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Organization of the  
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POLICY ANALYSIS OF  
**NATIONALLY DETERMINED CONTRIBUTIONS**  
IN THE EUROPE AND CENTRAL ASIA REGION  
**2021**



# POLICY ANALYSIS OF NATIONALLY DETERMINED CONTRIBUTIONS IN THE EUROPE AND CENTRAL ASIA REGION 2021

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# CONTENTS

Foreword .....	vii
Acknowledgements .....	ix
Acronyms and abbreviations .....	x
<b>INTRODUCTION.....</b>	<b>1</b>
<b>PART 1. Regional overview of climate impacts on agriculture, socioeconomic trends, and greenhouse gas emissions, in Europe and Central Asia .....</b>	<b>5</b>
1.1. Basic data for agriculture profile .....	6
1.1.1 Agricultural land use .....	6
1.1.2 Population and economy .....	8
1.2. Climate change impacts and vulnerabilities in the Europe and Central Asia region .....	12
1.3. Greenhouse gas emission trends in the Europe and Central Asia region .....	20
<b>PART 2. Overview of mitigation and adaptation aspects in Nationally Determined Contributions with a focus on agricultural and land use, land use change and forestry sectors, and relevant climate-change policies of Europe and Central Asia countries .....</b>	<b>30</b>
2.1. Progress made to achieve Nationally Determined Contribution goals for mitigation .....	32
2.2. Progress made to achieve Nationally Determined Contribution goals for adaptation .....	63
2.3. Linkages of Nationally Determined Contribution measures with Sustainable Development Goals and disaster risk reduction efforts.....	97
2.3.1. Nationally Determined Contribution–Sustainable Development Goal linkages .....	97
2.3.2. Nationally Determined Contribution–disaster risk reduction linkages .....	100
<b>PART 3. Climate finance flows .....</b>	<b>106</b>
3.1. Global framework of climate finance .....	107
3.2. Climate finance needs and progress in the Europe and Central Asia region.....	111
3.3. Further options for climate finance in the Europe and Central Asia region.....	115
<b>CONCLUSIONS.....</b>	<b>119</b>
References .....	123

# Boxes, figures and tables

## BOXES

1. United Kingdom's enhanced commitment to GHG emissions reduction	46
2. Moldova case study: its adaptation vision, goal, and agricultural investment priorities	78

## FIGURES

1. Agriculture value added to national GDP in the ECA region (%), 2020	10
2. Employment in agriculture, male and female employment as proportion of total, male and female employment (%) in the Caucasus, Central Asia, CIS and SEE sub-regions, 2020	11
3. Poverty rate (% of population living below the national poverty line) in the Caucasus, Central Asia, CIS, and SEE sub-regions, 2019	12
4. Proportion of degraded land in the ECA region, 2015	14
5. Number and type of natural hazard-induced and biological disasters in the Caucasus, Central Asia, CIS and SEE sub-regions, 1990–2020	16
6. Frequency of natural hazard-induced and biological disasters in the Caucasus, Central Asia, CIS and SEE sub-regions (%), 1990–2020	16
7. Total net GHG emissions of big emitter countries (those that emit more than 150 Mt CO <sub>2</sub> -eq annually) in the ECA region, with and without LULUCF, 2019	20
8. Total net GHG emissions of small emitter countries in the ECA region, with and without LULUCF, 2019	21
9. GHG emission trends in the Caucasus sub-region, 1990–2015	22
10. GHG emissions of Turkmenistan, Kyrgyzstan, and Tajikistan, 1990–2018	23
11. GHG emission trends in Kazakhstan and Uzbekistan, 1990–2018	24
12. GHG emission trends of EU27+UK, including and excluding LULUCF, 1990–2018	25
13. GHG emission trends in EFTA countries, including and excluding LULUCF, 1990–2018	25
14. GHG emission trends in Belarus and Republic of Moldova, including and excluding LULUCF, 1990–2018	26
15. GHG emission trends in the Russian Federation and Ukraine, including and excluding LULUCF, 1990–2019	27
16. GHG emission trends in the SEE sub-region, including and excluding LULUCF (including Turkey), 1990–2019	28
17. GHG emission trends in SEE sub-region, including and excluding LULUCF (excluding Turkey), 1990–2015	29
18. Relevant adaptation-related measures for the agricultural sector in the Caucasus sub-region	69
19. Relevant adaptation-related measures for the agricultural sector in the Central Asia sub-region	75
20. Relevant adaptation-related measures for the agricultural sector in the CIS sub-region	81
21. Overview of national adaptation strategies and plans in the EU27+UK and EFTA sub-regions	83
22. Relevant adaptation-related measures for the agricultural sector in EU27+UK and EFTA countries	89
23. Relevant adaptation-related measures for the agricultural sector in SEE sub-region	96
24. Degree of convergence between climate actions in the agricultural sector and SDGs in the Caucasus	98
25. Degree of convergence between climate actions in the agricultural sector and SDGs in Central Asia	98
26. Degree of convergence between climate actions in the agricultural sector and SDGs in CIS sub-region	99
27. Degree of convergence between climate actions in the agricultural sector and SDGs in SEE	100
28. Share of ECA countries with cross-sectoral or agriculture-related adaptation priorities in NDCs contributing to the Sendai Framework, per SFDRR priority for action (%)	101

29. Main climate-finance actors	108
30. Overview of climate finance flows	110
31. International public climate finance flows (narrowed down for ECA region)	115
32. Multilateral development banks' climate finance by region, 2018	117

## TABLES

1. Agricultural land use in the ECA region, 2018	7
2. Population and urbanization projections for the ECA region, 2018 and 2050	9
3. Projections of water stress levels for agriculture in the ECA region	13
4. Overview of the cost of land degradation in Armenia, Belarus, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia, 2017	15
5. INFORM Risk Index in the Caucasus, Central Asia, CIS and SEE sub-regions, 2021	17
6. INFORM Risk Index in the EU27+UK and EFTA sub-regions, 2021	19
7. Summary of NDC analysis for the Caucasus sub-region	33
8. Summary for NDC analysis for the Central Asia sub-region	41
9. Summary NDC analysis for the EU27+UK sub-region	51
10. Summary of NDC analysis for the CIS sub-region	55
11. Summary NDC analysis for the SEE sub-region	60
12. Summary analysis of adaptation mainstreaming in NDCs of the Caucasus sub-region	66
13. Summary of adaptation analysis in NDCs of the Central Asia sub-region	72
14. Summary of adaptation analysis in NDCs of CIS countries	80
15. Summary of adaptation analysis in NDCs of the EU27+UK and EFTA countries	87
16. Summary of adaptation analysis in NDCs of SEE countries	94
17. Climate finance requirements as indicated in NDC	112
18. Eligibility of ECA countries for accessing climate finance (developed from countries on ODA list)	118



# FOREWORD

Climate change is expected to have both direct and indirect adverse impacts on countries' agricultural production and productivity, including through changing rainfall patterns, increasing frequency and severity of hydrometeorological hazards such as drought, storms and flooding, and increased outbreaks and geographical redistribution of animal and plant pests and diseases. Smallholders, herders, fishers and foresters are among the most vulnerable to the impact of climate variability and change, due to the climate-sensitive nature of agriculture and due to their livelihoods depending on the sector and its activities. In the Europe and Central Asia (ECA) region, climate change can potentially undermine the ability to ensure regional food and nutrition security, eradicate poverty, and achieve sustainable development.

Although global greenhouse gas (GHG) emissions are dominated by sectors such as energy, industry, and transport, agriculture is also one of the drivers of climate change, as it is contributing to the emission of GHGs through the use of agricultural machinery and equipment, through enteric fermentation from ruminant animals, via the application of chemical fertilizers and pesticides, and via rice cultivation and other agriculture-related processes. On the other hand, the sector can also be part of the solution to climate change – specific agricultural practices can help to reduce and remove GHG emissions, reduce climate risks, and adapt to climate change, thereby building resilience. As a result, mitigation and adaptation go hand in hand in addressing climate change in the sector.

The outbreak of COVID-19 has spread rapidly across the world and devastated lives and the livelihoods of people. The pandemic has revealed a changing risk environment as well as the systemic and overlaying nature of risks that have cascading adverse impacts on all sectors, including agriculture. Hence, the need for multi-hazard and multi-sectoral approaches that ensure the integration of disaster and climate risk management to strengthen the resilience of people, their agricultural livelihoods, and the ecosystems they rely on. Additionally, the COVID-19 crisis has forced economies to slow down, thereby changing countries' GHG emission sources and patterns in an unexpected way; it has also increased uncertainties related to the achievement of the targets as defined in Nationally Determined Contributions (NDCs).

In view of the current global context, tackling climate change requires the implementation of different types of mitigation, adaptation and risk-reduction interventions within the context of sustainable development, which evidently strengthens the linkages between the international frameworks of the Paris Agreement, the Sendai Framework for Disaster Risk Reduction (SFDRR), and the 2030 Agenda for Sustainable Development. This publication aims to provide an overview of the efforts conducted by countries in the ECA region to mitigate and adapt to climate change, in alignment with the commitments agreed in the context of the NDCs and the linkages and complementarities with the Sustainable Development Goals (SDGs) and disaster risk reduction (DRR) efforts. Moreover, the Strategic Framework of the Food and Agriculture Organization of the United Nations (FAO) seeks to support the 2030 Agenda through the transformation to more efficient, inclusive, resilient, and sustainable agrifood systems through four pillars – better production, better nutrition, a better environment, and a better life – and leaving no one behind.

This is the second in a series of FAO publications and follows the 'Policy Analysis of Nationally Determined Contributions in Europe and Central Asia 2018' report. In this context, this second edition gives an update on the countries' progress towards their commitments in climate-change mitigation and adaptation through their NDCs, national policies, and legislative framework. The report provides an update on the GHG emission trends from 1990 to date, including a sectoral approach, focusing on the highest-emitting sectors, together with recent developments in national climate-change mitigation policies and legal framework as well as the implementation of measures. The report also provides a thorough analysis of existing and expected impacts and vulnerabilities to climate-related hazards, and adaptation-related legislation and policies relevant for the agricultural sector. Finally, information on climate-finance flows to support countries in the implementation of their global commitments towards the realisation of the Paris Agreement is also included in this analysis report.



This publication is developed under the thematic umbrella of Regional Initiative 3 – ‘Managing natural resources sustainably and preserving biodiversity in a changing climate’ – as a mechanism to support FAO Members in building the resilience of agricultural and food systems to climate change and natural hazard-induced disasters. This publication aims to act as a strong analytical tool on the road to the United Nations Climate Change Conference (COP26) and the work conducted by ECA countries to review and update their NDCs.

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This publication was prepared by the FAO Regional Office for Europe and Central Asia (REU) as part of the systematic efforts conducted by the Organization to support countries in the implementation of their commitments in the context of the United Nations Convention on Climate Change, focusing particularly on the areas of the FAO mandate.

The document aims to compile relevant and up-to-date information on the progress made to date by countries in ECA in the implementation of NDCs and the projected collective efforts on the road to COP26 and beyond. It also contains an analysis of the synergies and complementarities between the SDGs and the 2030 agenda, and the NDCs under the Paris Agreement.

This analysis was made possible thanks to the overall coordination of Tania Santivanez, agricultural officer and Regional Initiative 3 delivery manager (REU). The main authors are Tamara van 't Wout (Office of Emergencies and Resilience/REU), Gamze Celikyilmaz (REU), Carmen María Argüello López (REU). The report was reviewed by Krystal Crumpler (Office of Climate Change, Biodiversity and Environment), Martial Bernoux (Office of Climate Change, Biodiversity and Environment), Sophie von Loeben (Office of Emergencies and Resilience), Sylvie Wabbes-Candotti (Office of Emergencies and Resilience), Anastasia Kvasha (REU), and Evetta Zenina (Subregional Office for Central Asia), who provided valuable technical inputs. Additionally, editorial and visual support was provided by Ronan Goggin. Layout and graphic design work was carried out by Nina Barrois.

The document was developed under the supervision of Raimund Jehle, FAO regional programme leader for Europe and Central Asia, who tirelessly supports technical teams in REU who assist FAO Members in their efforts to tackle climate change as one of the biggest challenges facing the agricultural sector.

