record are more attractive because financiers can rely on past performance data and standardized risk assessments; this reduces perceived uncertainty compared to untested or experimental approaches (Brandon 2024).

## 5. What Financing Modalities Exist? An Adaptation Finance Typology for Europe and Central Asia

To guide both public and private actors in navigating the complex landscape of adaptation finance in Europe and Central Asia, Table 7 introduces a typology that categorizes the region's diverse adaptation investment needs and links them to suitable financing approaches. This typology is designed for providers and recipients of adaptation financing in Europe and Central Asia. It sets out the broad and diverse scope of adaptation financing needs across the region and provides a comprehensive breakdown of potential investment needs into sectors and subsectors that is recognizable to investors and investees alike. It then assigns typical financial profiles to this range of adaptation investments and maps these against the most appropriate financing modalities, differentiating between public and private investments and revenue-generating or non-revenue-generating investments. The typology is organized around the Climate Bonds Resilience Taxonomy climate resilience themes.<sup>15</sup> However, this typology is not exhaustive, and the example investments provided are only illustrative.

15. This framework does not use the Climate Bonds Resilience Taxonomy's detailed breakdown of different investment types (that is, adapting measures, enabling measures, adapted activities, and enabling activities) as that level of granularity is not required for the purposes of this paper. Instead, the framework simply identifies higher-level economic activities within each respective theme/sector.

**The financing modalities appropriate for different investments were assessed using the following criteria:**

- **Financing instrument:** whether financing takes the form of debt financing through borrowing (for example, a loan or bond), equity (that is, raising capital by selling a stake in a company), or guarantees (that is, promising to cover a debt if the borrower defaults). Equity financing is only relevant for private investments, whereas debt financing and guarantees are relevant to both public and private investments.
- **Pricing:** whether finance is offered on commercial terms and lent at market rates (that is, non-concessional), on concessional terms and priced at submarket rates (including blended concessional/non-concessional finance) or in the form of grants through which finance is provided for free. Non-concessional finance is typically offered for revenue-generating and commercially viable investments (typically private investments, although when public investments are revenue-generating, they can also use non-concessional financing instruments), whereas concessional or blended finance is typically appropriate for investments that generate some revenues but may not achieve full cost recovery. Grants (provided by donors or in the form of government subsidies) are typically used for investments that generate no or low financial returns.
- **Directness of financing:** whether financing is provided directly to the end recipient, for example, by an MDB to a government, or indirectly through a financial intermediary such as a local bank, and so on. Intermediated finance may be especially appropriate for reaching smaller borrowers, such as small and medium enterprises (SMEs), small-scale farmers, or households.

**TABLE 7: Adaptation Finance Typology for Europe and Central Asia**

| Sectors (with subsectors)                                                                                                                                                                                                 | Sample adaptation investments (non-exhaustive)                                                                                                                                                                                                                                              | Typically public or private sector?                                                                                                                                                                                                                                                                                                                                                          | Typical financial profile of investments                                                                                                                                                                                                                                                                                 | Potentially appropriate financing modalities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Theme: Resilient Agri-Food Systems</b>                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Agricultural production <ul style="list-style-type: none"> <li>• Crop production</li> <li>• Livestock production</li> <li>• Agroforestry</li> </ul>                                                                       | <ul style="list-style-type: none"> <li>• Irrigation improvements to make crop production more resilient to water stress</li> <li>• CSA (for example, introduction of heat-tolerant livestock breeds)</li> <li>• Adoption of agroforestry cropping systems to reduce soil erosion</li> </ul> | Private/mixed <ul style="list-style-type: none"> <li>• Private enterprises ranging from very large to very small</li> <li>• Agricultural state-owned enterprises (SOEs) in some countries of Europe and Central Asia</li> </ul>                                                                                                                                                              | Revenue-generating in certain cases, for example, commercial production and larger enterprises<br><br>Smaller farmers, especially in challenging contexts, may operate on a sub-commercial or subsistence basis.                                                                                                         | <ul style="list-style-type: none"> <li>• Non-concessional debt financing (direct; intermediated)</li> <li>• Equity investments</li> <li>• Guarantees</li> </ul><br><ul style="list-style-type: none"> <li>• Concessional/blended debt financing (direct; intermediated)</li> <li>• Government subsidies</li> <li>• Donor grants</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Aquacultural production <ul style="list-style-type: none"> <li>• Fishing</li> <li>• Other aquacultural production</li> </ul>                                                                                              | <ul style="list-style-type: none"> <li>• Introduction of heat-tolerant farmed fish species</li> </ul>                                                                                                                                                                                       | Private                                                                                                                                                                                                                                                                                                                                                                                      | Revenue-generating                                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• Non-concessional debt financing (direct; intermediated)</li> <li>• Equity investments</li> <li>• Guarantees</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Agri-food logistics, processing, and retail <ul style="list-style-type: none"> <li>• Wholesale of agricultural produce</li> <li>• Manufacture of food and beverage products</li> <li>• Retail of food products</li> </ul> | <ul style="list-style-type: none"> <li>• Adoption of water-efficient technologies in food and beverage processing</li> <li>• Cool logistics systems for perishable produce</li> </ul>                                                                                                       | Private/mixed <ul style="list-style-type: none"> <li>• Private enterprises</li> <li>• Agri-business SOEs in some countries of Europe and Central Asia</li> </ul>                                                                                                                                                                                                                             | Revenue-generating                                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• Non-concessional debt financing (direct; intermediated)</li> <li>• Equity investments</li> <li>• Guarantees</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Theme: Resilient Cities and Settlements</b>                                                                                                                                                                            |                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Buildings <ul style="list-style-type: none"> <li>• Residential</li> <li>• Commercial</li> <li>• Industrial</li> <li>• Public</li> </ul>                                                                                   | <ul style="list-style-type: none"> <li>• Green roofs that reduce internal temperatures/runoff</li> <li>• Passive ventilation/improved cooling</li> <li>• Water efficiency measures</li> </ul>                                                                                               | Mixed <ul style="list-style-type: none"> <li>• Residential buildings may be privately or government owned.</li> <li>• Commercial buildings are typically privately owned.</li> <li>• Industrial buildings may be privately owned or owned by industrial SOEs.</li> <li>• Health sector and municipal buildings are generally public in most countries of Europe and Central Asia.</li> </ul> | Privately owned residential buildings: revenue-generating<br><br>State-owned residential buildings may generate some revenues but may not fully cover investment costs<br><br>Commercial and industrial buildings: revenue generating<br><br>Health sector and municipal buildings: not revenue generating (public good) | <ul style="list-style-type: none"> <li>• Non-concessional debt financing (direct; intermediated)</li> <li>• Concessional/blended finance (direct; intermediated)</li> <li>• Equity investments (for example, in property construction companies)</li> <li>• Guarantees (for example, for property construction companies)</li> </ul><br><ul style="list-style-type: none"> <li>• Non-concessional debt financing (direct; intermediated)</li> <li>• Concessional/blended finance (direct; intermediated)</li> </ul><br><ul style="list-style-type: none"> <li>• Non-concessional debt financing (direct; intermediated)</li> <li>• Equity investments (for example, in companies that own buildings)</li> <li>• Guarantees (for example, for companies that own buildings)</li> </ul><br><ul style="list-style-type: none"> <li>• Government subsidies</li> <li>• Donor grants</li> </ul> |
| Urban systems <ul style="list-style-type: none"> <li>• Urban planning and management</li> </ul>                                                                                                                           | Improved stormwater management<br>Blue/green infrastructure to build resilience to floods/heatwaves                                                                                                                                                                                         | Public<br>Especially local government                                                                                                                                                                                                                                                                                                                                                        | May generate some revenue but may not cover full investment costs                                                                                                                                                                                                                                                        | Non-concessional debt financing (direct; intermediated)<br>Concessional/blended finance (direct; intermediated)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Sectors (with subsectors)                                                                                                                                            | Sample adaptation investments (non-exhaustive)                                                                                           | Typically public or private sector?                                                                                                | Typical financial profile of investments | Potentially appropriate financing modalities                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Theme: Resilient Health Systems</b>                                                                                                                               |                                                                                                                                          |                                                                                                                                    |                                          |                                                                                                   |
| Health facilities<br>• Hospitals, clinics, nursing homes, and so on                                                                                                  | Improved cooling<br>• New health facilities to serve climate-vulnerable communities                                                      | Public<br>• Most health facilities are state-owned in Europe and Central Asia, although private providers exist in some countries. | Not revenue-generating                   | • Government subsidies<br>• Donor grants                                                          |
| Health care services<br>• Delivery of treatment and care<br>• Emergency health services                                                                              | • Immunization programs for climate-driven infectious diseases<br>• Post-emergency sanitation facilities (for example, following floods) | Public<br>• As above                                                                                                               | Not revenue-generating                   | • Government subsidies<br>• Donor grants                                                          |
| <b>Theme: Resilient Industry and Commerce</b>                                                                                                                        |                                                                                                                                          |                                                                                                                                    |                                          |                                                                                                   |
| Mining and quarrying                                                                                                                                                 | • Water efficiency measures<br>• Flood protection of tailing dams                                                                        | Private/mixed<br>• Mining SOEs in some countries                                                                                   | Revenue-generating                       | • Non-concessional debt financing<br>• Equity investments<br>• Guarantees                         |
| Forestry and logging<br>• Commercial timber production                                                                                                               | • Wildfire prevention/control measures                                                                                                   | Private/mixed<br>• Timber/logging SOEs in some countries                                                                           | Revenue-generating                       | • Non-concessional debt financing<br>• Equity investments<br>• Guarantees                         |
| Manufacturing<br>• Process manufacturing<br>• Pharmaceuticals and biotechnology<br>• Technology manufacturing<br>• Other discrete manufacturing                      | • Water efficiency measures<br>• Cool logistics systems for perishable manufactured products                                             | Private                                                                                                                            | Revenue-generating                       | • Non-concessional debt financing (direct; intermediated)<br>• Equity investments<br>• Guarantees |
| Commercial trade<br>• Wholesale trade<br>• Retail trade                                                                                                              | • Enhanced commodity storage capacity for extreme weather events                                                                         | Private                                                                                                                            | Revenue-generating                       | • Non-concessional debt financing (direct; intermediated)<br>• Equity investments<br>• Guarantees |
| Logistics services<br>• Warehousing and storage<br>• Logistics information management                                                                                | • Cool logistics systems to prevent losses during heatwaves                                                                              | Private                                                                                                                            | Revenue-generating                       | • Non-concessional debt financing (direct; intermediated)<br>• Equity investments<br>• Guarantees |
| Hospitality<br>• Tourism<br>• Leisure                                                                                                                                | • Water efficiency<br>• Cooling<br>• Designing leisure facilities as extreme heat shelters                                               | Private                                                                                                                            | Revenue-generating                       | • Non-concessional debt financing (direct; intermediated)<br>• Equity investments<br>• Guarantees |
| Financial services<br>• Banking<br>• Insurance                                                                                                                       | • Provision of credit to climate-vulnerable households<br>• Weather-related insurance products                                           | Private                                                                                                                            | Revenue-generating                       | • Non-concessional debt financing<br>• Equity investments<br>• Guarantees                         |
| Other services<br>• Scientific and engineering services including research and development (R&D)<br>• Data and information services<br>• Other office-based services | • Flood warning systems<br>• Weather forecasting services                                                                                | Mixed<br>• May be carried out by private enterprises or by public bodies such as research institutes, and so on                    | Private enterprises – revenue-generating | • Non-concessional debt financing<br>• Equity investments<br>• Guarantees                         |
|                                                                                                                                                                      |                                                                                                                                          |                                                                                                                                    | Public bodies - public good              | • Government subsidies<br>• Donor grants                                                          |