# ACRONYMS AND ABBREVIATIONS

<b>ADB</b>	Asian Development Bank
<b>AfDB</b>	African Development Bank
<b>AFOLU</b>	Agriculture, forestry and other land use
<b>BAU</b>	Business as usual
<b>CCA</b>	Climate-change adaptation
<b>CIS</b>	Commonwealth of Independent States
<b>COP</b>	Conference of Parties
<b>DFI</b>	Development financial institution
<b>DRR</b>	disaster risk reduction
<b>EBRD</b>	European Bank for Reconstruction and Development
<b>EIB</b>	European Investment Bank
<b>ECA</b>	Europe and Central Asia
<b>EFTA</b>	European Free Trade Agreement
<b>ETF</b>	Enhanced Transparency Framework
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>GCF</b>	Green Climate Fund
<b>GDP</b>	Gross domestic product
<b>GEF</b>	Global Environment Facility
<b>GHG</b>	greenhouse gas
<b>IDGB</b>	Islamic Development Bank Group
<b>INDC</b>	Intended Nationally Determined Contribution
<b>INFORM</b>	Index For Risk Management
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>IPPU</b>	Industrial processes and product use
<b>LUCF</b>	Land use change and forestry
<b>LULUCF</b>	land use, land use change and forestry
<b>NAMA</b>	Nationally appropriate mitigation action
<b>NAP</b>	National Adaptation Plan
<b>NDC</b>	Nationally Determined Contribution
<b>SDG</b>	Sustainable Development Goal
<b>SEE</b>	Southeastern Europe
<b>SFDRR</b>	Sendai Framework for Disaster Risk Reduction
<b>UNDP</b>	United Nations Development Programme
<b>UNEP</b>	United Nations Environment Programme
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>WBG</b>	World Bank Group

# INTRODUCTION

Climate change is among the biggest global challenges faced by humankind in recent history. A global increase in temperature and decrease in precipitation is expected as a result of climate change; however, its effects will vary from region to region, due to different levels of exposure and vulnerability. In this context, certain regions will be disproportionately affected. For instance, in the ECA region during the 1990–2020 period, a total of 670 natural hazard-induced and biological disasters have affected over 36.1 million people, which has resulted in more than USD 56.5 billion in economic damage (EM-DAT, 2021).

An increase in the frequency and intensity of extreme weather events such as drought, flooding, and storms, is anticipated, which may lead to reduced productivity and yields in the crops, livestock, fisheries, and forestry sub-sectors. In this framework, smallholders, particularly poor producers, are among the most vulnerable as they rely entirely on the agricultural sector for their food security, income generation, livelihoods, and means of subsistence.

The United Nations Environment Programme (UNEP) annual Emissions Gap Report highlights the fact that at this point, even if countries meet commitments made under the 2015 Paris Agreement, the world is heading for a 3.2°C global temperature rise over pre-industrial levels, leading to even wider-ranging and more destructive impacts. Therefore, these options for enhanced ambition represent the need to have stronger commitments to kick start the major transformation of economies and societies.

International efforts to tackle climate change have gained pace with the signature of the Paris Agreement, through which parties established five-year cycles to increase ambitions with respect to climate action, including through NDCs that would ensure that increased mitigation and adaptation efforts are implemented over time to achieve the overall objective of the United Nations Framework Convention on Climate Change (UNFCCC). In this sense, NDCs are the key pillars of the Paris Agreement and represent countries' commitments towards long-term goals.

At the 24th Conference of the Parties (COP24), a decision was reached to enhance the ambition of the initial NDCs submitted by the parties, in view of the substantial gap existing in the aggregate GHG emission reductions offered by the parties, vis-à-vis the overall GHG emission level deemed by science needed to keep the temperature below 2 °C or even close to the 1.5 °C global emissions trajectory path (IPCC, 2018). Countries with an NDC timeframe up to 2025 were requested to submit a new NDC, and those with a timeframe until 2030 were requested to communicate or update an existing NDC (decision 1 CP/21, UNFCCC 2015). Furthermore, the COP24 decision 1 CP/24 "stresses the urgency of enhanced ambition in order to ensure the highest possible mitigation and adaptation efforts by all Parties", and also reiterates the need to communicate or update the NDC by 2020.

Concerning the adaptation component of the NDCs, the CMA (Conference of the Parties serving as the meeting of the Parties to the Paris Agreement) in its decision 9 established a set of guidelines for the parties regarding their "adaptation communications", according to which parties need to decide if their adaptation communications would be an integral part of their NDC, or submitted as a separate document.

Parties are requested to submit to the UNFCCC Secretariat their updated NDC at least nine to 12 months in advance of the relevant session of the Conference of the Parties, in this case COP26, which is expected to take place in Glasgow in November 2021. In this context, as the pre-2020 climate action comes to an end with the NDC enhancement process around the globe, the year 2020 represented a key milestone to fulfil the key elements of the Paris Agreement and the promise to act jointly and decisively to tackle climate change with the required urgency.

Countries in the ECA region have submitted their NDCs with a variety of mitigation and adaptation targets based on each country's existing capacities and developed policies, covering a large spectrum of GHG emissions, emission reduction potentials, vulnerabilities and exposure, climate-change impacts, and mitigation and adaptation options in the agricultural sector, together with a variety of financial, institutional, and human capacities to address the bottlenecks hindering progress in those different areas of work.

In the meantime, the COVID-19 pandemic has affected the entire world since early 2020. It has slowed down economic activities, and it is uncertain how long its impacts may last. The pandemic has revealed a changing risk environment and the systemic and overlaying nature of risks that have cascading adverse impacts on all sectors, including agriculture. This sector in particular needs to take a multi-hazards approach, and work with other sectors to address disaster and climate risks within the context of sustainable

development. Additionally, the reduced economic activity due to the COVID-19 crisis has caused a significant change in countries' GHG emission sources and patterns in an unexpected way, and has increased the uncertainties related to the achievement of the goals as defined in the NDCs.

The latest National GHG Inventory Report submissions from 2021 reflect the emissions from 2019. Therefore, accurate figures regarding GHG emissions for the year 2020 have yet to be submitted. However, a recent report published by the International Energy Agency (IEA), 'Global Energy Review 2021', indicates that global GHG emissions decreased by 5.8 percent in 2020, corresponding to almost 2 Gt CO<sub>2</sub>-eq (two gigatonnes of carbon dioxide equivalent).<sup>1</sup> The report projects global emissions to be 1.2 percent below the 2019 peak (IEA, 2021). It is clear that the economic impact of the pandemic will continue for an unknown period of time. Due to these uncertainties, earlier GHG emissions projections, and respective NDC targets, may deviate significantly from actual figures.

While climate is in the spotlight, however, in the context of the COVID-19 pandemic short-term relief comes first. The crisis puts at risk much needed structural change through the bailing out of polluting businesses (such as aviation or mining), often without climate-related conditions attached. There is a clear link between the health and climate crises as global food systems contribute substantially to extensive ecosystem degradation, biodiversity loss, and land-use changes that enable the transmission and spread of zoonoses, and drive GHG emissions. Therefore, there is a need to include response and recovery policies and programmes that mitigate the adverse impacts of the pandemic on incomes and food security, and at the same time contribute to building long-term resilience and adaptive capacity. Without such a transformation, the agrifood system will not be able to withstand future climate shocks and stresses, as highlighted by the recently published NDC Update Report.

The international scientific community is therefore urging countries to increase their ambition now and not wait until 2025 during the next NDC enhancement cycle. The road to COP26 represents a chance for crucial momentum for climate action, with countries working towards enhanced commitments.

## Objective

In this context, this publication has the objective of providing a comprehensive analysis of the key trends in GHG emissions and vulnerability to climate change in the ECA region, compiling most relevant efforts and progress reported by countries in the implementation of mitigation and adaptation goals and measures in recent years. Considering the areas of the FAO mandate, this document aims to provide information with relevance for the agricultural, and land use, land use change and forestry (LULUCF) sectors as key contributors to country gross domestic product (GDP) and one of the most vulnerable areas of economic activity to the impacts of climate change.

## About the NDC policy analysis report

This policy analysis report consists of three main sections that consider the levels of economic development, as well as diverse geopolitical contexts, in the region. To reflect this diversity of country realities, the information is structured and presented by sub-regions, including the Caucasus, Central Asia, (European part of) the Commonwealth of Independent States and Ukraine<sup>2</sup> (hereinafter referred to as CIS), EU27+UK<sup>3</sup>, European Free Trade Association (EFTA), and Southeastern Europe (SEE).

Section 1 provides a characterisation of the different sub-regions in ECA, departing from the role of agriculture as a pivot for economic and social development and providing up-to-date information on the impacts of climate change in the region, as well as GHG emissions trends.

Section 2 includes a comprehensive analysis of the commitments as defined in the NDCs of countries in the different sub-regions, reflecting on the progress made to date in the implementation of mitigation and adaptation goals. This section also provides a compilation of the key policy and legislative instruments through which countries are attempting to tackle climate change according to their respective circumstances and capacities. It provides a detailed overview of the linkages between NDCs and the SDG and DRR processes, which makes evident the need for coordination and more articulated action on these fronts.

1. A carbon dioxide equivalent or CO<sub>2</sub> equivalent, abbreviated as CO<sub>2</sub>-eq is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.

2. Ukraine ended its participation in CIS statutory bodies in 2018, however it is categorized under the CIS sub-region in this report for convenience.

3. The United Kingdom of Great Britain and Northern Ireland (UK) officially exited the European Union on 31 January 2020; however, within the time frame of the analyses conducted for this report, it was still part of the European Union, and therefore, the UK is considered together with the EU27, where the sub-region assessed is named EU27+UK.



Section 2 also provides a brief on the identified needs related to the provision of climate finance as included by different countries in their NDCs; this represents a key element for the realisation of commitments submitted by countries to the UNFCCC. Last, but not least, this publication aims to initiate an analysis of the path to COP26 as an important milestone in international climate-change negotiations, providing case studies of countries currently conducting efforts to review and update their NDCs to be submitted to the UNFCCC Secretariat.

Section 3 provides information on the climate–finance gap, both globally and for the ECA region. The section also frames the mechanisms for finance climate-change mitigation and adaptation efforts of middle-income countries. It underlines that the provision of financial resources by developed countries to middle-income countries is secured through the UNFCCC’s Article 4 and Paris Agreement’s Article 9. Therefore, the section also highlights the importance of reflecting financial needs in NDCs, which has not been very common in ECA countries to date. The progress of ECA countries with respect to climate finance is also examined in this section. Finally, the section presents the available climate-finance options for the ECA region, which consist mainly of the mechanisms under the UNFCCC and the Paris Agreement, together with bilateral financing options led by the European Union and European Union countries.

The report also includes overarching conclusions, aiming to provide experts and practitioners with a better understanding of the recent policy developments and achievements in the implementation of NDC targets in the ECA region.

### Methodology

This report has been established through a desk review of all initial NDCs and updated NDCs, including countries’ national communications, relevant national climate-change and agricultural policy documents, as well as additional analyses, research studies from academia, United Nations agencies, and non-governmental organizations, that have been published over the past 20 years. In addition, various databases and indices with data from 1990 to 2021 were also consulted, including from the European Commission, FAO, the International Labour Organization (ILO), Catholic University of Leuven, and the World Bank.

For the establishment of the linkages between the NDCs and the SDGs, the methodology established by FAO’s Office of Climate Change, Biodiversity and Environment was used. This methodology includes an NDC–SDG matrix that helps to assess the degree of alignment between each climate action with SDG targets for the agricultural sector in each ECA sub-region, and the degree of alignment indicates to what extent each SDG target has been met.





# **PART 1**

## **REGIONAL OVERVIEW OF CLIMATE IMPACTS ON AGRICULTURE, SOCIOECONOMIC TRENDS, AND GREENHOUSE GAS EMISSIONS, IN EUROPE AND CENTRAL ASIA**

### **KEY MESSAGES**

- The countries in the ECA region are vulnerable to the adverse impacts of climate variability and change, which threatens to reduce yields and productivity in crops, livestock, forestry, fisheries and aquaculture. During the 1990–2020 period, a total of 670 natural hazard-induced and biological disasters affected over 36.1 million people, which resulted in economic damages of over USD 56.5 billion (EM-DAT, 2021). Climate change is expected to increase the frequency and intensity of extreme weather events, which will negatively affect agricultural production systems and the most vulnerable, such as the smallholder farmers, who are dependent on the sector and its activities for their food, income and livelihoods.
- The reduced economic activity due to the global pandemic caused global GHG emissions to decrease by 5.8 percent in 2020, according to the 'Global Energy Review 2021' report (IEA, 2021). The report suggests that 2021 emissions will be 1.2 percent below the 2019 peak. However, the exact figures have not yet been reflected in the latest national inventory reports submitted to the UNFCCC. The uncertainty over future GHG emission trends creates difficulties in projecting progress in reaching the mitigation targets set out in the NDCs.
- The countries of the ECA region have diverse profiles in terms of historic GHG emission trends. The region hosts both the biggest emitters, such as the Russian Federation and the European Union, and smallest emitters, such as Montenegro. Several countries in the region experience challenges in the preparation of their national GHG inventories, which makes it challenging to track their progress and achievements.

# 1. Regional overview of climate impacts on agriculture, socioeconomic trends, and greenhouse gas emissions, in Europe and Central Asia

## 1.1. Basic data for agriculture profile

### 1.1.1 Agricultural land use

The ECA region comprises 53 countries in different geographical sub-regions, including the Caucasus, Central Asia, CIS, EU27+UK, EFTA, and SEE.<sup>4</sup> As a result, it is highly diverse in terms of landscape, climate, water resources, extent of urbanization, and levels of socioeconomic development.