| Sectors (with subsectors)                                                                                                                                           | Sample adaptation investments (non-exhaustive)                                                                                                                                                     | Typically public or private sector?                                                                                                                                          | Typical financial profile of investments                                                                                  | Potentially appropriate financing modalities                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Theme: Resilient Infrastructure</b>                                                                                                                              |                                                                                                                                                                                                    |                                                                                                                                                                              |                                                                                                                           |                                                                                                                                   |
| Energy infrastructure<br>• Electricity generation<br>• Electricity transmission, distribution, and storage                                                          | <ul style="list-style-type: none"> <li>Upgrading hydropower generation to cope with more variable hydrology</li> <li>Increasing storm or fire resilience in energy transmission systems</li> </ul> | Mixed<br>• May be carried out by state-owned energy utilities or by private enterprises in some cases (including public-private partnerships [PPPs]).                        | State-owned utilities - may generate some revenues but not cover full investment costs (often constrained by low tariffs) | <ul style="list-style-type: none"> <li>Non-concessional debt financing</li> <li>Concessional / blended debt financing</li> </ul>  |
|                                                                                                                                                                     |                                                                                                                                                                                                    |                                                                                                                                                                              | Private enterprises – revenue-generating                                                                                  | <ul style="list-style-type: none"> <li>Non-concessional debt financing</li> <li>Equity investments</li> <li>Guarantees</li> </ul> |
| Information and communication technology (ICT) infrastructure<br>• Transmission networks<br>• Data facilities                                                       | <ul style="list-style-type: none"> <li>Upgrading ICT infrastructure to be more resilient to storm damage</li> <li>Efficient cooling in data centers</li> </ul>                                     | Mixed<br>• May be carried out by state-owned telecoms utilities or by private enterprises                                                                                    | Revenue-generating                                                                                                        | <ul style="list-style-type: none"> <li>Non-concessional debt financing</li> <li>Equity investments</li> <li>Guarantees</li> </ul> |
| Transport infrastructure<br>• Roads<br>• Railways<br>• Ports<br>• Aviation                                                                                          | <ul style="list-style-type: none"> <li>Upgrading roads to be more resilient to flooding</li> <li>Upgrading ports to be more resilient to storm damage</li> </ul>                                   | Mixed<br>• May be carried out by public bodies (for example, road and rail) or in some cases by private enterprises including through PPPs (for example, ports and airports) | Public bodies - may generate some revenues but not cover full investment costs                                            | <ul style="list-style-type: none"> <li>Non-concessional debt financing</li> <li>Concessional/blended debt financing</li> </ul>    |
|                                                                                                                                                                     |                                                                                                                                                                                                    |                                                                                                                                                                              | Private enterprises – revenue-generating                                                                                  | <ul style="list-style-type: none"> <li>Non-concessional debt financing</li> <li>Equity investments</li> <li>Guarantees</li> </ul> |
| Water infrastructure<br>• Water storage<br>• Water supply<br>• Irrigation networks<br>• Desalination<br>• Wastewater collection and treatment<br>• Flood management | <ul style="list-style-type: none"> <li>Upgrading water supply systems to minimize water losses</li> <li>Desalination plants</li> </ul>                                                             | Public/mixed<br>• May be carried out by state-owned water utilities or by private enterprises in some cases (including PPPs)                                                 | State-owned utilities - may generate some revenues but not cover full investment costs (often constrained by low tariffs) | <ul style="list-style-type: none"> <li>Non-concessional debt financing</li> <li>Concessional/blended debt financing</li> </ul>    |
|                                                                                                                                                                     |                                                                                                                                                                                                    |                                                                                                                                                                              | Private enterprises – revenue-generating                                                                                  | <ul style="list-style-type: none"> <li>Non-concessional debt financing</li> <li>Equity investments</li> <li>Guarantees</li> </ul> |
| Waste infrastructure<br>• Solid waste management                                                                                                                    | <ul style="list-style-type: none"> <li>Flood protection of solid waste facilities</li> </ul>                                                                                                       | Public<br>• Typically local government                                                                                                                                       | May generate some revenues but possibly not cover full investment costs                                                   | <ul style="list-style-type: none"> <li>Non-concessional debt financing</li> <li>Concessional/blended debt financing</li> </ul>    |
| <b>Theme: Resilient Natural Systems</b>                                                                                                                             |                                                                                                                                                                                                    |                                                                                                                                                                              |                                                                                                                           |                                                                                                                                   |
| Terrestrial, freshwater, and marine ecosystems                                                                                                                      | <ul style="list-style-type: none"> <li>Protection of land-based, freshwater, and marine natural habitats against climate change impacts</li> </ul>                                                 | Public                                                                                                                                                                       | Not revenue-generating                                                                                                    | <ul style="list-style-type: none"> <li>Government subsidies</li> <li>Donor grants</li> </ul>                                      |
|                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Ecotourism</li> </ul>                                                                                                                                       | Public/private                                                                                                                                                               | Potentially revenue-generating                                                                                            | <ul style="list-style-type: none"> <li>Non-concessional debt financing</li> <li>Concessional/blended debt financing</li> </ul>    |
| <b>Theme: Resilient Social Systems</b>                                                                                                                              |                                                                                                                                                                                                    |                                                                                                                                                                              |                                                                                                                           |                                                                                                                                   |
| Education and awareness<br>• Child education<br>• Public awareness                                                                                                  | <ul style="list-style-type: none"> <li>Disaster risk awareness in school curricula</li> <li>Public awareness campaigns about water conservation</li> </ul>                                         | Public                                                                                                                                                                       | Not revenue-generating - public good                                                                                      | <ul style="list-style-type: none"> <li>Government expenditure</li> <li>Donor grants</li> </ul>                                    |
| Social protection<br>• Social assistance<br>• Livelihoods support                                                                                                   | <ul style="list-style-type: none"> <li>Material assistance programs for communities affected by climate disasters</li> <li>Alternative livelihood programs for climate-displaced people</li> </ul> | Public                                                                                                                                                                       | Not revenue-generating - public good                                                                                      | <ul style="list-style-type: none"> <li>Government expenditure</li> <li>Donor grants</li> </ul>                                    |
| Public administration<br>• Maintaining national security<br>• Disaster risk reduction (DRR)                                                                         | <ul style="list-style-type: none"> <li>Development of emergency response plans</li> </ul>                                                                                                          | Public                                                                                                                                                                       | Not revenue-generating - public good                                                                                      | <ul style="list-style-type: none"> <li>Government expenditure</li> <li>Donor grants</li> </ul>                                    |
| Culture<br>• Preservation of cultural heritage<br>• Management of cultural facilities                                                                               | <ul style="list-style-type: none"> <li>Protection of cultural heritage from floods</li> </ul>                                                                                                      | Public                                                                                                                                                                       | Not revenue-generating - public good                                                                                      | <ul style="list-style-type: none"> <li>Government expenditure</li> <li>Donor grants</li> </ul>                                    |

## 6. How Can Adaptation Finance Be Increased in Europe and Central Asia?

This section sets out an agenda to overcome the barriers identified above to adaptation investments in Europe and Central Asia. It first considers how to address the barriers to the identification and development of adaptation investments (to increase demand for adaptation finance) and then considers approaches and instruments to mobilize public and private capital (to increase supply of adaptation finance). The recommendations do not cover ex post risk financing, which are complex and covered elsewhere (World Bank 2019, 2023), and focus instead on finance for ex ante risk reduction investments. The recommendations marked as ‘High Priority’ should be pursued first in countries that have not completed them yet, since they are preconditions for the success of other recommendations.

### 6.1. Increasing demand for adaptation finance: establishing the conditions for adaptation investments

This section highlights a few critical recommendations that are particularly relevant to ensure that adaptation needs effectively translate into investment projects in Europe and Central Asia. Underinvestment in adaptation is a function of barriers to financing and constraints to demand that prevent quality adaptation investments from being identified and packaged.<sup>16</sup> Moreover, macroeconomic and other structural barriers may undermine investment, particularly private investment, across all sectors of the economy. Indeed, country-specific risk (rather than sector or project risk) is estimated to ac-

count for 60–90 percent of investor risk consideration (Gautam et al. 2024). Addressing such barriers will lift overall investment, with positive effects for adaptation investments as well, but their discussion is outside the scope of this report. Given that some adaptation investments are revenue-generating and could be potentially funded by the private sector, a Cascade approach can be followed, sequencing reforms, support to private investments, and then public investments (Cordella 2018).

#### **High Priority:**

***Improve the availability of data, models, and information for defining and assessing adaptation investment needs and potential returns***

#### **The problem(s)**

While the broad direction of the future climate is understood, specific impacts—including precise location, scale, and especially timing of climate events—remain highly uncertain. Lack of adequate granular localized and sector-specific climate risk data makes it difficult for actors to assess risks and potential returns on adaptation investments. Accurate medium- and long-term weather forecast data, packaged for use, have begun to develop in HICs but are mostly lacking in developing countries.

Europe and Central Asia overall has relatively good concentration of weather stations, although most countries in the region still lag significantly behind Western Europe and many still have far too few weather stations to allow for appropriately localized data. Moreover, the coverage and availability of high-resolution data, detailed hazard maps, and local-scale climate scenarios can be improved and made publicly available through public and/or commercial services. Similarly, many parts of the region, especially Central Asia, lack access to high-resolution flood risk data, which hampers

16. Lifelines: The Resilient Infrastructure Opportunity, Adaptation Principles.

accurate risk assessment and pricing. Within the public sector, there is limited capacity to assess climate risks and use risk assessments to inform resilience investment needs.

### Potential solutions

- **Improve the availability of climate data, models, and projections**, including by strengthening national bodies such as hydro-meteorological agencies and by creating public-private collaborations on data and modeling. This should include supporting public authorities to deliver reliable climate and weather information services relevant for the private sector. Provision of granular, localized climate data by public hydromet services creates a foundation for private sector innovation in climate risk and resilience services. When high-quality, timely data on temperature, rainfall, floods, and droughts are made openly available, they enable insurance providers, agri-tech firms, and infrastructure planners to develop tailored products such as index insurance, early warning systems, or climate risk analytics. Examples include the following:
  - [Climate Scale](#), a public-private platform that provides high-resolution, multi-decadal climate projections tailored for sectors such as energy, agriculture, and infrastructure. It bridges the gap between advanced climate science and actionable decision-making tools for businesses. Partners are Barcelona Supercomputing Center (Spain, public research), CLIMACORE S. L. (Spain, private), and regional stakeholders.
  - The [CLARITY project](#), funded by the EU's Horizon 2020 program, which developed the Climate Services Information System. This tool provides hazard and impact modeling, considering climate scenarios and urban microclimate variability. In Naples, Italy, the Climate Services Information System was used to assess risks such as heatwaves and floods, aiding in the integration of DRR and climate adaptation strategies into urban planning.
  - Ireland's [TRANSLATE](#) (Tool for Regional Assessment of Climate Impacts and Land Use Adaptation Strategies) is a publicly available, high-resolution climate modeling and impact projection tool developed by Met Éireann. It offers localized projections of key climate variables, such as temperature, precipitation, and sea level rise, at regional and sectoral scales across Ireland. By making these data openly accessible, TRANSLATE enables policy makers, planners, and stakeholders to assess potential climate impacts with greater precision and transparency. Met Éireann collaborates with stakeholders to transform TRANSLATE projections into customized climate services—for example, climate indexes, vulnerability metrics, and uncertainty estimates—explicitly tailored for decision makers in areas such as transport, energy, and water. TRANSLATE outputs underpin climate-service products such as vulnerability indexes for heritage sites and bespoke datasets in formats (NetCDF, GeoTIFF, and CSV) useful for private service providers.
- **Improve the assessment and quantification of the economic and financial returns of adaptation investments**, including by building the capacity of line ministries, ministries of finance, and other government bodies to carry out such assessments as part of national investment planning and NAP development, implementation, and monitoring. This could be supported, for example, through bodies such as the [Coalition of Finance Ministers for Climate Action](#). For public investment projects, online tools such as the World

Bank-led [Geospatial Planning and Budgeting Platform \(GPBP\)](#) combined with use of climate-informed cost-benefit analysis can progressively document and quantify adaptation benefits in terms of reduced risk of damage and losses as well as wider monetized ‘triple dividend’ benefits.