The diversity in the ECA region also translates into different levels of land resources available for agriculture. The majority of the countries have quite substantial amounts of agricultural land area, although it differs significantly by country and sub-region as shown in Table 1. Norway (2.7 percent), Sweden (7.4 percent), and Finland (7.5 percent), have the lowest amount of agricultural land, although the latter two have the highest share of forest land among all ECA countries – 68.7 percent and 73.7 percent, respectively. Kazakhstan (80 percent), Turkmenistan (72 percent), the United Kingdom of Great Britain and Northern Ireland (hereinafter referred to as the United Kingdom, 71.7 percent), and Ukraine (71.3 percent), have the largest agricultural land area as a proportion of total land area.

In terms of arable land, Montenegro (3.6 percent), Turkmenistan (5.7 percent) and Iceland (6.5 percent) have the least amount, while Finland (98.8 percent) and Denmark (90.9 percent) have the highest. The majority of countries in Central Asia have substantial areas under permanent meadows and pastures (from 82 percent to 94 percent), as well as the countries in the Caucasus (50 percent to 82 percent). It is more mixed in CIS, SEE, EU27+UK, and EFTA sub-regions, with Montenegro (94.3 percent), Iceland (93.5 percent), and Ireland (90 percent) among those with the largest areas. The extent of land under permanent crops varies significantly within and across all sub-regions – it ranges from 0.06 percent in Kazakhstan, 0.02 percent in Ireland, and 0.1 percent in Finland and Sweden, to 21.8 percent in Portugal and 19.6 percent in Italy. In terms of forest land, the countries with the lowest share include Iceland (0.5 percent), Kazakhstan (1.3 percent), and Malta (1.4 percent), while Sweden (68.7 percent), Slovenia (61.7 percent), and Montenegro (61.5 percent) have the largest amount of forest land (FAOSTAT, 2021).

4. The following sub-regions of the ECA region and their corresponding countries are included in the report: Caucasus (3) - Armenia, Azerbaijan, Georgia; Central Asia (5) - Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan; EU-27+UK (28) - Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden and the United Kingdom; European CIS (4) - Belarus, Republic of Moldova, the Russian Federation and Ukraine; EFTA (4) - Iceland, Liechtenstein, Norway and Switzerland; and, SEE countries (6) - Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia, and Turkey.

**TABLE 1. Agricultural land use in the ECA region, 2018** (Part 1)

Country	Land area (million ha)	Agricultural land area (% of total land area)	Arable land (% of agricultural land area)	Land under permanent crops (% of agricultural crops)	Land under permanent meadows and pastures (% of agricultural crops)	Forest land (% of total land area)
<b>Caucasus</b>						
Armenia	2 847	58.9	26.6	3.5	69.9	11.6
Azerbaijan	8 265	57.8	43.9	5.3	50.8	13.4
Georgia	6 949	34.1	13.1	5.1	81.8	40.6
<b>Central Asia</b>						
Kazakhstan	269 970	80	13.8	0.06	86.2	1.3
Kyrgyzstan	19 180	55	12.2	0.7	87.1	6.7
Tajikistan	13 879	34.1	14.8	3.2	82	3
Turkmenistan	46 993	72	5.7	0.2	94.1	8.8
Uzbekistan	44 056	58.1	15.9	1.6	82.6	8.3
<b>CIS</b>						
Belarus	20 298	41.6	67.6	1.3	31.1	43.1
Republic of Moldova	3 289	68.6	74.5	10.4	15.1	11.8
Russian Federation	1 637 687	13.2	56.5	0.8	42.7	49.8
Ukraine	57 940	71.3	79.6	2.1	18.3	16.7
<b>SEE</b>						
Albania	2 740	42.8	52.1	7.2	40.7	28.8
Bosnia and Herzegovina	5 120	43.2	46.5	4.5	48.9	42.7
Montenegro	1 345	19.1	3.6	2.1	94.3	61.5
North Macedonia	2 522	50.1	33.1	3.2	63.7	39.7
Serbia	8 746	39.6	74.6	5.9	19.5	31.1
Turkey	76 963	49.1	52.2	9.2	38.7	28.5
<b>EU27+UK</b>						
Austria	8 252	32.1	50	2.5	47.5	47.2
Belgium	3 028	44.7	62.8	1.8	35.5	22.8
Bulgaria	10 856	46.3	69.1	3	27.8	35.6
Croatia	5 659	26.2	54.2	4.9	41	34.2
Cyprus	924	14.2	79.4	19.4	1.2	18.7
Czechia	7 720	45.6	70.5	1.4	28.1	34.6
Denmark	4 000	65.8	90.9	1.1	8.1	15.7
Estonia	4 347	23.1	68.5	0.4	31.1	56.1



**TABLE 1. Agricultural land use in the ECA region, 2018 (Part 2)**

Country	Land area (million ha)	Agricultural land area (% of total land area)	Arable land (% of agricultural land area)	Land under permanent crops (% of agricultural crops)	Land under permanent meadows and pastures (% of agricultural crops)	Forest land (% of total land area)
<b>EU27+UK</b>						
Finland	30 392	7.5	98.8	0.1	1.1	73.7
France	54 756	52.3	63.2	3.5	33.2	31.2
Germany	34 938	47.6	70.5	1.2	28.3	32.7
Greece	12 890	47.4	35	17.8	47.2	30.3
Hungary	9 126	58	81.6	3.3	15.1	22.5
Ireland	6 889	65.6	10	0.02	90	11.2
Italy	29 773	41.7	54.2	19.6	26.2	31.8
Latvia	6 209	31.2	66.8	0.4	32.8	54.8
Lithuania	6 263	47.1	71.8	1.2	27	35.1
Luxembourg	243	54.1	47.2	1.2	51.5	36.2
Malta	32	32.4	87.4	12.6	n/a	1.4
Netherlands	3 367	54.1	56	2.1	41.9	10.9
Poland	30 617	47.4	75.9	2.4	21.7	30.9
Portugal	9 161	39	25.7	21.8	52.5	36.1
Romania	23 008	58.3	64.8	3.3	32	30.1
Slovakia	4 808	39.3	71.4	0.9	27.7	40.1
Slovenia	2 014	30.4	29.7	8.8	61.5	61.7
Spain	49 960	52.4	45.4	18.7	36	37.2
Sweden	40 731	7.4	84.7	0.1	15.1	68.7
UK	24 193	71.7	34.8	0.3	64.9	13.1
<b>EFTA</b>						
Iceland	10 083	18.6	6.5	n/a	93.5	0.5
Liechtenstein	16	32.3	41.9	n/a	58.1	41.9
Norway	36 511	2.7	81.4	0.3	18.3	33.3
Switzerland	3 952	38.2	26.4	1.7	72	31.9

Source: FAOSTAT, 2018.

n/a: data not available

### 1.1.2 Population and economy

The total population of the ECA region was 927.1 million in 2018 – this is projected to decrease by 19.7 million to 907.4 million by 2050 (UN DESA, 2018). The largest population increases between 2018 and 2050 are expected in Tajikistan (56 percent), followed by Kyrgyzstan (34.4 percent), Kazakhstan (21.7 percent), and EFTA (21.3 percent), while the largest population decreases are anticipated in North Macedonia (76 percent), Republic of Moldova (22 percent), and Ukraine (20.2 percent). In certain sub-regions (Central Asia and EFTA), all countries are expected to experience population increases, with population decreases expected in CIS and EU27+UK. In the Caucasus and SEE, the outlook is mixed, as shown in Table 2.

In the majority of the countries in the ECA region, more than half of the population resided in urban areas in 2018, except in Tajikistan (27.1 percent), Kyrgyzstan (36.4 percent), Republic of Moldova (42.6 percent), and Bosnia and Herzegovina (48.2 percent). By 2050, the countries projected to have the highest urbanization figures include Belarus (88.3 percent), EFTA and EU27+UK (87.6 percent), and the Russian Federation (83.3 percent). Tajikistan is the only country in the ECA region that is expected to have less than half of its population (43 percent) residing in cities by 2050 (UN, 2018).

**TABLE 2. Population and urbanization projections for the ECA region, 2018 and 2050**

	Total population in 2018 (millions)	Total population in 2050 (millions)	Population increase/ decrease (%)	Urban population as a share of total (%) 2018	Urban population as a share of total (%) 2050
<b>Caucasus</b>					
Armenia	2.9	2.7	-6.9	63.1	74.3
Azerbaijan	9.9	10.9	10.1	55.7	71
Georgia	3.9	3.4	-12.8	58.6	73.2
<b>Central Asia</b>					
Kazakhstan	18.4	22.4	21.7	57.4	69.1
Kyrgyzstan	6.1	8.2	34.4	36.4	53.6
Tajikistan	9.1	14.2	56.0	27.1	43
Turkmenistan	5.8	6.5	12.1	51.6	68.9
Uzbekistan	32.3	37.1	14.9	50.5	61.5
<b>CIS</b>					
Belarus	9.4	8.1	-13.8	78.6	88.3
Republic of Moldova	4.1	3.2	-22.0	42.6	56.9
Russian Federation	143.9	128.6	-10.6	74.4	83.3
Ukraine	44	35.1	-20.2	69.4	78.6
<b>SEE</b>					
Albania	2.9	2.7	-6.9	60.3	78.2
Bosnia and Herzegovina	3.5	3	-14.3	48.2	64.6
North Macedonia	2.1	0.5	-76.2	58	72.8
Montenegro	0.6	0.7	16.7	66.8	77.3
Serbia	8.7	7.4	-14.9	56.1	68.6
Turkey	81.9	95.8	17.0	75.1	86
<b>EFTA</b>	14.1	17.1	21.3	66	87.6
<b>EU27+UK</b>	509.4	499.8	-1.9	73.7	87.6

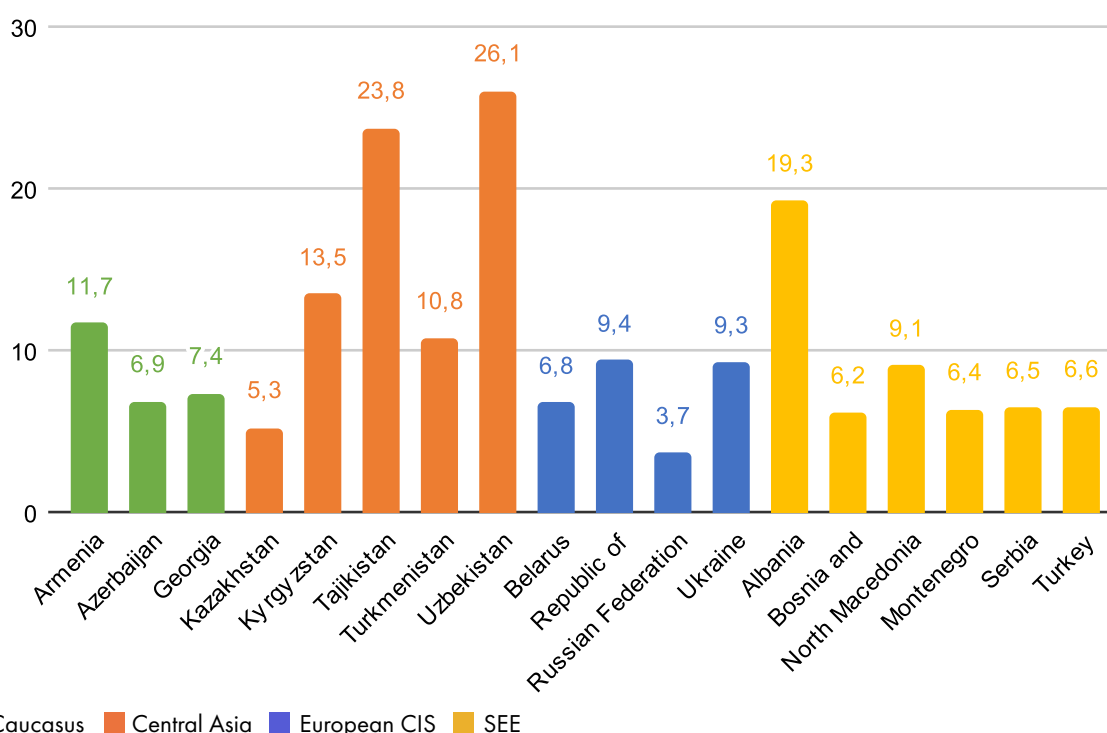
Source: UN, 2018.

Urbanization, as well as increased population and income, is expected to increase the demand for food and change people's dietary preferences towards more resource-intensive animal products and processed food, which will increase GHG emissions (FAO, 2018b). At the same time, there will be an outflow of people from rural areas who abandon agriculture, and who are needed to help produce food for an increasingly urban population. Some may migrate internally or internationally, either temporarily (seasonally) or permanently, in search of work opportunities and a better life. It is estimated that in 2017 the ECA region received 78 million international migrants from a total of 258 million worldwide, with over half (52 percent) estimated to be women. Within the region, the Russian Federation is the second-largest destination country for migrants after Germany. The Russian Federation hosts over 11 million international migrants, with around half originating from neighbouring countries. In 2017, international remittances in the ECA region were calculated at USD 44 billion, of which 40 percent was sent to rural communities. Among the key drivers of migration from rural areas are economic factors (rural poverty, food and nutrition insecurity in the absence of alternative opportunities to improve livelihood prospects); political factors (inequality between rural and urban areas, conflicts and political instability, limited access to basic services); and environmental factors (extreme weather events and climate change, depletion of natural resources, and environmental degradation). The decision to migrate is usually a mixture of these factors (FAO, 2018a).