- **Use tools such as the [World Bank Resilience Rating System \(RRS\)](#) to track projects’ contributions to broader resilience objectives.** The RRS is a diagnostic and decision support tool that assesses the climate resilience of projects by evaluating three dimensions: the resilience of project outcomes (including its economic and financial returns), the resilience of beneficiaries, and the project’s contribution to systemic resilience. It provides a standardized method for identifying climate risks and quantifying how well projects reduce vulnerability and enhance adaptive capacity. By assigning ratings based on these criteria, the RRS enables decision makers to prioritize and allocate funding to projects that deliver measurable climate adaptation benefits. It also helps track adaptation finance more accurately and supports mainstreaming climate resilience across sectors and portfolios.

### ***Strengthen the regulatory and policy enabling environment for adaptation investment***

#### **The problem(s)**

Investments in climate adaptation can be significantly constrained by weak government regulations, which fail to set clear and enforceable resilience standards. Asset owners and infrastructure providers typically do not bear the full costs of climate-induced shocks and disruptions and so have limited incentive to invest in resilience. For example, if building codes do not mandate climate-resilient construction,

such as flood-proofing in flood-prone areas or heat-adapted materials in increasingly hot regions, or if land use plans do not place restrictions on investments in flood-prone areas, private developers have limited incentive to invest in more expensive, adaptive infrastructure. Indeed, across most countries of Europe and Central Asia, the regulatory environment governing infrastructure service provision and land use fails to adequately address climate risk. For example, while many countries have integrated resilience in building codes and infrastructure standards, few have established residual risk levels for identified natural hazards. Moreover, the absence of regulatory frameworks for ecosystem-based adaptation (for example, wetlands restoration or urban greening) across most countries of Europe and Central Asia makes it difficult to quantify benefits and attract finance for nature-based adaptation solutions.

#### **Potential solutions**

- **Integrate climate resilience into the core of public investment management and land use planning.** This includes requiring that all public infrastructure planning, especially urban development and land use decisions, be risk-informed and aligned with long-term climate scenarios. By embedding climate adaptation criteria into investment planning and appraisal processes, governments can ensure that public resources are allocated to infrastructure that is future-proof and does not exacerbate climate vulnerability. Land use plans, in particular, should be revised to discourage development in high-risk areas such as floodplains, unstable slopes, or heat-vulnerable zones and promote zoning that supports resilient urban forms and nature-based solutions. While infrastructure investments can be required to meet certain resilience standards (for example, roads may be required to be constructed to cope with a 20-year return period rainfall

event), regulations can also require that infrastructure service providers meet some outcome standard that defines the minimum level of service acceptable in the event of a climate-induced disruption.

- **Integrate climate resilience into environmental impact assessments (EIAs).** EIAs can be required to include a mandatory assessment of how future climate effects could affect the viability and sustainability of proposed infrastructure projects over their lifetime. The EU's EIA Directive (2014) requires that EIAs explicitly evaluate potential impacts from climate-related hazards on any project. This helps prevent maladaptive investments and promotes early stage resilience planning.
- **Integrate climate resilience into PPP frameworks.** In PPPs, regulatory frameworks can require that climate risks and adaptation measures are disclosed and considered during project design, approval, and implementation. Strengthening these tools ensures that climate risks are visible to investors and decision makers, reducing uncertainty and encouraging private sector engagement in resilient infrastructure. The [World Bank's Framework for Disclosure in PPPs](#) offers a useful model, supporting the integration of climate-related physical, social, and financial risks into project disclosures. This is supported by [Climate Toolkits for Infrastructure PPPs](#), which provide guidance on aligning projects with climate policies, assessing greenhouse gas emissions, evaluating climate risks, and developing adaptation strategies; they also offer key performance indicators for contractual compliance with climate objectives, ensuring that climate resilience is embedded throughout the project life cycle.

- **Require firms (or, at least firms of a certain size) to develop business continuity plans.**

For example, Japan's policy and institutional framework for industry resilience, the Basic Disaster Response Plan, requires companies to recognize the role that they are expected to play when disaster strikes, to understand their own risk from a natural disaster, and to implement risk management and develop business continuity plans to minimize the consequences of shock (Hallegatte, Rentschler, and Rozenberg 2019).

### *Align pricing and other economic incentives to promote private adaptation investment*

#### **The problem(s)**

Not only do regulatory policies generally fail to facilitate adaptation investments but prices and markets often disincentivize such investments by households and firms. For example, access to highly subsidized water for irrigation, particularly in Central Asia but broadly across Europe and Central Asia, undermines the incentive for firms to invest in water-efficient technologies in the face of climate-induced water scarcity. Similarly, underinvestment in resilience is likely to prevail where markets fail to adequately price in flood risks to land and property developments or where flood insurance in high-risk locations is subsidized. For example, in the United States, the National Flood Insurance Program (NFIP) subsidizes premiums for buildings constructed before the first Flood Insurance Rate Map. As a result, a small share of NFIP policyholders are repetitive-loss properties that have received multiple payouts, such that about 1 percent of insured properties account for 25–30 percent of claims losses, largely due to build-and-rebuild cycles in flood zones.

## Potential solutions

- **Consider tariff reforms in sectors where adaptation investment needs are great but investment is hampered by low revenue flows**, for example, public water and energy utilities. There are a number of examples in Europe and Central Asia where reforms to agricultural water pricing (including cost recovery tariffs) have stimulated investments in drip irrigation, rainwater storage, and shifting to less water-intensive crops, for example, in [Spain](#) and [Türkiye](#). Such reforms should be advanced cautiously in light of significant economic, social, and political sensitivities around raising water and energy tariffs and should be accompanied by measures that ensure poor and vulnerable populations have access to affordable basic services. When reforming tariffs is not possible, using guarantees can help make resilience investments more attractive to the private sector (see Section 5).
- **Insurance mandates:** When insurance is mandatory and premiums reflect actual risk, companies have a direct financial incentive to invest in resilience measures—such as flood defenses, fireproofing, or climate-resilient construction—to lower their premiums or maintain coverage. Additionally, insurance mandates can be linked to regulatory requirements, such as compliance with risk reduction plans or building codes, further encouraging proactive investment in adaptation. This not only protects assets but also contributes to broader systemic resilience. For example, the [French CatNat insurance](#) scheme includes a progressive deductible mechanism for flood damages, which increases for municipalities that fail to adopt risk-informed urban planning through officially approved Natural Risk Prevention Plans (*Plans de Prévention des Risques Naturels*).

This design creates a financial incentive for local governments to invest in risk reduction and land use planning, helping mitigate future disaster losses and enhance community resilience.

- **Implement proactive incentives for private adaptation investments:** This could include financial incentives, for example, tax relief, import duty relief, risk guarantees, and so on or nonfinancial incentives, for example, fast-track permitting for adaptation projects in highly exposed sectors. Incentives could also be put in place for the financial sector such as tax reductions, grants for verification mechanisms of green bonds, and so on. For example, the Republic of Korea's [Smart City](#) and [Green New Deal](#) initiatives include tax breaks and accelerated permitting for projects that incorporate resilient infrastructure, water management, and early warning systems.

## High Priority:

### Strengthen institutional coordination and management for adaptation investment planning

## The problem(s)

Weak institutional mandates and poor coordination prevent adaptation planning from effectively integrating with national public investment planning. In most countries in Europe and Central Asia, NAPs or equivalent national adaptation planning processes are typically led by ministries of environment rather than by center-of-government bodies such as ministries of finance, ministries of planning, or prime ministers' offices, which is where national investment planning and the management of public finances generally take place. Furthermore, ministries of environment are often more peripheral line ministries that lack convening power over other sectoral line ministries. This

institutional disconnect is a common reason for why adaptation planning is largely detached from mainstream public investment planning in many countries around the world, including in Europe and Central Asia. In addition, ministries of environment are not well-resourced in some countries of Europe and Central Asia, especially smaller countries and LMICs with smaller government budgets. This means that ministries of environment are often constrained in terms of human, technical, and financial capacity, especially when small and resource-constrained teams ultimately need to manage competing and overlapping processes.

### Potential solutions

- **Link NAP development and implementation more closely to overall public investment planning and public expenditure management and engage the private sector:** This includes giving ministries of finance more prominent roles in these processes and involving the private sector in NAP development and ensuring that private sector perspectives and priorities are accounted for, for example, through the development of governance structures that include private sector representation in adaptation planning (for example, public-private councils and advisory boards), as well as co-investment models and partnership frameworks for joint public-private adaptation initiatives.
- **Convene interministerial coordination through a center-of-government body:** An example of this model is [Singapore's National Climate Change Secretariat](#). Situated within the Prime Minister's Office, it coordinates both mitigation and adaptation actions across all government agencies, including the Ministry of Sustainability and the Environment, the National Environment Agency,
- **Leverage external technical support for interministerial coordination on adaptation planning:** An example of this is the [ADB's Climate Adaptation and Investment Planning \(CAIP\)](#) approach that is currently being implemented in 12 Asian countries. CAIP facilitates policy dialogue and technical engagement to convene relevant ministries, particularly finance, environment (as the focal point for climate action), and key sectoral ministries such as agriculture and transport.

and the Ministry of Finance, which manages public finances and economic policy. [An OECD report](#) provides more successful examples. However, experience from Europe and Central Asia illustrates some of the challenges to implementing these kinds of institutional arrangements. For example, Armenia's Inter-Agency Coordinating Council on Climate Change, despite being chaired by the Deputy Prime Minister, has struggled to define its strategic focus and to provide an effective coordination mechanism. To address these challenges, the government of Armenia is looking at options for giving the Ministry of Finance a more prominent role and embedding the council's work into systematic government action plans.<sup>17</sup>

### *Integrate adaptation into fiscal planning and management processes*

#### The problem(s)

In most countries of Europe and Central Asia, climate adaptation remains poorly integrated into fiscal planning and public financial management systems, undermining the effectiveness, efficiency, and accountability of adaptation efforts. As shown in Section 4, among all categories in the assessment of A&R Readiness,

17. Armenia's CCDR.

#### BOX 4: Ireland's National and Sectoral NAP Process (2019–2025)

Ireland's National Adaptation Framework, established under the 2015 Climate Action and Low Carbon Development Act and updated in 2018, provides a strong example of effective cross-government planning for climate adaptation. The framework mandates the development of sectoral adaptation plans by key government departments—such as those responsible for transport, agriculture, health, and water—ensuring that adaptation is integrated into core policy areas. These sectoral plans are complemented by local authority strategies developed under the coordination of the Department of the Environment, Climate and Communications, which provides guidance and national-level coordination. The process is underpinned by regular cross-departmental coordination, facilitated by the Climate Action Delivery Board, a high-level governance body co-chaired by the Secretaries General of the Department of the *Taoiseach* (head of government) and the Department of the Environment, that monitors and drives implementation of

both mitigation and adaptation actions. This integrated, whole-of-government approach ensures alignment of adaptation planning with national development goals and creates a foundation for more targeted and efficient allocation of adaptation finance.