Stronger rural–urban linkages can enhance food and nutrition security, improve both rural and urban livelihoods, and enhance environmental quality through climate resilient food systems (Blay-Palmer *et al.*, 2018). In this regard, there are relative benefits of local versus global food systems, among others related to relative GHG emissions, such as through enhanced linkages between rural producers and urban consumers, increased agricultural production in periurban and urban areas, and the consumption of more local and seasonal food (Coley, Howard and Winter, 2009; Garnett, 2011).

Agriculture is considered a driving force for growth, economic development and poverty reduction, especially in middle-income countries. In these countries, the rural population in particular is highly dependent on the sector for food security, income generation, and livelihoods (World Bank, 2016). The sector contributes significantly to the economies in the ECA region, although it varies by country and sub-region. For instance, the share of agriculture's contribution to GDP ranges from 3.7 percent and 5.3 percent in the Russian Federation and Kazakhstan, respectively, to 23.8 percent in Tajikistan and 26.1 percent in Uzbekistan, as shown in Figure 1.

**FIGURE 1. Agriculture value added to national GDP in the ECA region (%), 2020**



Source: World Bank data, 2020.

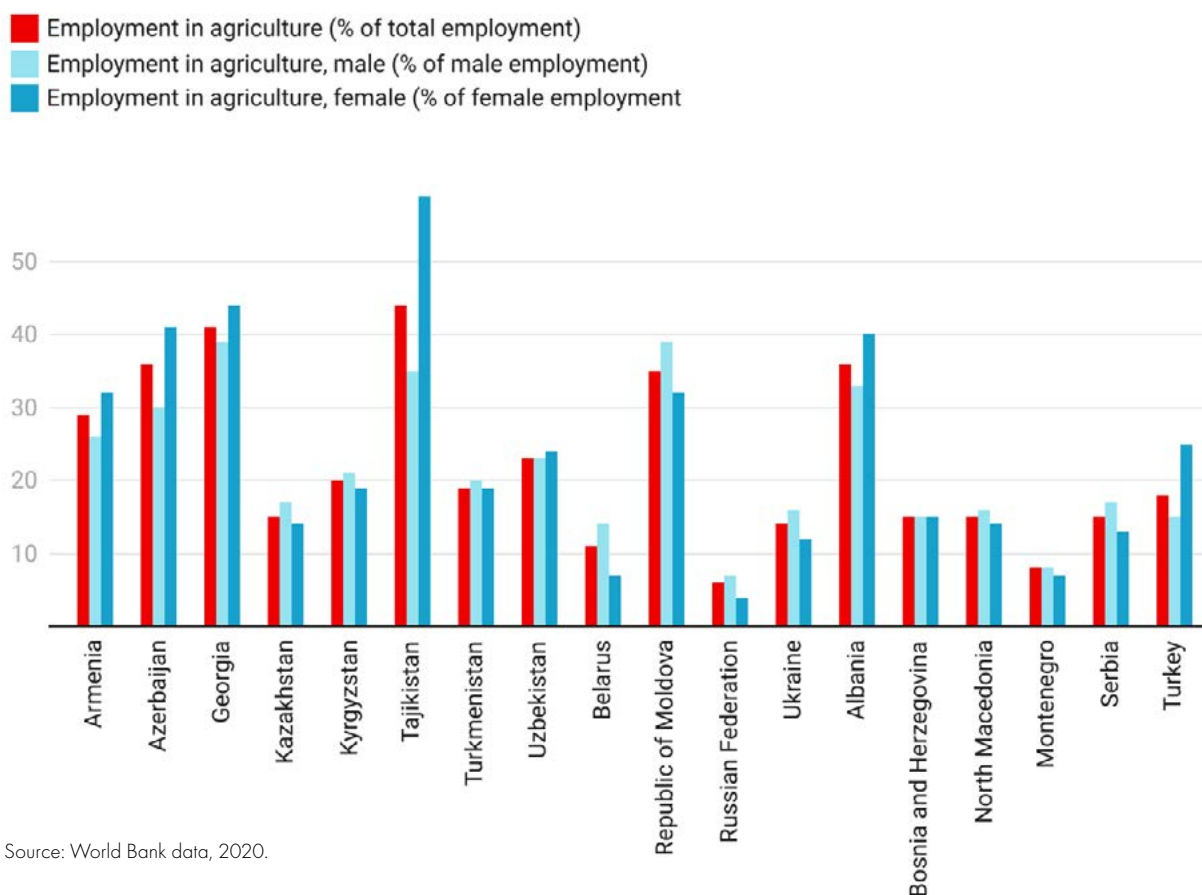
The data presented for Turkmenistan is from 2019.

Data from EU27+UK and EFTA countries is not included in Figure 1. In the EU27+UK sub-region, the average contribution of the agricultural sector to national GDP is 2 percent, while in the EFTA sub-region, this figure is 1.7 percent. The figure varies according to the country – from 0.1 percent in Liechtenstein to 4.4 percent in Iceland, and 0.2 percent in Luxembourg to 4.1 percent in Greece (World Bank, 2020).

Across the ECA region, roughly one-third to half of people reside in rural areas, in particular in Central Asia and the Caucasus, as shown in Table 2. Even in places where agriculture accounts for a lower share of output, such as in some CIS countries, Kazakhstan and some Western Balkan countries, the rural population still represents a significant share of the total population, which indicates that many of those people's livelihoods continue to be linked to agricultural production, processing and related services. This can also be observed from the share of agricultural employment as a proportion of total employment, which in 2020 was the highest

in Tajikistan with 44 percent, followed by Georgia (41 percent), Azerbaijan and Albania (both 36 percent), and the Republic of Moldova (35 percent). In these as well as some other countries, female employment is higher than male employment in the sector, as shown in Figure 2.

**FIGURE 2. Employment in agriculture, male and female employment as proportion of total, male and female employment (%) in the Caucasus, Central Asia, CIS and SEE sub-regions, 2020**

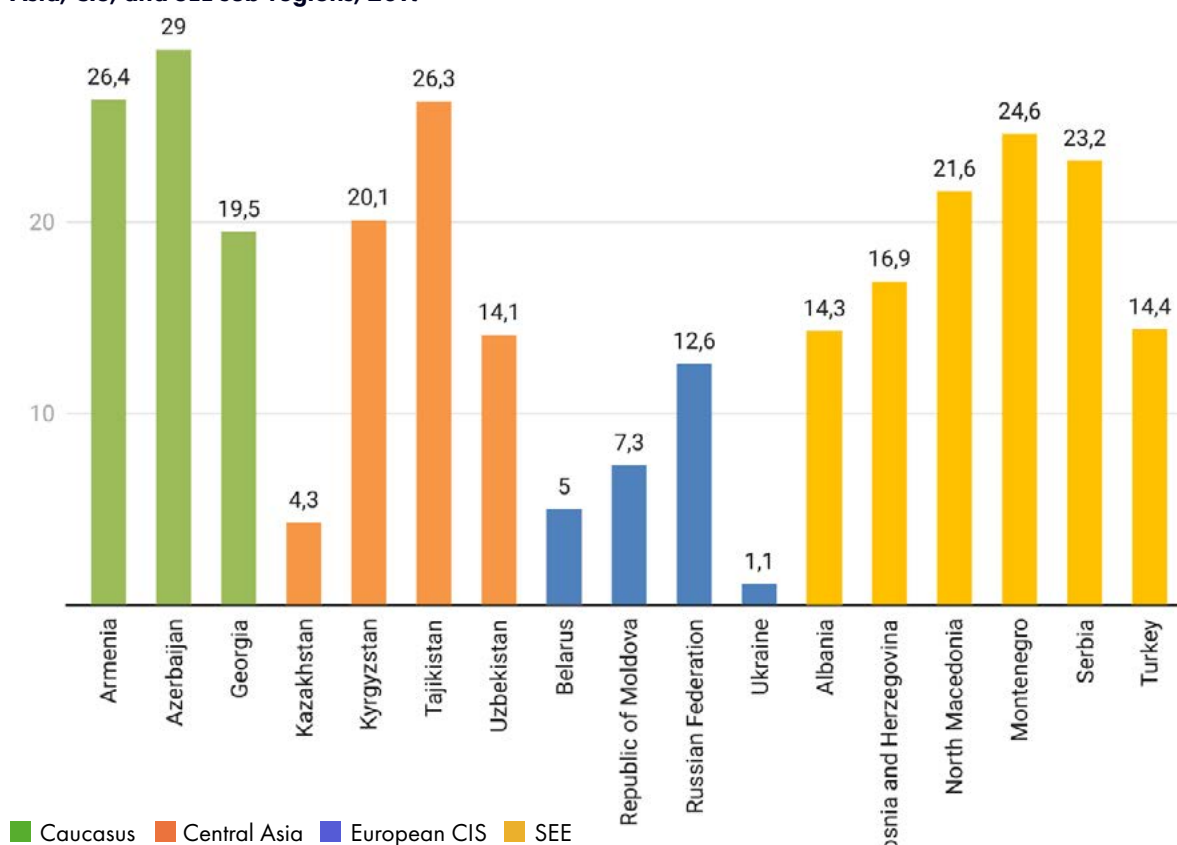


Source: World Bank data, 2020.

In the EU27+UK and EFTA regions, the average share of agricultural employment as a proportion of total employment is 4.5 percent and 3 percent, respectively. The agriculture employment data depicted in the above figure only includes formal employment and does not include those who work in the sector informally, such as family workers contributing to the family farm, or employees with an informal contract. It is estimated that over 60 percent of the world's workers work informally, and this tends to be more prevalent in the agricultural sector than in the industrial and service sectors (ILO, 2016). For instance, in the rural areas of SEE and CIS countries, informal employment is calculated as 82.1 percent of rural employment and 98.6 percent of agricultural employment (ILO, 2019). However, it should be taken into account that agricultural employment is anticipated to decline over time in most countries, due to ageing populations and a gradual decrease in the number of young people living in rural areas. The agricultural labour force is anticipated to decrease from around 50 million to around 15 million in the ECA region by 2050 (FAO, 2012).

The importance of the sector for people's lives and livelihoods in the ECA region should not be underestimated. Growth in the agricultural sector can help to reduce poverty. The majority of poor people reside in the countryside. It is estimated that globally 75 percent of extremely poor people still live in rural areas, and many of these rural poor are employed in the agricultural sector as smallholders (Anríquez and Stamoulis, 2007). The countries in the ECA region with the highest poverty rates include Armenia (26.4 percent), Tajikistan (26.3 percent), Montenegro (24.5 percent), and Serbia (23.2 percent), as shown in Figure 3.

**FIGURE 3. Poverty rate (% of population living below the national poverty line) in the Caucasus, Central Asia, CIS, and SEE sub-regions, 2019**



No data was available for Turkmenistan.

Due to availability of data, for the majority of the countries data from 2019 was used to compile this graph, except for Albania (2012), Azerbaijan (2012), Bosnia and Herzegovina (2015), Kazakhstan (2018), Montenegro (2018), North Macedonia (2018), Republic of Moldova (2018), the Russian Federation (2018), Serbia (2018), Turkey (2018) and Uzbekistan (2013).

Source: World Bank data.

Poor smallholders, who mainly reside in rural areas, are the most vulnerable to the adverse impacts of extreme weather events and climate change. Building their resilience to these future shocks and stresses will be crucial, while considering also a smaller workforce.

## 1.2. Climate change impacts and vulnerabilities in the Europe and Central Asia region

Water is an essential input for agricultural production, and sustainable water-resources management is extremely important within the context of climate change. It is expected that besides an increase in average annual global temperatures, there will be a decline in average annual precipitation (IPCC, 2014). Similar trends are also observed in the ECA region, with temperature increases of up to an average of 2.6 °C and overall reductions in precipitation anticipated by 2050 (World Bank, 2009).



It is expected that by 2050, the northern and eastern areas of the region will generally become wetter, with the southern part expected to become drier. In most parts of the Russian Federation, rainfall is likely to increase by 5 percent to 11 percent by 2050, except for the North Caucasus, which may experience a reduction of 2 percent, although its winter precipitation may rise by between 9 percent and 18 percent. Furthermore, an increase in precipitation is anticipated in the rest of the ECA region in springtime (by 5 percent) and winter (by 9 percent), except for SEE, which is expected to experience a 6 percent decrease in rainfall. In addition, it is likely that the intensity of rainfall will increase by between 2 percent and 6 percent for the entire region, which may result in more flooding. At the same time, runoff is expected to decline throughout, except in the Russian Federation, with the largest decrease of 25 percent in SEE that may lead to more dry spells and drought (World Bank, 2009).

It has been observed that climate change has already negatively affected crop yields, such as maize and wheat in many lower-latitude regions, while temperature increases have also had adverse impacts on productivity in parts of the Mediterranean (IPCC, 2019). It is expected that in the near future, climate change will affect the water resources and ecosystems in the ECA region. One example of this is the influence of the glaciers of the Tien Shan mountains of northern China and Kyrgyzstan on the water resources for agriculture throughout Central Asia, where the sector relies almost entirely on irrigation. Due to the rise in temperatures, the mountain snowpack and volume of Tien Shan glaciers have reduced significantly. With the anticipated warming, winter snowfall will be replaced by rainfall and river flow will increase in winter, but decrease in spring and summer, which will lead to winter flooding and summer drought. As the glaciers shrink, the water supply will also decline throughout the year, which will likely result in insufficient water for extensive irrigation and may also lead to reduced water levels in the Aral Sea (World Bank, 2009).

Moreover, the reduction in precipitation due to the anticipated adverse impacts of climate change may lead to a rise in water withdrawal from surface and ground level sources for agriculture. When water is substantially withdrawn for agriculture, it results in higher levels of water stress (Luo, Young and Reig, 2015).<sup>5</sup> By 2030, it is expected that every country in Central Asia and the Caucasus, except Georgia, will be experiencing 'high' or 'extremely high' levels of water stress. This is also anticipated for some countries in CIS, such as the Russian Federation and Ukraine, for the SEE countries of North Macedonia and Turkey, as well as for several European Union countries such as Greece, Italy, Portugal, and Spain, as shown in Table 3.

**TABLE 3. Projections of water stress levels for agriculture in the ECA region**

Score	0–1	1–2	2–3	3–4	4–5
Value	Low (< 10%)	Low to medium (10–20%)	Medium to high (20–40%)	High (40–80%)	Extremely high (> 80%)

Name	2030	2040
Kyrgyzstan	4.92	4.93
Kazakhstan	4.77	4.79
Armenia	4.46	4.74
Turkmenistan	4.38	4.76
Azerbaijan	4.34	4.58
North Macedonia	4.05	4.13
Uzbekistan	4.26	4.30
Spain	4.09	4.22
Greece	4.12	4.23
Turkey	3.95	4.12
Italy	3.72	3.8
Ukraine	3.70	3.22
Tajikistan	3.36	3.42
Portugal	3.37	3.61
Bulgaria	2.86	2.69
Russian Federation	3.06	3.02

Name	2030	2040
United Kingdom	2.87	2.81
Belgium	3.01	3.25
Luxemburg	2.76	2.75
Georgia	2.67	2.94
Albania	2.44	2.56
Republic of Moldova	2.84	3.77
Poland	2.21	2.21
Netherlands	2.35	2.75
Lithuania	1.93	2.09
Czechia	1.88	1.91
Austria	1.77	1.89
Germany	1.68	1.67
France	1.77	1.9
Belarus	1.37	1.37
Ireland	1.25	1.22
Switzerland	1.28	1.34

Name	2030	2040
Hungary	1.29	1.39
Romania	1.32	1.42
Montenegro	1.44	1.68
Estonia	1.27	1.50
Sweden	0.92	0.93
Finland	0.63	0.54
Liechtenstein	0.53	0.59
Latvia	0.56	0.63
Slovakia	0.58	0.73
Slovenia	0.59	0.82
Serbia	0.42	0.60
Norway	0.21	0.21
Croatia	0.23	0.32
Denmark	0.23	0.53
Bosnia and Herzegovina	0.01	0.02
World average	2.00	2.09

Source: Luo, Young and Reig, 2015. No data available for Iceland.

5. Water stress refers to the total annual water withdrawals – municipal, industrial, and agricultural – expressed as a percentage of the total annual available blue water (water from rivers, lakes and groundwater). Higher values indicate more competition among uses.

By 2040, it is expected that Turkey will no longer experience 'high' water stress, but 'extremely high' water stress, while Republic of Moldova is anticipated to shift from 'medium to high' to 'high' levels of water stress.

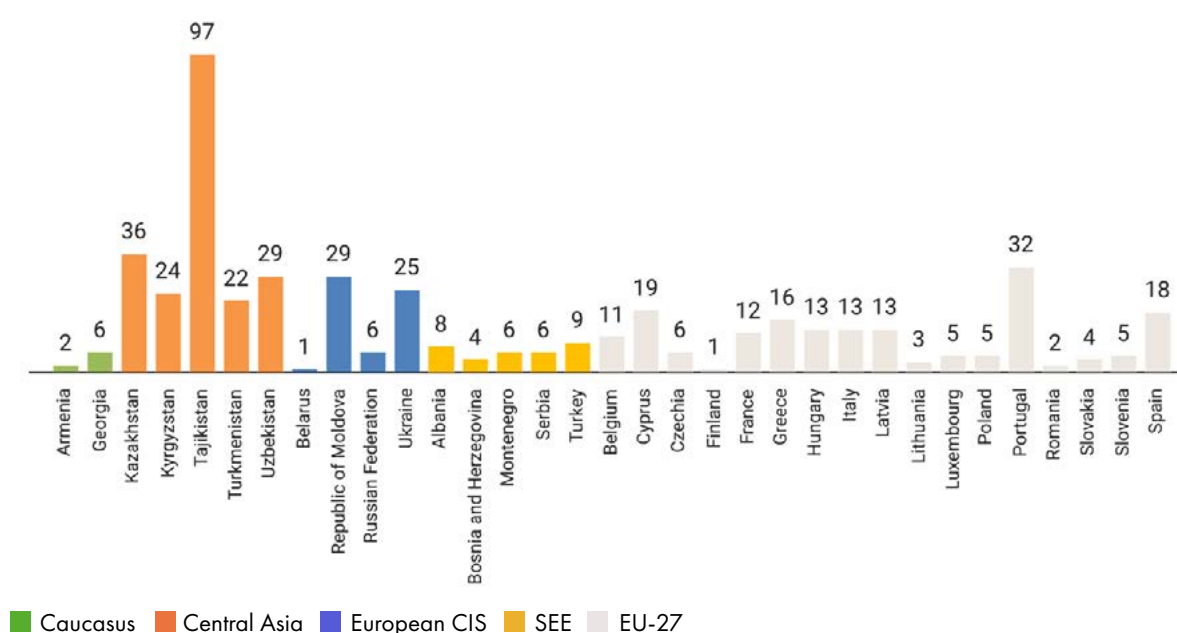
Besides a reduced availability of water adversely impacting agricultural yields, there will be other water-related issues in the region, which may result in reduced quantity (for example overexploitation of water for irrigation, dry rivers) and quality (for example eutrophication, organic matter pollution, saline intrusion) (World Bank, 2009). Both the quantity and quality of water may negatively impact crop productivity. In this regard, crop varieties that are more drought- and salt-resistant may be promoted as adaptation options in order to build resilience in agriculture to climate variability and climate change.

## LAND DEGRADATION

Soil health is of the utmost importance in order to support food production. It is the foundation for agriculture and the medium through which almost all food-producing plants grow. Soil supplies the essential nutrients, water, oxygen, and root support that plants need to grow. When land is degraded, it is less resilient to withstand the impacts of disasters such as flooding, landslides, storm surges, hurricanes, and drought. These climate-related hazards are expected to increase in frequency and severity as a result of climate change. Disasters, in turn, contribute to further aggravating ecosystem degradation and loss, including increased erosion, salinisation of soils, and loss of biodiversity (FAO, 2013).

Figure 4 shows the amount of degraded land as a proportion of the total land area (SDG indicator 15.3.1) in the ECA region. It is clear that Tajikistan has the highest proportion of degraded land (97 percent) in the region, followed by Kazakhstan (36 percent), Portugal (32 percent), Republic of Moldova (29 percent), and Uzbekistan (29 percent) (UNSTATS, 2015).

**FIGURE 4. Proportion of degraded land in the ECA region, 2015**



Source: UNSTATS, 2015.

No data available for Austria, Azerbaijan, Bulgaria, Croatia, Denmark, Estonia, Germany, Iceland, Ireland, Liechtenstein, Malta, the Netherlands, North Macedonia, Norway, Sweden, Switzerland, UK.

Various country profiles conducted by the United Nations Convention to Combat Desertification (UNCCD, 2017) included the cost of land degradation for seven ECA countries as shown in Table 4. It indicates that of these seven countries, Belarus has the highest total annual land degradation cost – estimated at USD 360 million – followed by Serbia (USD 254 million) and Bosnia and Herzegovina (USD 99 million). The cost of land degradation as a percentage of agricultural GDP is highest in Belarus (9.5 percent), closely followed by Montenegro (9.4 percent) and Bosnia and Herzegovina (8.2 percent). The cost of action and inaction is highest in Belarus (USD 6 billion and USD 40.8 billion, respectively) and lowest in Montenegro (USD 0.1 billion and USD 1 billion, respectively). The return on action against land degradation per dollar invested is highest in Montenegro and North Macedonia (both USD 8), and lowest in Serbia (USD 4).

**TABLE 4. Overview of the cost of land degradation in Armenia, Belarus, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia, 2017**

	Armenia	Belarus	Bosnia and Herzegovina	Montenegro	North Macedonia	Serbia
<b>Total annual cost of land degradation</b>	USD 71 ml	USD 360 ml	USD 99 ml	USD 25 ml	USD 51 ml	USD 254 ml
<b>Cost of land degradation as % of agricultural GDP</b>	4.2%	9.5%	8.2%	9.4%	6.9%	7.6%
<b>Cost of action (30-year planning horizon)</b>	USD 1.1 bn	USD 6 bn	USD 1.4 bn	USD 0.1 bn	USD 0.7 bn	USD 0.8 bn
<b>Cost of inaction (30-year planning horizon)</b>	USD 8.2 bn	USD 40.8 bn	USD 7.9 bn	USD 1 bn	USD 5 bn	USD 3 bn
<b>Return on action against LD per dollar invested</b>	USD 7	USD 7	USD 6	USD 8	USD 8	USD 4

Sources: UNCCD, 2017a; UNCCD, 2017b; UNCCD, 2017c; UNCCD, 2017d; UNCCD, 2017e; UNCCD, 2017f.

At present, 18 countries in the ECA region have committed to setting land degradation neutrality targets (UNCCD, 2021).<sup>6</sup> These include all the Caucasus, Central Asian, CIS, and SEE countries (except Albania), plus Italy. Achieving land degradation neutrality represents a paradigm shift in land-management policies and practices, which counterbalances the anticipated loss of productive land with the recovery of degraded land and focuses on conservation, sustainable management, and restoration of land within the context of sustainable and integrated land-use planning. Addressing ecosystem degradation and loss is crucial, as healthy and diverse systems are more productive and more resilient to climate variability and change.

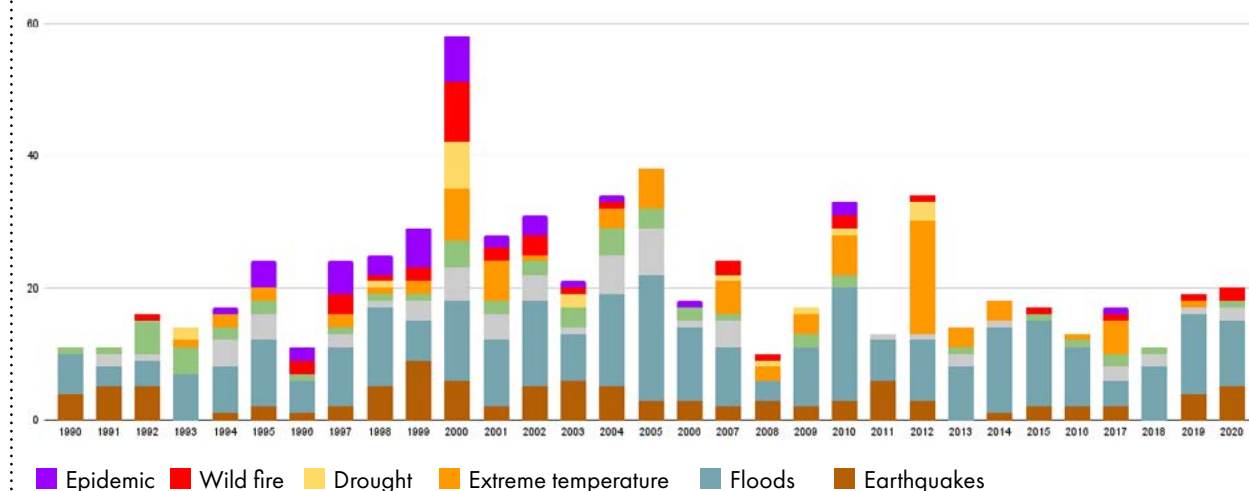
## NATURAL AND BIOLOGICAL HAZARDS

Due to the diversity of the ECA region in terms of geophysical, climatic and socioeconomic characteristics, it is vulnerable and exposed to various natural and biological hazards such as earthquakes, landslides, flooding, storms, drought, and wildfires, as well as (transboundary) plant and animal diseases including locusts, foot-and-mouth disease, lumpy skin disease, and African swine fever.