The process also supports identification, prioritization, and packaging of adaptation investments. Under the National Adaptation Framework and its Sectoral Planning Guidelines, each sectoral plan requires assessing the costs and benefits of proposed actions, supported by technical climate risk assessment tools (for example, the [TRANSLATE](#) dataset from Met Éireann), ensuring decisions are based on robust climate data and thus enabling sectors to rank and cost out interventions, essential for preparing bankable packages. This structured approach allows departments to systematically move from broad adaptation goals to targeted, costed investment portfolios aligned to national and EU funding frameworks.

Source: [Climate Ireland](#).

countries of Europe and Central Asia rated lowest on macro-fiscal and financial readiness, with very limited planning for long-term macroeconomic impacts. Indeed, climate risks are generally overlooked in budget and investment decisions, leading to misaligned spending and greater long-term vulnerability. Moreover, few governments have systems in place to identify and track adaptation-related expenditures, due in part to lack of clear definitions and overlapping mandates for the adaptation agenda. These specific gaps for adaptation investments exacerbate underlying inefficiencies in public investment management prevalent across most of Europe and Central Asia (including the use of dual capital-recurrent budgeting), which contributes to underinvestment in resilience.

#### Potential solutions

- **Integrate physical climate risk and adaptation needs assessments into country-level macroeconomic and fiscal analyses**, including coordination with International Monetary Fund (IMF) Article IV assessments and Public Investment Management Assessments, where relevant. This should aim to ensure that adaptation priorities are systematically fed into national policy, planning, and investment processes. In the UK, for example, the 2008 Climate Change Act mandates that a [Climate Change Risk Assessment](#) be carried out every five years, evaluating climate risk to key infrastructure and sectors of the economy. Although the assessment does not direct-

ly provide detailed macroeconomic and fiscal impact modeling, it establishes a critical evidence base to inform adaptation policy and investment planning. [Georgia](#) quantifies and reports climate-related fiscal risks and those from natural disasters annually to Parliament. In Albania, the [IMF's 2024 Article IV assessment](#) identified that the effects of extreme climate events driven by rising temperatures on key sectors such as hydropower and agriculture have the potential to lower economic growth and disrupt financial stability. In response, the IMF recommended prioritizing natural disaster vulnerability assessments, the adoption of adaptation measures in key economic sectors, and the development of a comprehensive disaster resilience strategy.

- **Introduce climate/green budget tagging.** Policy-based budget tagging has emerged as one of the most prominent tools to track climate adaptation (and mitigation) public finance at a more granular level. Tools such as climate budget tagging/tracking (CBT) apply specific taxonomies to identify adaptation expenditures across sectors. In Europe and Central Asia, beyond HICs such as Austria, France, and the UK, [Georgia](#) has now instituted CBT as part of its eBudget system while Serbia has published for the first time an [annex of green programs](#) as part of its 2025 budget disclosure, also including a number of adaptation-focused initiatives. Except in some of the most mature cases, CBT accounting and reporting in Europe and Central Asia still excludes subnational and SOE sectors, falling short of a whole-of-government approach. [Austria's Green Budgeting](#) experience illustrates the ability to use spending reviews to better understand the strengths and weaknesses for particular programs, including maladaptation risks.

## 6.2. Mobilizing public finance and private capital for adaptation investments

This section summarizes actions that can help mobilize public and private financial resources for adaptation (the supply side of adaptation finance). In a context of limited fiscal resources, it is critical that public finance for adaptation is deployed in a strategic and efficient manner. This requires prioritizing investments with the highest adaptation impact and effectively integrating this with public investment and fiscal management processes to ensure targeted and efficient investment. It also requires mobilizing financial instruments from domestic and international sources that can be particularly effective in supporting public adaptation investments. Governments also play a critical role in enabling private investment in adaptation-related sectors such as water, agriculture, infrastructure, and insurance. This section outlines key policy and regulatory actions that can help unlock private finance, including the development of clear and credible adaptation taxonomies, integration of adaptation objectives into sustainable finance frameworks, development of platforms to aggregate and facilitate adaptation investments, and de-risking of private investments with blended finance or guarantees.

### **Mobilize domestic public resources and maximize access to international concessional finance**

#### **The problem(s)**

As discussed throughout this report, public investments in adaptation fall short in most countries due to a combination of structural factors related to adaptation investments (lack of strong cost-benefit evidence, poor government coordination, and weak institutional constituencies) and increasing budget constraints. International concessional finance continues to be

significantly skewed toward climate mitigation over adaptation. Moreover, the institutional architecture to access funds for adaptation can be challenging, with fragmented funding sources and complex eligibility, access, and reporting procedures, raising transaction costs and delaying implementation. The challenges in accessing and efficiently using both domestic public financing and international financing are aggravated by the tendency of NAPs to focus almost exclusively on grants as the means of financing adaptation priorities.

### Potential solutions

- Spend better: Repurpose subsidies to target adaptation outcomes.** Governments can repurpose subsidies to better support climate adaptation by shifting financial support away from traditional production-based incentives toward payments for ecosystem services (PES) and resilience-building activities. For example, instead of subsidizing agricultural inputs such as fertilizers or water-intensive crops, subsidies can reward farmers for practices that enhance soil health, conserve water, restore wetlands, or maintain natural buffers that reduce flood risks and improve drought resilience. [Costa Rica's lauded PES program](#) was financed through shifting subsidies from agricultural expansion toward payments to landowners who conserve forests, protect watersheds, and maintain biodiversity, which contributed to improved water security and reduced flood risks and helped rural communities adapt to climate variability by preserving natural ecosystem buffers. In Europe, Switzerland's Ecological Direct Payments System (Box 5) and the reforms to the EU's Common Agricultural Policy similarly have shifted from government expenditures that aggravated climate vulnerability to expenditures that support resilience-building investments.
- Ring-fence environmental taxes for adaptation investments:** Governments can effectively ring-fence revenues from carbon pricing or other environmental levies to fund investments in climate A&R, creating a direct funding stream that aligns polluter payments with urgent climate needs. This helps ensure that revenues generated from emissive activities is reinvested into strengthening the resilience of vulnerable communities and critical infrastructure. While ring-fencing can be criticized for reducing budget flexibility and potentially the efficiency of carbon pricing, it can have important political economy benefits due to its transparency and ability to demonstrate tangible benefits of environmental taxes. [Colombia](#) allocates carbon tax proceeds to the Colombian Peace Fund (originally, the Sustainable Colombia Fund), from which the majority of resources are used for adaptation and wider environmental projects, including managing coastal erosion and reducing deforestation. Similarly, South Africa's carbon tax includes provisions for revenues to fund a [National Climate Change Response Policy](#), which incorporates both mitigation and adaptation strategies, including investments in water resource management and DRR. [Ireland](#) ring-fences its carbon tax revenue and allocates it to support the climate transition, including both mitigation (building retrofitting and other energy efficiency measures) and adaptation (especially agricultural schemes).
- Leverage subnational investment capacity.** Governments can take advantage of funding at the subnational level—such as by cities and municipalities—to help close national funding gaps for climate adaptation by empowering local authorities to identify and implement resilience projects. National governments can support bottom-up investment

### **BOX 5: Switzerland's Ecological Direct Payments System - transforming agricultural subsidies for climate resilience**

Switzerland's Ecological Direct Payments System, embedded in its agricultural policy since the 1990s and refined through reforms such as Agricultural Policy 2014–17, marks a shift from production-based subsidies to performance-based payments tied to environmental and climate resilience outcomes. The system allocates approximately CHF 3.9 billion annually (~57% of total agricultural support) to incentivize climate-resilient farming practices for 88% of Swiss farms which participate in the program (approximately 46,000 farms). It operates through seven key direct payment categories, as outlined by the Swiss Federal Office for Agriculture: (a) Cultural Landscape: maintenance of traditional farming systems that preserve landscape resilience and aesthetic value; (b) Biodiversity: management of Ecological Compensation Areas, such as meadows and hedgerows, to enhance ecosystem resilience; (c) Landscape Quality Enhancement for preserving climate-adaptive landscape features, such as terraced slopes or water retention areas; (d) Animal Welfare: livestock systems that reduce climate vulnerability through sustainable grazing; (e) Resource Efficiency: practices for reducing water, nutrient, and energy use intensity; (f) Production System: organic farming, integrated pest management, and climate-adaptive crop varieties; and (g) Sustainable Supply Chains: maintaining domestic food production under cross-compliance with environmental standards. Farmers receive payments based on verified performance against 37 specific indicators under the above categories with payments ranging from CHF 200 to 3,500 per ha depending on the combination of practices adopted.

**Impact and outcomes:** Evidence showcases results in strengthening adaptation resilience with (a) 30–40% increase in [plant species richness](#) in Ecological Compensation Areas compared to conventional grasslands (these areas cover 15.6% of the utilized agricultural area in 2023) (Enri et al. 2020), (b) ~5–10% improvement in soil organic carbon content in some organic farms under direct payments (Enri et al. 2020), and (c) ~10–15% better yield stability during extreme weather events and droughts (2022 and 2023) compared to conventional farms and improvements in [water retention](#).

**Lessons to scale and replicate:** The Swiss model's robust monitoring (for example, Swiss Biodiversity Monitoring Data), farmer acceptance, and quantifiable outcomes make it a scalable framework, especially in small-scale, mosaic landscapes, alpine regions including mountainous areas of the Balkans, and temperate agricultural zones such as Poland. Its flexibility allows adaptation to local contexts, with better availability of environmental indicators, resulting in category expansion for direct payments to support reduction in pesticide use. The EU's Common Agricultural Policy 2023–27 has integrated this instrument, with countries such as France and Germany testing similar performance-based models.

Sources: [Swiss Federal Office for Agriculture](#) (Swiss Government 2007), [OECD Swiss Agricultural Policy](#) Monitoring Report 2023.

by decentralizing access to catalytic funding and providing technical support. They can also help ensure the enabling environment to generate local revenues and use the proceeds for adaptation investments. In this context, one innovation that can be relevant for adaptation investments is ‘land value capture’, whereby local governments capture a portion of the increase in land value that results from an adaptation investment (for example, flood protection infrastructure)—for instance through developer fees, leasing of public land, or land taxes—and use it to fund the investment (see examples from [Cali, Colombia](#), [Miami, USA](#), and an [overview for 60 countries](#)). Local governments may also be able to issue their own green bonds (see further discussion in the next section) or use blended finance (see Section on blended finance below).