During the past few decades, it is estimated that between 1990 and 2020, a total of 670 natural hazard-induced and biological disasters – 571 of which were climate-related – have occurred in the ECA region. These affected over 36.1 million people (25.7 million of them impacted by climate-related disasters), and resulted in over USD 56.5 billion in economic damage, of which USD 25.3 billion was linked to climate-related disasters (EM-DAT, 2021). Figure 5 shows that over the past two decades, the number of disasters has increased and certain disasters have become more frequent, in particular flooding and extreme temperatures. The highest number of disasters occurred in 2000, when the ECA region was impacted by 58 natural hazard-induced and biological disasters, of which 52 were climate-related. It is important to also point out that the EM-DAT database includes only medium to large-scale disasters, so the occurrence of such disasters is likely to be under reported.

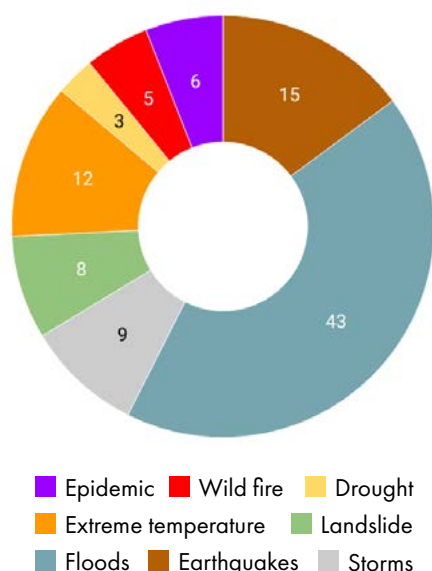
6. Land Degradation Neutrality (LDN) has been defined by the parties to the UNCCD as “a state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems”.

**FIGURE 5. Number and type of natural hazard-induced and biological disasters in the Caucasus, Central Asia, CIS and SEE sub-regions, 1990–2020**



Flooding (43 percent) have occurred most frequently in the ECA region, followed by earthquakes (15 percent), extreme temperatures (12 percent), storms (9 percent), landslides (8 percent), biological disasters, including epidemics and insect infestations (6 percent), wildfires (5 percent), and drought (3 percent), as shown in Figure 6.<sup>7</sup>

**FIGURE 6. Frequency of natural hazard-induced and biological disasters in the Caucasus, Central Asia, CIS and SEE sub-regions (%), 1990–2020**



Earthquakes are included here as countries in the Caucasus and Central Asia, and some in SEE (Albania, Bosnia and Herzegovina, North Macedonia, and Turkey), are particularly at risk of earthquakes. The adverse impacts may significantly reduce governments' financial resources and their ability to fund actions to tackle climate change.

With climate change, it is expected that the frequency and intensity of climate-related hazards will increase (IPCC, 2014). Due to the climate-sensitive nature of agriculture, this economic sector is particularly vulnerable to natural and biological hazards. It is estimated that as whole, the sector absorbed approximately 26 percent of the total damage and losses caused by medium- and large-scale natural hazard-induced disasters that occurred in least developed countries and low- and middle-income countries in the 2008–2018 period. Crop and livestock production losses, due to disasters, amounted to an estimated USD 108.5 billion in these countries. The losses totalled USD 280 billion if upper-middle income countries and high-income countries are included (FAO, 2021).

The 2021 Index for Risk Management (INFORM) indicates that all countries in the four sub-regions in ECA have a high to very high risk of flooding, in particular Serbia (8.9), followed by the Russian Federation (8.4), Bosnia and Herzegovina (7.1), and Ukraine

7. The incidence of drought is likely to be under reported due to the slow-onset nature of the hazard and the difficulty to establish triggers to declare a drought, which is also related to the need to have adequate and reliable agrometeorological infrastructure in place, as well as the human and technical resources to systematically and accurately collect and analyse the data.

(7.1), as shown in Table 5. Countries that have a high risk of suffering drought include Moldova (5.6), Georgia (5.5), Azerbaijan (5.3), Armenia (5.2), Kazakhstan (5), and Turkmenistan (4.6); while countries that have a very high risk of drought are Tajikistan (7.6), followed by Albania (6.9), Uzbekistan (6.6), the Russian Federation (6.4), and Kyrgyzstan (6.3). Drought has a particularly damaging impact on agriculture, such as the 2007 drought in Republic of Moldova that affected 80 percent of the country's territory and resulted in devastating agricultural losses calculated at nearly USD 1 billion (World Bank, 2009). According to a FAO study (2017), 83 percent of total global damage and losses caused by drought was absorbed by the sector, especially the crop and livestock sub-sectors. However, due to its slow-onset nature, lack of visible physical damage, blurred temporal boundaries and wide geographical reach, it is difficult to assess the exact impact of drought and as a result, the evidence base is often missing. The adverse impacts of drought – in terms of agricultural damage and losses data – is often underestimated, while its quantification is crucial for the development of effective DRR policies, and to inform cost-effective prevention and response strategies (FAO, 2017a).

**TABLE 5. INFORM Risk Index in the Caucasus, Central Asia, CIS and SEE sub-regions, 2021**

Score	0.0 - 1.4	1.5 - 2.6	2.7 - 4.0	4.1 - 6.0	6.1 - 10.0
Value	very low	low	medium	high	very high

	INFORM Risk	Hazard & Exposure	Natural hazards (overall score)	Flood	Drought	Epidemics (Infectious disease outbreaks)	Lack of coping capacity
<b>Caucasus</b>							
Armenia	3.3	3.2	4.5	4.7	5.1	2.5	4.6
Azerbaijan	4.4	4.4	4.9	4.9	5.5	4.3	4.5
Georgia	3.9	4	4.5	5.1	4.7	4.6	3.2
<b>Central Asia</b>							
Kazakhstan	1.8	2.3	4	6	3.8	0.7	3.7
Kyrgyzstan	3.5	4.5	5.1	5.6	5.4	2.2	4.4
Tajikistan	4.5	5.3	5.8	5.4	6.3	3.5	5
Turkmenistan	2.4	2.2	3.7	6.4	5.6	1.1	5.7
Uzbekistan	3.1	3.8	5.2	6.3	6.0	2.1	3.9
<b>CIS</b>							
Belarus	1.8	1.7	2.2	6.2	2.4	1.3	2.8
Republic of Moldova	2.9	2.9	4.1	5.6	4.6	1.9	4.6
Russian Federation	3.8	6.1	5.7	8.4	3.2	2	4.5
Ukraine	4.7	5.4	3.2	7.1	3.9	3.9	4.7
<b>SEE</b>							
Albania	2.9	4.1	6.4	4.7	4.8	1.5	4.1
Bosnia and Herzegovina	3.7	3	4.1	7.1	2	3.7	4.7
North Macedonia	2.4	2.3	3.8	4.2	4.9	1.7	3.6
Montenegro	2.4	2.5	4.3	4.4	2.6	1.7	3.2
Serbia	3.1	3.4	4.5	8.9	3.9	2.3	3.9
Turkey	5	7.9	6.2	5.7	6.2	4.9	3.2

Source: Inter-Agency Standing Committee and the European Commission, 2021.

In order to improve the evidence base of the impact of drought on agriculture, the 'Central Asian Countries Initiative for Land Management' project is currently being implemented. This regional Global Environment Facility (GEF) funded project of USD 10.8 million is implemented by FAO and aims to scale up integrated national resources management in drought-prone and salt-affected agricultural production landscapes in the five countries of Central Asia, plus Turkey. The upscaling of integrated national resources management practices will help to limit pressures and adverse impacts on natural resources and include those that strive to improve irrigated land fertility, prevent and reduce erosion, improve crops sowing and land tillage methods, apply agricultural afforestation, enhance water capture and retention, and improve pasture productivity and forage production.

COVID-19 has spread rapidly across the world and devastated lives and livelihoods. It was caused by a biological hazard and has resulted in a public-health disaster. COVID-19 is unfolding on top of other shocks and stresses such as flooding, storms, earthquakes, drought, and desert locusts and fall armyworms outbreaks. These disasters, some of which are linked or aggravated by the effects of climate change, will further increase the exposure and vulnerabilities of people, systems, and economies. The pandemic has clearly shown the changing risk environment as well as the systemic and overlaying nature of risks that have adversely impacted all sectors. Hence, there is a need for multi-hazard, preventive, anticipatory and multi-sectoral approaches that ensure the integration of disaster and climate risk management to strengthen the resilience of people, their agricultural livelihoods, and the ecosystems they rely on (FAO, 2020).

In this regard, the risk of epidemics is a recently introduced component in the 2021 INFORM Index and covers zoonoses, vector-borne, people-to-people, and food-waterborne diseases. Countries in Central Asia, the Caucasus and some countries such as Tajikistan (6.3), Turkey (6.2), and Uzbekistan (6.0), are indicated as having a high to very high risk to these biological hazards. Turkey (7.9) and the Russian Federation (6.1) have the highest hazard and exposure score. In terms of vulnerability, which includes both socioeconomic aspects and vulnerable population, the highest scores include Turkey (4.9) and Georgia (4.6), while Turkmenistan (5.7), Tajikistan (5.0), Bosnia and Herzegovina (4.7), and Ukraine (4.7) have the highest scores regarding a lack of institutional and infrastructural coping capacity (Inter-Agency Standing Committee and the European Commission, 2021).

According to a 2010 report by the European Environment Agency (EEA, 2010), the number and impacts of disasters have also increased in Europe during the 1998–2009 period. It is estimated that during this period, disasters killed almost 100 000 people, affected over 11 million people, and resulted in economic losses of around EUR 150 billion. Extreme temperatures have caused the highest number of human fatalities, with flooding and storms resulting in the highest financial losses (of EUR 52 billion and EUR 44 billion, respectively).

The INFORM Risk Index of 2021, for EU27+UK and EFTA countries (as shown in Table 6), indicates a very high risk of flooding in Hungary (7.5), Romania (7), Slovakia (6.7), Croatia (6.5), Latvia (6.5), Germany (6.1), and Poland (6.1). With regard to drought risk, Spain has a high risk (4.3), while the majority of countries have a low to medium risk (Inter-Agency Standing Committee and the European Commission, 2021). Drought has substantially impacted the agricultural sector in Germany in recent years (2018, 2019 and 2020). For instance, the drought that occurred from April to November in 2018 was declared a crisis of "national proportions" by the German government. Major crop failures and loss of income forced 8 000 farmers to apply for emergency aid, and the price of some vegetables increased by 30 percent (DW, 2020; Reuters, 2020).

With regard to the risk of epidemics, Hungary (4.8), Bulgaria (4.6), Greece (4.6), and Romania (4.6), are among the countries with a high risk score. In terms of vulnerability, Cyprus (4.2) is the only country in the EU27+UK and EFTA sub-regions to have high a risk score, followed by a medium risk score for Germany (3.4) and France (2.8). The lack of coping capacity in both sub-regions is considered very low to medium, with the latter including Romania (3.5), Croatia (3.1), and Bulgaria (3) (Inter-Agency Standing Committee and the European Commission, 2021).