- **Optimize the use of international concessional finance for adaptation:** Given the relatively limited availability of international concessional finance in Europe and Central Asia (Table 4), governments should prioritize its strategic and efficient use. This includes focusing the use of concessional resources on investments that are non-revenue-generating or weakly revenue-generating, targeting concessional finance toward high-priority, high-vulnerability sectors and geographies and (where adaptation projects generate revenue streams) using concessional financing to de-risk projects and leverage additional private investments (Table 7). Countries of Europe and Central Asia may look to make use of policy-based financing instruments, such as IBRD development policy financing and the [IMF Resilience and Sustainability Trust](#), which can contribute finance for investment while also driving reforms that may

help unlock private investment.<sup>18</sup> Countries may also explore more innovative sources of concessional financing, including results-based adaptation financing (Box 6).

### High Priority:

#### Create regulatory and supervisory enabling environments for adaptation finance

#### The problem(s):

Most countries of Europe and Central Asia lack the appropriate enabling environment to allow for the development and adoption of financing instruments that can aggregate adaptation investments. Adaptation lacks a clear taxonomy, standardized metrics, and integration into financial supervision, while institutional fragmentation and the perception of adaptation as a public good further limit regulatory attention. This stands in contrast to mitigation finance, where regulators, taxonomies, and disclosure rules have matured rapidly.

#### Potential solutions

- **Develop sustainable finance taxonomies that comprehensively define adaptation finance within each country’s context.** Several countries of Europe and Central Asia have established sustainable finance taxonomies (Table 4), some of which include adaptation finance. However, the integration of adaptation considerations into these taxonomies has been inconsistent, lacking standardized approaches to ensure coverage of a wide range of adaptation investments. This situation is improving as clearer standards and templates for adaptation finance taxon-

18. As of early 2025, Moldova and Kosovo were the only countries of Europe and Central Asia to have accessed funds from the Resilience and Sustainability Trust, partly due to eligibility restrictions (including a maximum income threshold and requirement to have a parallel IMF program in place, among others)

**BOX 6: Results-based financing for adaptation**

Results-based financing has long been established in climate mitigation, particularly through carbon markets that pay for verified emission reductions. Its application to climate adaptation is only beginning to emerge however. Adaptation outcomes tend to be more context-specific and harder to quantify than mitigation results, making it more difficult to structure standardized, outcome-based payment mechanisms. Nevertheless, a number of recent initiatives are piloting results-based financing for adaptation. Examples include the following:

- **GCF—Enhancing Direct Access**: The GCF’s Enhancing Direct Access pilots allow national institutions to manage and implement climate finance directly, with disbursements linked to achieving specific adaptation results. For example, in Namibia, the Environmental Investment Fund uses results-based financing to support ecosystem-based adaptation, where payments are tied to community-level outcomes such as improved water harvesting and rangeland management.
- **Ethiopia—Productive Safety Net Programme**: Ethiopia’s Productive Safety Net Programme integrates resilience-building into a cash-for-work model that includes performance-based elements. Donor disbursements are partly tied to results such as improved watershed management, enhanced food security, and infrastructure that reduces vulnerability to climate shocks,

effectively linking social protection to climate adaptation outcomes.

- **African Development Bank—Adaptation Benefit Mechanism**: The Adaptation Benefit Mechanism is an innovative results-based finance [model](#) that issues certified adaptation benefits for verified resilience outcomes, such as reduced climate risk or improved livelihoods. These benefits can be purchased by public or private actors, creating a performance-based revenue stream for adaptation projects in sectors such as agriculture, water, and clean energy.

While the above efforts have so far been primarily supported through concessional finance from international financial institutions and climate funds, the World Bank’s [Pilot Auction Facility](#) offers a potential model to engage private sector actors. Originally focused on mitigation, the Pilot Auction Facility uses a reverse auction mechanism to allocate public finance efficiently and transparently, offering winning bidders put options that guaranteed a minimum price for verified emission reductions. This approach effectively de-risked private investment and mobilized capital for projects in sectors such as methane capture and waste management. The Pilot Auction Facility model has generated interest as a potential template for adaptation finance, where similar auction-based or outcome-purchasing mechanisms could be used to crowd in private capital, provided that robust, verifiable adaptation metrics can be developed.

omies emerge, including the [Climate Bonds Resilience Taxonomy](#). This sets a comprehensive and inclusive structure that defines a broad spectrum of climate resilience (or adaptation) investments across seven Resil-

ience themes, as set out in Table 7. The broad and inclusive framework for the identification and categorization of adaptation investments enables a wide range of adaptation investment needs to be considered, includ-

ing in important sectors such as industry, commerce, health care, or social welfare that are often significant omissions in national adaptation planning.

- Engage and collaborate with regulators and industry associations to develop and promote sector-specific adaptation standards that can be recognized by financial institutions and investors:** Recognized standards for adaptation can, in principle, enable financiers to identify and recognize investments and assets that have been developed and/or managed to reduce climate vulnerabilities and increase climate resilience. This in turn could facilitate greater financing flows for adaptation by lowering the transaction costs for financiers to identify and assess adaptation investments. Adaptation standards are typically sector-specific and may also be developed in response to adaptation needs in a specific country. For example, the [Dutch Green Buildings Council Framework for Climate Adaptive Buildings](#) was developed by a partnership comprising construction sector firms and industry associations, financial institutions (banks, insurers, and investors), and public sector bodies.
- Weigh the costs and benefits of adopting climate/sustainability-related financial disclosure regimes that cover physical climate risk disclosure:** Sustainability disclosure regimes are being adopted by numerous countries around the world, building on the momentum of the Task Force on Climate-related Financial Disclosures (TCFD) and the transition toward the International Sustainability Standards Board (ISSB), which is increasingly recognized as a global baseline for corporate sustainability disclosures, including climate-related risks and opportunities.<sup>19</sup> ISSB's International Financial Reporting Standards

(IFRS) S2 *Climate-related Disclosures standard* largely consolidates and formalizes the TCFD framework.<sup>20</sup> However, policy makers and regulators in climate-vulnerable countries should consider carefully how the disclosure of physical climate risks, as well as broader A&R considerations, is addressed in the country-level implementation of IFRS S2. While IFRS S2 contains requirements for disclosing physical climate impacts, it places greater emphasis on transition risks linked to carbon reduction, and like TCFD, it applies a single materiality perspective: focusing on how climate (including hazards such as extreme heat or floods) affects the financial position of firms, but not on the reverse (how firms affect community or systemic resilience). In climate-vulnerable countries, where adaptation investments are critical, the adoption of such standards should therefore be designed to avoid disincentivizing investment in vulnerable firms and assets and instead create incentives for investors and investees alike to prioritize adaptation. While Türkiye is the only country of Europe and Central Asia (outside the EU) currently in the process of adopting ISSB standards, others are expected to follow as international uptake grows.<sup>21</sup> For LMICs in Central Asia and the Caucasus, where attracting foreign investment is already challenging, it will be important to consider how the adoption of ISSB or TCFD-aligned standards can be tailored to support rather than deter, urgently needed adaptation finance.

- Integrate adaptation into sustainable bond issuances and pooled investment vehicles:** As detailed in Table 4, most countries of Europe and Central Asia already access capital markets to finance national investment needs through sovereign bonds, with several also

19. IFRS - International Sustainability Standards Board.

20. IFRS - Climate-related Disclosures.

21. IFRS - Jurisdictional sustainability consultations.

using sovereign sustainable bonds for sustainability investments. However, only Romania and Türkiye currently have sustainable bond frameworks or guidelines for other investment instruments that include adaptation as an eligible use of proceeds. Integrating adaptation priorities, especially revenue-generating ones, into these frame-

works presents an opportunity to mobilize additional sources of finance for adaptation. This requires ensuring that adaptation is considered in national regulations and guidelines for (sustainable) bond markets. And beyond bonds, it could also include integrating adaptation considerations into sustainable fund labeling regimes to provide clear defini-

### BOX 7: EBRD Climate Resilience Bonds - pioneering dedicated adaptation finance

In September 2019, EBRD launched the world's first of 13 dedicated Climate Resilience Bonds to date, raising [US\\$700 million through a five-year bond issuance](#) at 1.625 percent. Unlike conventional green bonds, this instrument exclusively supported A&R initiatives across the EBRD's 38 countries of operation (the majority of which are in Europe and Central Asia). The bond aligns with the Climate Bonds Initiative's Climate Resilience Principles, ensuring robust impact measurement and transparent reporting on adaptation outcomes. Projects are selected based on EBRD's climate resilience methodology, which includes vulnerability assessments and adaptation impact metrics (see below). Eligible projects must demonstrate clear resilience benefits against 11 types of physical climate risk: (a) extreme heat events, (b) drought, (c) extreme mass movement (such as landslides), (d) floods, (e) increased water stress, (f) increasing mean temperatures, (g) sea level rise, (h) erosion, (i) heavy rainfall events, (j) extreme wind events, and (k) wildfires. Use of proceeds from the bond are allocated to projects addressing the risks outlined above through investments in climate-resilient agriculture, ecosystems, and climate-resilient infrastructure (for example, water, energy, transport, communications, and urban infrastructure). Examples include the Qairokkum hydropower upgrade in Tajikistan and the Saïss water conservation project in Morocco.

**Impact and outcomes:** The EBRD provides annual reports detailing adaptation outcomes, using [standardized metrics](#) reported under the following six categories as defined in the [Green Economy Transition Handbook](#). From 2019 to 2024, 77 adaptation projects were financed with a portfolio value at EUR 2.7 billion. They would result in increased water availability of 566 million m<sup>3</sup>/year, increased energy availability of 3,099 GWh/year, increased agricultural potential through improvements in soil quality of 1.2 million tons yield/year, improvements to human health/productivity equivalent of 1,420 quality-adjusted life years (QALYs), reduced weather-related disruption associated with acute climate risks across 32.4 days/year, and reduced weather-related damage of valorized climate resilience outcome of EUR 11 million/year.

**Lessons to scale and replicate:** First, the standardized robust methodological framework developed for the bond can be adopted by other MDBs or national banks to identify and boost investments in climate adaptation at a national or regional scale. Second, this is a pioneering approach to mobilize private capital for adaptation, offering a scalable model driven by strong investor potential, with the 2019 bond attracting over 40 investors from 15 countries. Last, this instrument offers flexibility across different types of adaptation measures and projects and across countries in the region while tracking and measuring outcomes consistently across the region.

Source: [EBRD, 2019](#), [EBRD Investor Report on Sustainability 2024](#).

tions and criteria for investment funds and other investment vehicles that aggregate finance from a range of sources for adaptation investments. For example, the [UK's Green Financing Framework](#) includes investment in flood protection measures as a priority adaptation use of proceeds within the UK's green gilts (sovereign green bonds). A number of developing countries are also mainstreaming adaptation into their sovereign sustainable bond frameworks, such as [Brazil](#) and [Rwanda](#). Innovative adaptation-focused bonds have also been issued in recent years at the city level. For example, [Cape Town, South Africa](#), issued a green bond to finance infrastructure projects (water capture, storage, distribution infrastructure, alternative water treatment plants) addressing water supply shortages caused by severe droughts. And in Washington, DC, the [DC Water Environmental Impact Bond](#) leveraged private capital to finance investments that reduced stormwater runoff, supported by robust reporting and verification of results.

### *Establish national platforms to package and develop adaptation investments for the private sector*

#### **The problem(s)**

Mobilizing private finance for climate adaptation remains a major challenge across most countries of Europe and Central Asia and most countries globally. In large part, this is because adaptation needs are dispersed across sectors and regions, with limited coordination or visibility. Moreover, NAP processes tend to be policy- and planning-oriented, lacking the detail and structure on investable opportunities needed to translate adaptation priorities into actionable and financeable investments, particularly from the private sector. Projects are often small-scale, lack standardization, and are not packaged to meet investor requirements, making them difficult to identify, assess, and finance.

As a result, even where the project economics mean there should be strong demand for investment, opportunities remain fragmented and underdeveloped, and projects struggle to attract market-based financing.

#### **Potential solutions**

- Establish national platforms for adaptation investment to mobilize and channel finance:** Country-driven, national platforms can connect high-level adaptation plans such as NAPs with financeable investments and coordinate investment priorities by, among others, consolidating smaller investments into investable portfolios, deploying a range of financial instruments, and providing capacity-building support. Additionally, national platforms can identify adaptation investment needs requiring concessional or blended finance from MDBs or DFIs, strategically coordinate these different financing modalities, and facilitate strategic planning and pipeline management for adaptation investments.
- Project preparation facilities (PPFs) are another important mechanism for facilitating adaptation investment by developing pipelines of bankable adaptation projects:** Through targeted technical and financial support, PPFs can help project proponents overcome barriers to accessing adaptation finance. PPFs can, when operating as intended, act as a core enabling mechanism for the bankability and feasibility of adaptation projects at the national level.

Examples of national platforms and PPFs from Europe and Central Asia include the following:

- [Kyrgyz Republic—Climate Finance Center \(CFC\)](#): The CFC functions as a centralized entity to channel funding from external donors to local adaptation projects. Initially established under the Pilot Pro-

gramme on Climate Resilience, with support from EBRD, the CFC is now hosted within the Prime Minister's office to facilitate coordination across government agencies. While the CFC has successfully mobilized funds from various international sources (CIF, EBRD, GCF, GEF, ADB), its long-term financial sustainability remains uncertain beyond current donor commitments. The CFC focuses primarily on funding deployment, with capacity building and innovation support as secondary functions.

- **[Kazakhstan—Green Finance Centre \(GFC\)](#)**: The GFC aims to introduce green finance instruments, such as green bonds and loans, and develop the country's legal and methodological framework for sustainable finance. Operating independently, it provides strategic and business consulting to diverse stakeholders and supports green bond issuance on Kazakhstan's capital markets. However, the nascent ecosystem and incomplete national regulations pose challenges for scaling up green financial products and services based on GCF's pioneering work.

Examples from other regions of the world include the following:

- **[Netherlands—Sustainable Finance Platform](#)**: The platform promotes making the Netherlands more sustainable and climate resilient, including through the financial sector. It is chaired by the Dutch central bank and includes stakeholders such as the Dutch Banking Association, insurers, pension funds, asset managers, and government ministries.
- **[Bangladesh—Climate and Development Partnership \(BCDP\)](#)**: The BCDP was launched jointly by the government of Bangladesh

and several MDBs under the umbrella of the IMF's US\$1.4 billion Resilience and Sustainability Facility (RSF) arrangement, the World Bank's US\$1 billion programmatic series of Green and Climate-Resilient Development Policy Credits, and the ADB's ongoing funding for climate projects. The BCDP focuses on investment pipeline generation, coordination of policy reforms, as well as a better climate risk integration into government fiscal planning and public investment management. It also includes a project preparation facility.

### ***Blended finance, guarantees, and other risk mitigation instruments***

#### **The problem(s)**

Adaptation investments often have long lifespans, high up-front costs, and risk profiles that are difficult to assess using traditional financial tools, especially as returns are typically indirect, diffuse, or tied to avoided losses. Financial institutions in Europe and Central Asia have limited capacity to evaluate these risks, and most countries lack regulatory frameworks that require or support the integration of climate risk into lending and investment decisions. Insurance markets are underdeveloped, and climate-related stress testing or disclosure by financial actors is rare. As a result, private investors face high uncertainty and limited incentives to engage. In this context, and while the regulatory reforms are being deployed to address these shortcomings, public finance can play a catalytic role, not by covering the full cost of adaptation, but by deploying guarantees, concessional capital, or other blended finance instruments to absorb risks and improve the commercial viability of adaptation projects. This approach can crowd in private capital, particularly in sectors such as infrastructure, agriculture, and water, where adaptation needs are urgent but market-based finance remains scarce.

## Potential solutions

- **Natural Capital Finance Facility (NCFF):** Launched by the EIB and the European Commission (EC) in 2014 with EUR 125 million in backing, the NCFF represents an innovative

blended finance approach to ecosystem-based adaptation. The facility provides flexible financing (loans, guarantees, and equity) for revenue-generating projects that restore, protect, and enhance natural capital while building climate resilience (Box 8).

### BOX 8: Natural Capital Finance Facility - Blending public and private capital for ecosystem resilience

The NCFF, [launched in 2014 by the EIB](#) in partnership with the EC, was a pioneering blended finance instrument designed to support ecosystem-based adaptation projects that enhance biodiversity and climate resilience. The NCFF combines EIB funding with the EU's LIFE Programme to provide loans, guarantees, and equity investments for projects that conserve, restore, and manage natural capital while delivering measurable climate adaptation benefits. The NCFF employed a [blended finance model to de-risk investments](#) and attract private capital, structured in three layers: (a) Risk Capital: The EC provided €50 million as a guarantee to absorb first-loss risks (up to 20% of the portfolio), reducing exposure for investors; (b) Concessional Financing: The EIB contributed €100–125 million in below-market-rate loans and guarantees, enabling affordable financing for high-risk projects; and (c) Commercial Investment: Private investors and commercial banks provided senior financing, leveraging public funds to scale investment. The facility also included a technical assistance component, offering up to €1 million per project for preparation, implementation, and monitoring to ensure project viability and impact. Eligible project categories were (a) green infrastructure, (b) PES, (c) biodiversity offsets and compensation, and (d) pro-biodiversity and adaptation businesses.

**Impact and outcomes:** The NCFF mobilized €160–185 million for 2014–2017 (including loans and guarantees) in private capital with evidence highlighting the cost-effectiveness of nature-based solutions. For example, the Croatian Bank for Reconstruction and Development received a loan for on-lending to beneficiaries ranging from local authorities to SMEs in sectors such as ecotourism, sustainable agriculture, and forestry. The Romania Forest Regeneration project received financing to support 2,200 ha of forests in Romania, fostering natural regeneration and resilience of forest ecosystems.

**Scaling:** The NCFF model offered a proven, financially viable model for nature-based solutions, with projects demonstrating revenue generation and cost savings. Success lies in measurable adaptation outcomes, supported by robust impact indicators and a blended finance structure that reduces risks for private investors, encouraging greater capital inflows. The EU External Investment Plan aligns with NCFF principles, and EBRD and Green for Growth Fund engage in similar green finance initiatives. Preconditions for success include standardized methodologies for ecosystem service quantification, technical assistance facilities to build a pipeline of bankable projects, and enabling of regulatory frameworks for PES to incentivize private investment.

Sources: EC, NCFF documentation including EIB Annual Reports (2014–2023), [EIB NCFF website](#), [Green Finance Platform NCFF Case Study](#), and EIB [Investing in nature report](#).

- **[Türkiye Financing Adaptation for Growth Project](#)**: This US\$600 million World Bank project aims to mobilize private sector investment in climate resilience by offering an IBRD guarantee that reduces risk for lenders. It is designed to address market gaps and encourage private capital to flow into projects that enhance Türkiye's ability to withstand climate-related risks. The financing is supported by a tool that helps firms identify local and firm-specific climate risks and helps package potential adaptation investment solutions.
- **[Land Degradation Neutrality Fund](#)**: This impact investment fund blends public, private, and philanthropic to foster sustainable land management and land restoration projects implemented by the private sector. The fund offers financial solutions that are not readily available in the market such as longer tenors, longer grace periods, and more flexible repayment schedules, enabling investment in projects that might otherwise be considered too risky by traditional investors. Given the high risk perception of the underlying investments, the fund employs a layered capital structure to attract a diverse range of investors that helps mitigate risks and render investments more attractive to both the public and private sectors. The Land Degradation Neutrality Fund, which is co-promoted through the [Mirova Natural Capital platform](#), has over US\$150 million in commitments from investors and has supported a number of successful investments in Latin America, Africa, and Asia (Land Degradation Neutrality Fund 2021). Other examples of regional and global impact investment funds targeting natural capital restoration include [eco.business Fund](#), [Rewilding Europe Capital](#), and the [Althelia Climate Fund](#).
- **Municipal public-private collaborations**: At the city level, joint initiatives between public entities and private investors can improve funding opportunities for investments that tackle climate risks and build resilience. Examples of collaborations around extreme urban heat include in Los Angeles, California, the '[Cool LA](#)' initiative combines municipal funding with private sector contributions to finance shade tree programs and reflective road coatings. Similarly, in Bangkok, Thailand, the [Urban Heat Resilience Fund](#) pools resources from municipal budgets, private donors, and international grants.

## 7. Conclusion and Country Priorities

This report assessed the main barriers that prevent countries of Europe and Central Asia from increasing the amount of finance allocated to adaptation investments and proposed six recommendations for lifting these barriers. These main recommendations are summarized in Table 8, with priority countries for each recommendation based on the diagnostics presented in Section 4.

**TABLE 8: Summary of recommendations and priority countries**

| Country                | Increasing demand                       |                        |                              |                                                           | Increasing supply                  |                                                 |                                                                                     |
|------------------------|-----------------------------------------|------------------------|------------------------------|-----------------------------------------------------------|------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------|
|                        | Strengthen the climate information base | Regulatory environment | Price signals and incentives | Institutional coordination/fiscal planning and management | Mobilize domestic public resources | Regulatory and supervisory enabling environment | Investment platforms/project preparation facilities/blended finance/risk mitigation |
| Albania                | Yellow                                  | Blue                   | Blue                         | Yellow                                                    | Blue                               | Blue                                            | Blue                                                                                |
| Armenia                | Blue                                    | Blue                   | Blue                         | Yellow                                                    | Blue                               | Blue                                            | Blue                                                                                |
| Azerbaijan             | Blue                                    | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Bosnia and Herzegovina | Yellow                                  | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Croatia                | Blue                                    | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Georgia                | Yellow                                  | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Kazakhstan             | Yellow                                  | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Kosovo                 | Yellow                                  | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Kyrgyz Rep.            | Yellow                                  | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Moldova                | Blue                                    | Blue                   | Blue                         | Blue                                                      | Blue                               | Yellow                                          | Blue                                                                                |
| Montenegro             | Yellow                                  | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| North Macedonia        | Yellow                                  | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Poland                 | Blue                                    | Blue                   | Blue                         | Blue                                                      | Blue                               | Blue                                            | Blue                                                                                |
| Serbia                 | Blue                                    | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Tajikistan             | Blue                                    | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Türkiye                | Blue                                    | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Ukraine                | Blue                                    | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |
| Uzbekistan             | Yellow                                  | Blue                   | Blue                         | Yellow                                                    | Blue                               | Yellow                                          | Blue                                                                                |

Yellow = Recommendations that should be pursued first in countries that have not completed them yet, since they are preconditions for the success of other the recommendations (blue)

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## Annex: Applying the Adaptation Finance Typology to Armenia and Türkiye

### Armenia

#### NAP

Armenia's NAP was developed in 2021, led by the Ministry of Environment. Despite highlighting, in principle, the role of financial resource mobilization for NAP implementation, in practice, the NAP does not provide detailed information in this respect: No detailed adaptation investment needs are identified, other than high-level and generic references to some of the themes and sectors identified in the framework. The NAP does not define these investment priorities in detail nor does it quantify investment needs or identify potential financing sources and modalities. Instead, the NAP refers to the future development of local adaptation plans at *marz* (district) level, in which these investment priorities may be set out in more detail.