**TABLE 6. INFORM Risk Index in the EU27+UK and EFTA sub-regions, 2021**

Score	0.0 - 1.4		1.5 - 2.6	2.7 - 4.0		4.1 - 6.0		6.1 - 10.0
Value	very low		low	medium		high		very high
	INFORM RISK	Hazard & Exposure	Natural hazards (overall score)	Flood	Drought	Epidemics (Infectious disease outbreaks)	Vulnerability	Lack of coping capacity
EU-27 +UK								
Austria	1.7	1.3	2.5	5.5	1.9	1.6	2.6	1.5
Belgium	1.9	1.9	1.8	4	1	1.3	2	1.8
Bulgaria	2.4	2	3.6	4.9	3.1	4.6	2.4	3
Croatia	2.3	3	4.8	6.5	3.5	2	1.3	3.1
Cyprus	3	2.5	4.3	0	2.8	2.4	4.2	2.5
Czechia	1.2	0.9	1.7	5.3	1.4	1.2	0.9	2.1
Denmark	1.2	0.7	1.4	2.3	3.5	1.7	1.8	1.3
Estonia	0.9	0.5	0.9	3.6	0	1	0.8	1.8
Finland	0.9	0.3	0.6	0.1	1.9	1.1	1.7	1.3
France	2.2	2	3.4	6.4	1.7	1.3	2.8	1.9
Germany	1.9	1.4	2.5	6.1	1.4	1.4	3.4	1.5
Greece	3	3.6	5.9	3.1	2.1	4.6	3	2.4
Hungary	1.9	2	3.6	7.5	3.6	4.8	1.6	2.2
Ireland	1.5	1.2	2.2	3.9	0.5	1.3	1.5	1.8
Italy	2.5	3	5.1	5.4	2.4	2.1	2.4	2.2
Latvia	1.5	1.2	2.1	6.5	2.8	1	1.1	2.6
Lithuania	1.4	0.9	1.7	4.7	3.1	0.9	1.2	2.3
Luxembourg	0.9	0.4	0.8	2	1	1.5	1.4	1.2
Malta	1.9	1.3	2.5	0.1	0	2.9	2.2	2.4
Netherlands	1.4	1	2	5.8	0.5	1.7	2.1	1.2
Poland	1.7	1.3	2.3	6.1	2.6	2.1	1.4	2.9
Portugal	1.6	1.9	3.4	3.7	3.3	1.8	1.2	1.9
Romania	2.6	2.8	4.1	7	3.1	4.6	1.7	3.5
Slovakia	1.6	1.5	2.8	6.7	1.4	1.9	1	2.7
Slovenia	1.2	1.9	3.4	4	1	1.4	0.6	1.6
Spain	2.1	2.4	4.1	5.4	4.3	2.1	2.3	1.8
Sweden	1.4	0.6	1.1	3.2	1	1.7	3.1	1.4
United Kingdom	2.2	3.1	2.4	4.8	1	1.5	2.2	1.6
EFTA								
Iceland	1.2	1.2	2.2	0.1	0	2.2	0.8	1.8
Liechtenstein	0.8	0.7	1.3	0.1	0	1.2	0.6	1.1
Norway	1.1	0.4	0.7	0.1	1.9	1	2.1	1.6
Switzerland	1.4	1.3	2.3	4.3	1	1.7	2.4	0.9

Source: Inter-Agency Standing Committee and the European Commission, 2021.

## 1.3. Greenhouse gas emission trends in the Europe and Central Asia region

According to the United Nations Environment Programme (UNEP) Emissions Gap Report of 2020, global GHG emissions reached 52.4 Gt CO<sub>2</sub>-eq (gigatonnes of carbon dioxide equivalent) without land-use change (LUC) emissions, and 59.1 Gt CO<sub>2</sub>-eq including LUC. Growth in global GHG emissions has averaged 1.4 percent per year since 2010. The highest emitters (China, United States of America, EU27+UK, and India), contributed 55 percent of total GHG emissions without LUC over the past decade. The top seven emitters (which also includes the Russian Federation, Japan, and international transport) account for 65 percent, while G20 countries account for 78 percent of global emissions.

On the other hand, the impacts of the global pandemic on national GHG inventories are not clear yet. Every country has been affected to varying degrees, and how this will impact emissions are even less certain.

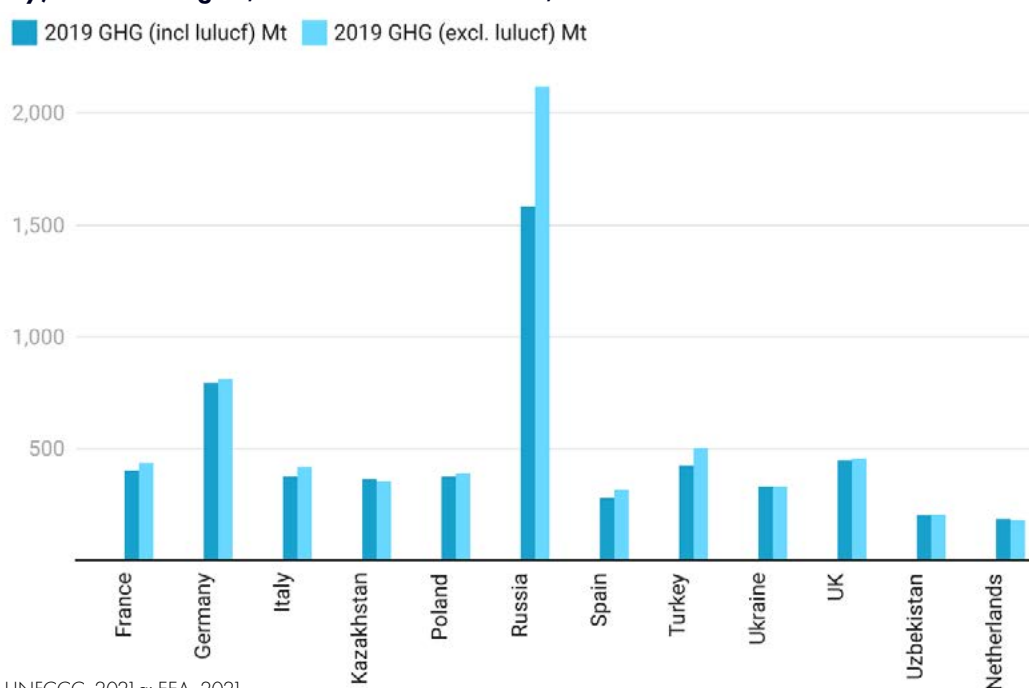
This section provides an assessment of emission trends of ECA countries since 1990. The latest GHG inventory submissions of the countries show emissions from 2019; therefore the results do not reflect the impact of the pandemic yet.

Total GHG emissions of countries in the ECA region vary from big emitters – such as the Russian Federation, and the European Union – to very small emitters such as Montenegro. According to the latest national inventory reports (2021), among the Annex I countries of the ECA region, the Russian Federation has the highest GHG emissions, both including (1 584.6 Mt CO<sub>2</sub>-eq) and excluding (2 119.4 Mt CO<sub>2</sub>-eq) the LULUCF sector; followed by Germany (809.8 Mt CO<sub>2</sub>-eq), Turkey (506.8 Mt CO<sub>2</sub>-eq), UK (455.1 Mt CO<sub>2</sub>-eq), France (436 Mt CO<sub>2</sub>-eq), Italy (418.3 Mt CO<sub>2</sub>-eq), and Poland (412.9 Mt CO<sub>2</sub>-eq), excluding LULUCF, in 2019.

Figure 7 provides an overview of total GHG emissions for countries that are relatively big GHG emitters, while Figure 8 reveals the GHG emissions of relatively small emitters in the ECA region for 2019.

Non-Annex I countries are not obliged to submit their GHG emissions annually, therefore it is not possible to compare their latest GHG figures with those of Annex I countries. However, it is possible to have an evaluation of their GHG emission trends based on the available data. Among non-Annex I countries, Kazakhstan and Uzbekistan have the highest GHG emissions, with 354.8 Mt CO<sub>2</sub>-eq (2019) and 205.27 Mt CO<sub>2</sub>-eq (2012) respectively.

**FIGURE 7. Total net GHG emissions of big emitter countries (those that emit more than 150 Mt CO<sub>2</sub>-eq annually) in the ECA region, with and without LULUCF, 2019**

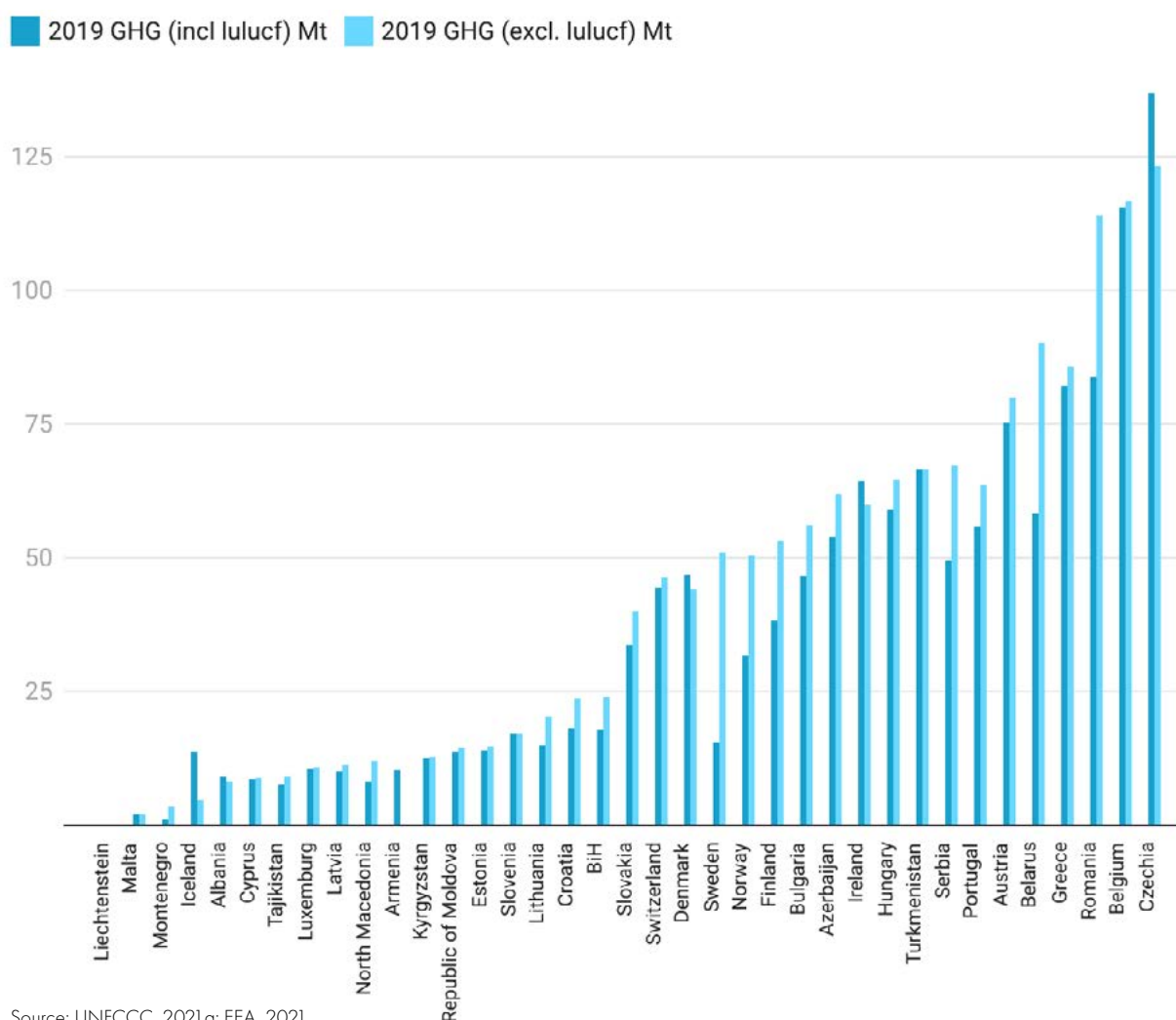


Source: UNFCCC, 2021a; EEA, 2021.



As revealed in Figure 8, among the smaller emitter countries (those that emit less than 150 Mt CO<sub>2</sub>-eq annually), the Czech Republic (123.3 Mt CO<sub>2</sub>-eq), Belgium (116.65 Mt CO<sub>2</sub>-eq) and Romania (113.87 Mt CO<sub>2</sub>-eq) had the highest annual GHG emissions, followed by Greece (85.63 Mt CO<sub>2</sub>-eq) and Belarus (90.12 Mt CO<sub>2</sub>-eq), in 2019, excluding LULUCF.

**FIGURE 8. Total net GHG emissions of small emitter countries in the ECA region, with and without LULUCF, 2019.**<sup>8</sup>



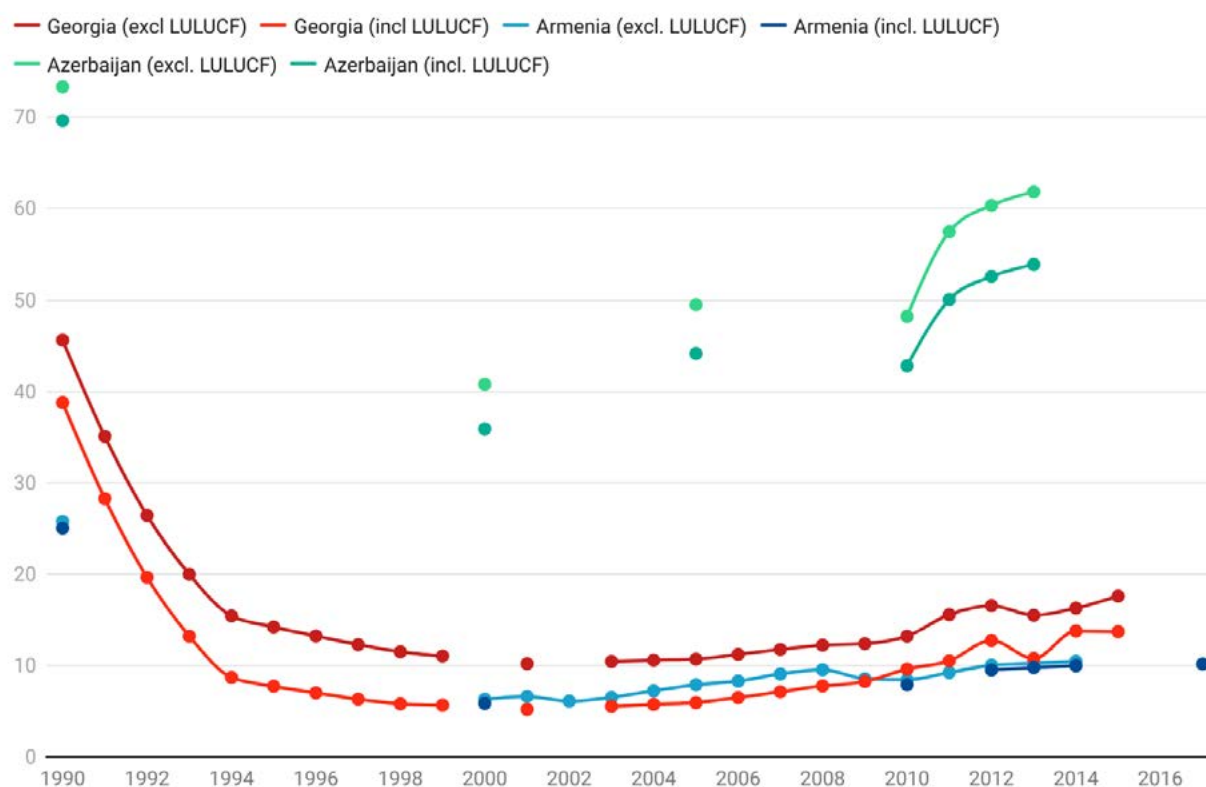
Source: UNFCCC, 2021a; EEA, 2021.