#### World Bank CCDR

Armenia's CCDR emphasizes water conservation and efficiency, CSA, land restoration,

and critical infrastructure resilience as top adaptation priorities. The agriculture sector faces severe water stress, requiring investments in irrigation efficiency, storage, and CSA technologies. The modernization of irrigation systems and early warning systems for climate risks is also highlighted. Additionally, the report recommends resilient infrastructure investments, particularly in flood protection for roads, schools, and hospitals, which could yield significant economic benefits.

The CCDR outlines a mix of financing mechanisms, including blended finance, PPPs, green bonds, and development bank support. It stresses the need for international financial institutions and donor grants to complement government investments in adaptation. It also mentions the scope for private sector involvement in adaptation through targeted subsidies, tax incentives, and blended finance mechanisms to support sustainable water management and climate-smart technologies.

**TABLE 9: Armenia—Outline application of the adaptation investment framework on the 2021 NAP and 2024 CCDR**

| Sectors (with subsectors)               | NAP priorities                  | CCDR priorities                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Public/private investments                                                                                                                    | Typical financial profile                                                                                                              | Potential financing modalities                                                                                                                                                                                                                                        |
|-----------------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Theme: Resilient Agri-Food Systems      |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                               |                                                                                                                                        |                                                                                                                                                                                                                                                                       |
| Agricultural production                 | Identified as a priority sector | <ul style="list-style-type: none"><li>Investing around US\$1 billion in water efficiency, storage, and water resource management to support sustainability and growth in the agriculture sector (estimated public/private financing split: 80/20)</li><li>Rehabilitate and modernize water conveyance infrastructure, on-farm systems, and pumping stations serving at least 50,000 ha of irrigated land (estimated public/private financing split: 80/20)</li></ul> | Public/mixed: may be carried out by state-owned water utilities/irrigation companies or by private enterprises in some cases (including PPPs) | State-owned utilities - may generate some revenues but not cover full investment costs (often constrained by low tariffs)              | <ul style="list-style-type: none"><li>Non-concessional debt financing (private)</li><li>Concessional/blended debt financing (public)</li><li>PPPs (for example, Ministry of Economy of Armenia, Armenian Territorial Development Fund [ATDF])</li></ul>               |
|                                         |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                               | Private enterprises (for example, agri enterprises, famers and agriculture cooperatives, and agri-tech start-ups) - revenue-generating | <ul style="list-style-type: none"><li>Non-concessional debt financing - direct and intermediated (private)</li><li>Equity investments (private)</li><li>Guarantees (private), for example, Ameriabank and ACBA Bank</li></ul>                                         |
|                                         |                                 | Investing US\$190 million to support a broad rollout of CSA and early warning systems (estimated public/private split: 10/90)                                                                                                                                                                                                                                                                                                                                        | Private agricultural enterprises (large and small)                                                                                            | Revenue-generating in certain cases, for example, commercial production and larger enterprises                                         | <ul style="list-style-type: none"><li>Non-concessional debt financing - direct, intermediated (private)</li><li>Equity investments (private)</li><li>Guarantees (private), for example, Ameriabank, Agricultural Cooperative Bank of Armenia, and ACBA Bank</li></ul> |
|                                         |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                               | Smaller farmers especially in challenging contexts may operate on a sub-commercial or subsistence basis.                               | <ul style="list-style-type: none"><li>Concessional/blended debt financing - direct, intermediated (public)</li><li>Grants (public), for example, Ministry of Economy of Armenia and ATDF</li></ul>                                                                    |
| Theme: Resilient Cities and Settlements |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                               |                                                                                                                                        |                                                                                                                                                                                                                                                                       |
| Human settlements                       | Identified as a priority sector | <ul style="list-style-type: none"><li>Investing around US\$790 million to improve the resilience of critical infrastructure (schools, hospitals, and primary roads), emergency service facilities, and land restoration</li><li>US\$41 million in strengthening the resilience of schools and hospitals to severe flood risks</li></ul>                                                                                                                              | Public: local government, municipalities, utilities, urban development agencies, and so on                                                    | State-owned urban infrastructure: may generate some revenues but possibly not cover full investment costs.                             | <ul style="list-style-type: none"><li>Non-concessional debt financing - direct (private)</li><li>Concessional/blended debt financing - direct (public)</li><li>PPPs for urban developments, for example, Yerevan Municipality and ATDF</li></ul>                      |
|                                         |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                               | Health sector and community buildings such as schools: not revenue-generating (public good)                                            | <ul style="list-style-type: none"><li>State budget grants (public)</li><li>Donor grants (public), for example, Ministry of Health of Armenia and ATDF</li></ul>                                                                                                       |
| Theme: Resilient Health Systems         |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                               |                                                                                                                                        |                                                                                                                                                                                                                                                                       |
| Health care services                    | Identified as a priority sector | <ul style="list-style-type: none"><li>Awareness campaigns on the health benefits of substituting fuelwood with other more sustainable heating solutions is crucial, especially in rural households.</li></ul>                                                                                                                                                                                                                                                        | Public: health authorities and health care facilities                                                                                         | Not revenue-generating - public good                                                                                                   | <ul style="list-style-type: none"><li>State budget grants (public)</li><li>Donor grants (public), for example, Ministry of Health of Armenia and ATDF</li></ul>                                                                                                       |
| Theme: Resilient Industry and Commerce  |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                               |                                                                                                                                        |                                                                                                                                                                                                                                                                       |
| Tourism                                 | Identified as a priority sector | n.a.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Private businesses: for example, hotels, resorts, tourism agencies, and so on                                                                 | Revenue-generating                                                                                                                     | <ul style="list-style-type: none"><li>Non-concessional debt financing - direct, intermediated (private)</li><li>Equity investments (private)</li><li>Guarantees (private), for example Development Foundation of Armenia (DFA) and Ameriabank</li></ul>               |

TABLE 9 (continued)

| Sectors (with subsectors)               | NAP priorities                                                                  | CCDR priorities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Public/private investments                                                                                                 | Typical financial profile                                                                                                                                                 | Potential financing modalities                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Theme: Resilient Infrastructure</b>  |                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                            |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Energy infrastructure                   | Identified as a priority sector                                                 | <ul style="list-style-type: none"> <li>Under the Net Zeros Strategy, Armenia would need to invest an additional US\$1.3 billion in the energy system over 2025–30, and US\$6 billion during 2025–60.</li> <li>Between 2021 and 2060, the necessary incremental investments compared to the current reference scenario would be divided to US\$0.2 billion in the transport sector, US\$3 billion in the power sector, US\$1.5 billion in the residential sector, and US\$1.3 billion in the industrial and commercial sectors.</li> </ul>                                                                                                                                                                  | Mixed public/private: state-owned energy utilities and private enterprises (including PPPs).                               | State-owned utilities - may generate some revenues but not cover full investment costs (often constrained by low tariffs)<br><br>Private enterprises - revenue-generating | <ul style="list-style-type: none"> <li>Non-concessional debt financing - direct (private)</li> <li>Concessional/blended debt financing (public), for example, Electric Networks of Armenia (ENA) and ATDF</li> <li>Non-concessional debt financing - direct (private)</li> <li>Equity investments (private)</li> <li>Guarantees (private), for example, ArmSwissBank and Ameriabank</li> </ul>       |
| Water infrastructure                    | Identified as a priority sector                                                 | <ul style="list-style-type: none"> <li>The CCDDR recommends following the ambitious adaptation portfolio scenario, with high storage, high irrigation expansion, and high efficiency, which costs US\$2.3 billion (undiscounted) or US\$1 billion (discounted) and includes 15 new reservoirs for a total volume of 99 million m<sup>3</sup> (an increase in total reservoir capacity of 7% compared to the current situation); investments to modernize and rehabilitate irrigation systems to increase irrigation efficiency from 40 to 70% in 2050 (nationally); and investments to increase irrigation for 75,914 ha of agriculture land (a 66% increase compared to the baseline scenario)</li> </ul> | Public/mixed: state-owned water utilities, irrigation companies and so on, or by private enterprises (including PPPs)      | State-owned utilities - may generate some revenues but not cover full investment costs (often constrained by low tariffs)<br><br>Private enterprises - revenue-generating | <ul style="list-style-type: none"> <li>Non-concessional debt financing - direct (private)</li> <li>Concessional/blended debt financing (public)</li> <li>PPPs, for example, Water Committee of Armenia and ATDF</li> <li>Non-concessional debt financing - direct (private)</li> <li>Equity investments (private)</li> <li>Guarantees (private), for example, ArmSwissBank and Ameriabank</li> </ul> |
| <b>Theme: Resilient Natural Systems</b> |                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                            |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Natural ecosystems                      | Identified as a priority sector<br>Forest management<br>Natural park management | <ul style="list-style-type: none"> <li>Investing US\$610 million in land restoration portfolio, across 5% of the country's total area to bring benefits four times higher by increasing crop production and reducing cultivation costs (estimated public/private split: 70/30)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                  | Public (for example, local forest authorities and national park authorities)                                               | Not revenue-generating - public good                                                                                                                                      | <ul style="list-style-type: none"> <li>State budget grants (public)</li> <li>Donor grants (public), for example, Ministry of Environment of Armenia and ATDF</li> </ul>                                                                                                                                                                                                                              |
| <b>Theme: Resilient Social Systems</b>  |                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                            |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                      |
| DRR                                     | n.a.                                                                            | <ul style="list-style-type: none"> <li>Investing US\$45 million to rehabilitate, strengthen, and/or rebuild 40 critical emergency response facilities (approximately 63% of available facilities) that are exposed to floods, earthquakes, and other major disasters</li> <li>Allocate more resources to support hydrological, agrometeorological, climate, and meteorological monitoring using geographic information systems and remote sensing tools.</li> </ul>                                                                                                                                                                                                                                        | Public (for example, emergency response and disaster management agencies, local municipalities, and national DRR agencies) | Not revenue-generating - public good                                                                                                                                      | <ul style="list-style-type: none"> <li>State budget grants (public)</li> <li>Donor grants (public), for example, Ministry of Emergency Situations of Armenia and Armenian Red Cross Society</li> </ul>                                                                                                                                                                                               |

## Türkiye

### NAP

Türkiye's Climate Change Adaptation Strategy and Action Plan (2024–2030), led by the Ministry of Environment, Urbanization, and Climate Change, outlines a comprehensive approach to adaptation. The plan identifies 40 strategic goals and 132 adaptation actions across 11 key sectors along with cross-cutting themes. Despite the comprehensive sectoral approach, the financing aspect remains vague. While the strategy emphasizes the need for enhancing preparedness and adaptability, it lacks detailed investment priorities, quantified adaptation costs, and defined funding sources. Instead, the plan defers to future local adaptation plans and stakeholder collaboration to refine financial strategies. This highlights a commitment to action but leaves uncertain the concrete financial mechanisms that would underpin implementation.

### World Bank CCDR

Türkiye's CCDR prioritizes climate resilience in infrastructure, water management, agriculture, and urban development, emphasizing targeted adaptation policies to mitigate economic risks. To finance adaptation, the CCDR outlines a mix of PPPs, blended finance models, and development bank support, stressing the need for greater private sector engagement although without specifying sectors. Türkiye will require US\$68 billion by 2030 and US\$165 billion by 2040 for adaptation investments, with half expected from private capital, supported by sectoral regulations and long-term capital mobilization. The CCDR also highlights that there are opportunities to mainstream climate and other natural risks in public finance by widening and making the tax base more robust and using reserve funds, contingent finance, regional risk pools, insurance schemes, and other risk financing instruments.

**TABLE 10: Türkiye—Outline application of the adaptation investment framework on the 2024–2030 NAP and 2022 CCDR**

| Sectors<br>(with subsectors)                                             | NAP priorities                                                                                                                                                                                                                                                                                                       | CCDR priorities                                                                                                                                                                                                                                          | Public/private<br>investments                                                                               | Typical financial<br>profile                                          | Potential financing modalities                                                                                                              |
|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Theme: Resilient Agri-Food Systems                                       |                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                          |                                                                                                             |                                                                       |                                                                                                                                             |
| Agricultural production<br>• Agro-forestry                               | • Developing policy and legal frameworks to support the agriculture sector’s institutional capacity, cooperation, and awareness<br>• Promoting sustainable ecosystem and natural resource use in agriculture<br>• Advancing R&D on climate change adaptation in agriculture through data, technology, and innovation | • Maximizing carbon sinks and climate resilience through sustainable forest management and wildfire mitigation<br>• Investing in landscape restoration, including reforestation, grassland rehabilitation, cropland management, and wetland conservation | Public/mixed (for example, state-owned agricultural entities, local governments, and research institutions) | Limited revenue generation, reliant on grants or concessional finance | Concessional/blended debt, state/donor grants (for example, Turkish Treasury and Finance Ministry)                                          |
|                                                                          |                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                          | Private enterprises (for example, farmers, agribusinesses, and cooperatives)                                | Revenue-generating (commercial agricultural enterprises)              | Non-concessional debt, equity investments, guarantees (for example, commercial banks and Development and Investment Bank of Türkiye (TKYB)) |
| Theme: Resilient Cities and Settlements                                  |                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                          |                                                                                                             |                                                                       |                                                                                                                                             |
| Buildings<br>• Residential, commercial, and community buildings          | • Strengthening urban resilience and adaptation by revising legislation and spatial plans for climate change adaptation                                                                                                                                                                                              | • 100% of urban plans updated to account for future climate risk                                                                                                                                                                                         | Public (municipalities, urban planning agencies)                                                            | Limited direct revenue; infrastructure improvements                   | State budget grants, concessional/ blended debt finance (for example, İlbank loans)                                                         |
|                                                                          |                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                          | Private enterprises (for example, construction companies, real estate developers)                           | Revenue-generating (real estate developments)                         | Non-concessional debt financing (for example, commercial banks and TKYB), equity, guarantees, and PPPs                                      |
| Theme: Resilient Health Systems                                          |                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                          |                                                                                                             |                                                                       |                                                                                                                                             |
| Health care facilities<br>• Hospitals, clinics, nursing homes, and so on | • Improving evidence-based analysis, assessment, and reporting on climate change while expanding health-related R&D<br>• Strengthening institutional capacity, cooperation, and awareness to integrate climate and health perspectives                                                                               |                                                                                                                                                                                                                                                          | Predominantly public (for example, Ministry of Health and public health care facilities)                    | Non-revenue-generating, public good                                   | State budget grants and donor grants (for example, Ministry of Health and Presidency of Strategy and Budget)                                |
|                                                                          |                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                          | Private sector participation in large hospital PPPs                                                         | Revenue-generating (from private and public sources)                  | PPPs (for example, Türkiye’s Healthcare PPP Programme)                                                                                      |

TABLE 10 (continued)

| Sectors<br>(with subsectors)                                                   | NAP priorities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | CCDR priorities                                                                                                                                                                                                                                                                                      | Public/private<br>investments                                                                                                                                    | Typical financial<br>profile                                                                   | Potential financing modalities                                                                                                                                                                     |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Theme: Resilient Industry and Commerce</b>                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                  |                                                                                                |                                                                                                                                                                                                    |
| Manufacturing processes<br><br>Other discrete manufacturing                    | <ul style="list-style-type: none"> <li>Identifying facilities at risk of technological and industrial accidents and developing priority adaptation measures</li> <li>Assessing climate change impacts on investments and integrating adaptation criteria into green procurement</li> <li>Updating insurance legislation to improve coverage against climate change impacts</li> <li>Enhancing industry access to national projections and databases</li> <li>Promoting sectoral cooperation through mentorship and trainer programs</li> </ul> | n.a.                                                                                                                                                                                                                                                                                                 | Predominantly private (manufacturing firms)                                                                                                                      | Revenue-generating (industrial enterprises, manufacturing businesses)                          | Non-concessional debt, equity investments, and guarantees (for example, commercial banks and Turkish Export Credit Bank - Eximbank)                                                                |
| Hospitality<br>• Tourism<br>• Leisure                                          | <ul style="list-style-type: none"> <li>Strengthening tourism adaptation by improving physical and social infrastructure</li> <li>Integrating climate adaptation into tourism and cultural heritage planning while ensuring coordination among authorities</li> </ul>                                                                                                                                                                                                                                                                           | n.a.                                                                                                                                                                                                                                                                                                 | Predominantly private (tourism and hospitality businesses)                                                                                                       | Revenue-generating (tourism facilities, hotels, resorts)                                       | Non-concessional debt, equity investments, guarantees (for example, commercial banks)                                                                                                              |
| <b>Theme: Resilient Infrastructure</b>                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                  |                                                                                                |                                                                                                                                                                                                    |
| Energy infrastructure<br>• Electricity transmission, distribution, and storage | n.a.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>Developing policies and legal frameworks for energy sector adaptation, strengthening institutions, and improving data sharing</li> <li>Enhancing energy infrastructure, ensuring climate-adaptive designs, and increasing power system flexibility</li> </ul> | Public: state-owned energy utilities<br><br>Private energy companies                                                                                             | Revenue-generating or partially revenue-generating<br><br>Revenue-generating                   | Concessional/blended debt financing and non-concessional debt financing (for example, TKYB)<br><br>Non-concessional debt financing, equity investments, guarantees (for example, commercial banks) |
| Transport infrastructure<br>• Roads<br>• Railways<br>• Ports<br>• Aviation     | <ul style="list-style-type: none"> <li>Ensuring the resilience of critical transport and communication infrastructure</li> <li>Aligning transport and communication planning with climate adaptation goals</li> <li>Strengthening emergency response by improving accessibility, communication, and evacuation during climate disasters</li> </ul>                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>Providing an additional investment by 2022-2030 of US\$8 billion in a new resilient transport infrastructure</li> </ul>                                                                                                                                       | Mixed (public transport agencies and infrastructure developers)<br><br>Private infrastructure developers/operators                                               | Revenue-generating; limited revenue generation (below cost recovery)<br><br>Revenue-generating | Non-concessional debt financing, concessional/blended debt financing finance<br><br>Non-concessional debt financing, equity investments, guarantees (for example, commercial banks), and PPPs      |
| Water infrastructure<br>• Water supplies                                       | n.a.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Developing policy and legal frameworks for water resources management and enhancing the generation and sharing of data and information<br><br>Ensuring the protection, improvement, and efficient use of water resources                                                                             | Mainly public: Water utilities companies (ISKI – Istanbul Water and Sewerage Administration)<br>State Hydraulic Works (Devlet Su İşleri - DSI)<br>Municipalities | Limited revenues potentially below operating costs; possible due to low water tariffs          | Concessional/blended debt financing (for example, TKYB and İlbank Infrastructure Loans)                                                                                                            |

TABLE 10 (continued)

| Sectors<br>(with subsectors)                                                                | NAP priorities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CCDR priorities                                                                                                                                                                                                                                                                                                                                                                                                                              | Public/private<br>investments                                                    | Typical financial<br>profile        | Potential financing modalities                                                                                       |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Theme: Resilient Natural Systems</b>                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                  |                                     |                                                                                                                      |
| Terrestrial ecology<br>• <i>Terrestrial ecosystems</i><br>• <i>Terrestrial biodiversity</i> | <ul style="list-style-type: none"> <li>• Raising awareness and capacity on biodiversity, ecosystem services, and nature-based adaptation through impact monitoring</li> <li>• Strengthening data exchange, clarifying responsibilities, and enhancing stakeholder cooperation</li> <li>• Reducing biodiversity threats such as habitat fragmentation, pollution, and overexploitation</li> <li>• Expanding protected areas, restoring ecosystems, and integrating climate adaptation into conservation plans</li> </ul> | <ul style="list-style-type: none"> <li>• Enhancing carbon sinks and climate resilience through sustainable forest management and wildfire risk reduction</li> <li>• Investing in landscape restoration via reforestation, grassland rehabilitation, cropland management, and wetland conservation</li> <li>• Providing an additional investment of US\$2 billion for restoration, reforestation, and fire management by 2022–2030</li> </ul> | Primarily public (environmental authorities and conservation organizations)      | Non-revenue-generating, public good | Public: State budget grants (for example, Ministry of Environment, Urbanization and Climate Change) and donor grants |
| <b>Theme: Resilient Social Systems</b>                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                  |                                     |                                                                                                                      |
| Education and awareness<br>• <i>Child education</i><br>• <i>Public awareness</i>            | <ul style="list-style-type: none"> <li>• Embedding climate adaptation in policies and strategies while strengthening knowledge for informed decision-making</li> <li>• Building institutional capacity through expertise development, training, databases, monitoring, and R&amp;D</li> <li>• Raising public awareness and engagement to integrate citizens into climate adaptation efforts</li> </ul>                                                                                                                  | n.a.                                                                                                                                                                                                                                                                                                                                                                                                                                         | Primarily public (for example, Ministry of Education and research institutions). | Non-revenue-generating, public good | State budget grants and donor grants (for example, Ministry of Education)                                            |
| Social protection<br>• <i>Social assistance</i><br>• <i>Livelihoods support</i>             | <ul style="list-style-type: none"> <li>• Integrating climate impacts and adaptation into socioeconomic and ecosystem protection strategies at all levels</li> <li>• Embedding a social perspective in climate adaptation policies, planning, and implementation</li> <li>• Developing social protection policies to strengthen public resilience to climate hazards</li> <li>• Implementing national adaptation policies with a rights- and benefits-based approach for societal well-being</li> </ul>                  | n.a.                                                                                                                                                                                                                                                                                                                                                                                                                                         | Predominantly public (Ministry of Family and Social Services).                   | Non-revenue-generating, public good | State budget grants and donor grants (for example, Ministry of Family and Social Services)                           |
| Public administration<br>• <i>Maintaining national security</i><br>• <i>DRR</i>             | <ul style="list-style-type: none"> <li>• Shifting from crisis management to risk management by strengthening legal, institutional, and financial capacity</li> <li>• Enhancing knowledge and information infrastructure on climate and disaster risks for sustainable development</li> <li>• Ensuring transformative risk governance to boost climate and disaster resilience</li> <li>• Promoting consistent and sustainable investments in resilience</li> </ul>                                                      | n.a.                                                                                                                                                                                                                                                                                                                                                                                                                                         | Predominantly public (public administration and DRR agencies).                   | Non-revenue-generating, public good | State budget grants and donor grants (for example, Disaster and Emergency Management Presidency)                     |