8. The countries whose GHG emissions belong to their latest available inventory: Albania (2009), Armenia (2017), Azerbaijan (2013), Bosnia and Herzegovina (2013), Kyrgyzstan (2010), Montenegro (2015), North Macedonia (2014), Republic of Moldova (2016), Serbia (2014), Tajikistan (2014), Turkmenistan (2010).

Apart from the total GHG emissions of Uzbekistan, Azerbaijan, and Kazakhstan, non-Annex I country emissions are extremely low compared with Annex I countries. Sub-regional trends in total GHG emissions are as follows:

## CAUCASUS

Armenia, Azerbaijan, and Georgia all saw a sharp GHG emissions reduction due to the collapse of the USSR in the early 1990s, which caused the centrally planned economy to crumble. Every country in the region subsequently increased its emissions; however, those have not reached 1990 levels since then. The energy sector is the main

**FIGURE 9. GHG emission trends in the Caucasus sub-region, 1990–2015**

Source: Graph prepared with data provided in the biennial update reports of Armenia (Republic of Armenia Ministry of Nature Protection, 2018), Azerbaijan (Republic of Azerbaijan, 2018), and Georgia (Ministry of Environmental Protection and Agriculture of Georgia, 2019b).

source of GHG emissions in Armenia, Azerbaijan, and Georgia. Figure 9 shows the GHG emission trends of countries in the Caucasus sub-region from 1990 to date.

Armenia has the least GHG emissions in the Caucasus region with 10.62 Mt CO<sub>2</sub>-eq in 2017 (Republic of Armenia, 2021). Even though its GHG emissions have slowly increased since 2000, they have never reached the 1990 levels of 25.77 Mt CO<sub>2</sub>-eq. In Armenia, the agriculture, forestry and other land use (AFOLU) sector follows the energy sector (66.7 percent in 2017) as the second biggest contributor of GHG emissions with 18.5 percent (without forestry and other land use). The forestry sector represents a minor decreasing impact on the net emissions, bringing it down to 10.15 Mt CO<sub>2</sub>-eq including LULUCF (2017).

In 2013, Azerbaijan's emissions amounted to 61.84 Mt CO<sub>2</sub>-eq (excluding LULUCF), 80 percent of which originated from the energy sector, followed by the agricultural sector (14 percent). From 1990 to 2013, emissions from the industrial processes and product use (IPPU) sector decreased, while emissions from the transport sector increased significantly (Republic of Azerbaijan, 2018). However, the country's GHG emissions have never reached the level of 1990 (when they totalled 73.33 Mt CO<sub>2</sub>-eq). Azerbaijan has seen net reductions from the LULUCF sector, which decreased net emissions to 53.9 Mt CO<sub>2</sub>-eq in 2013.

After independence from the USSR, GHG emissions in Georgia experienced a sharp fall, reaching a floor in 2001. Emissions then started to rise until the 2007–2010 period, when a combination of factors emerged to stall the increase – including the global economic recession, the 2008 war with the Russian Federation, and the increased prevalence of hydroelectric power generation. The year 2011 saw a sudden and rapid growth in GHG emissions (19 percent over the previous year), which was due to an economic recovery, growth in electricity demand, and a relatively poor hydrological (rain) year, as well as an increase in the use of coal in the manufacturing industry. GHG emissions reached 17.59 Mt CO<sub>2</sub>-eq in 2015, with the energy sector constituting 62 percent, and the agricultural sector constituting 18.6 percent of total emissions. In Georgia, the LULUCF sector has contributed to a net GHG emissions reduction, which brought net emissions down to 13.7 Mt CO<sub>2</sub>-eq in 2015. The energy sector constituted the

majority of GHG emissions at 62 percent (excluding LULUCF) in 2015. Georgia's last GHG inventory dates back to 2015; therefore, GHG emission trends over recent years are not known.

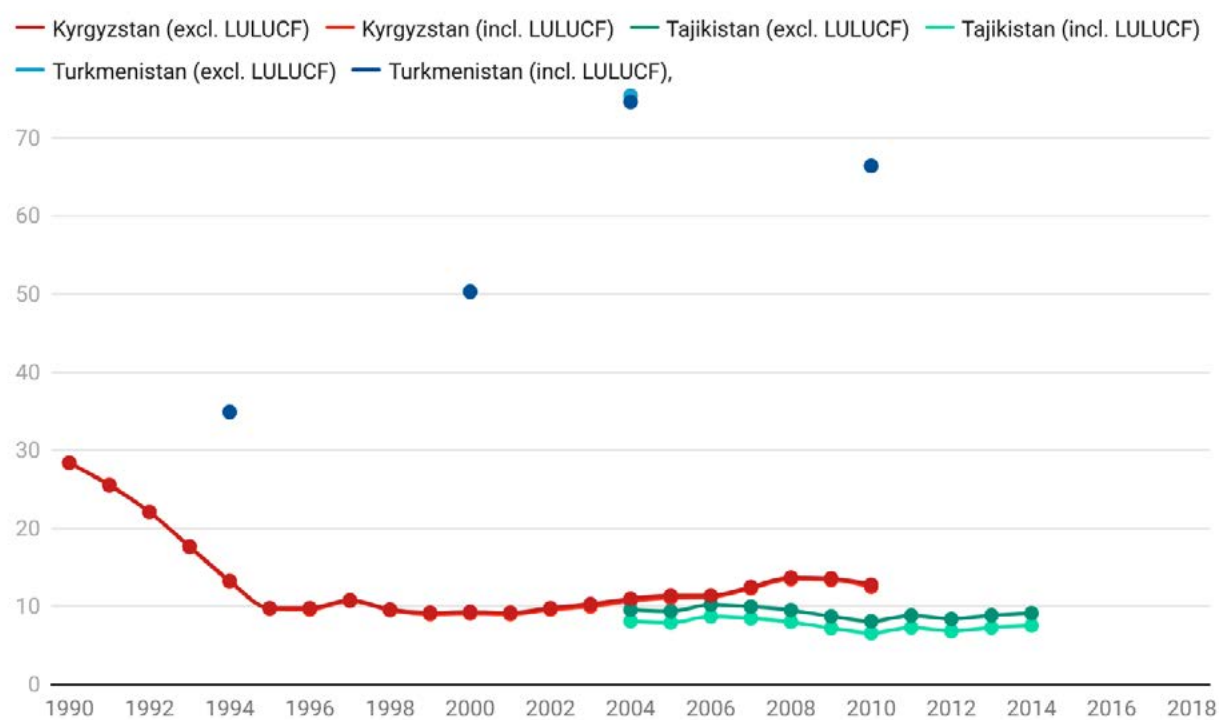
## CENTRAL ASIA

Central Asia is a major emerging energy player globally. Although the countries of the region are non-Annex I, their GHG emissions show significant differences, together with emissions per capita, mainly owing to the influence of the oil and gas industry. Over the years, economic growth and population growth have had a significant impact on GHG emissions in the region. The small emitters in the sub-region – Tajikistan, Kyrgyzstan, and Turkmenistan – are featured in Figure 10; while the bigger emitters – Kazakhstan and Uzbekistan – feature in Figure 11.

Tajikistan is the smallest emitter in the Caucasus sub-region and one of the smallest emitters in the world. The country's latest inventory dates back to 2014, when total GHG emissions amounted to only 9.1 Mt CO<sub>2</sub>-eq without LULUCF, and 7.55 Mt CO<sub>2</sub>-eq with LULUCF, which is far below the emissions of other countries in Central Asia (Government of the Republic of Tajikistan, 2018b).

Kyrgyzstan closely follows Tajikistan's GHG emissions with 12.77 Mt CO<sub>2</sub>-eq excluding LULUCF in 2010 (UNFCCC, 2020a). The per capita GHG emissions of Kyrgyzstan are less than one-third of the world's average.

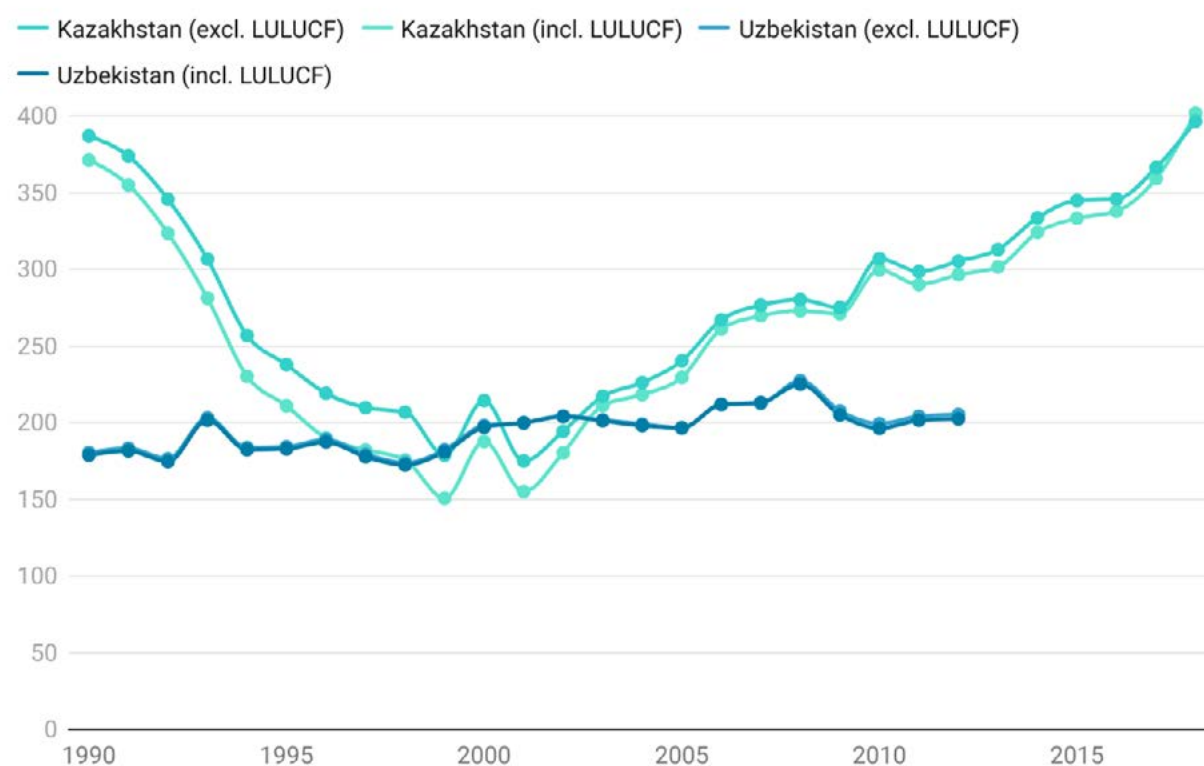
**FIGURE 10. GHG emissions of Turkmenistan, Kyrgyzstan, and Tajikistan, 1990–2018**



Source: Graph prepared from data gathered from UNFCCC submissions of National Communications.

The low emissions of the country are mainly due to the fact that 90 percent of total electricity generation is supplied by hydroelectric power plants.

Turkmenistan's GHG emissions were 66.37 Mt CO<sub>2</sub>-eq excluding LULUCF in 2010, following Kyrgyzstan and Tajikistan. Not much data on the country's GHG inventories has been available since the 1990s. Kazakhstan and Uzbekistan have the highest GHG emissions in the Central Asia region. Uzbekistan's latest GHG inventory is from 2012, and amounts to 205.3 Mt CO<sub>2</sub>-eq excluding LULUCF, and 202.4 Mt CO<sub>2</sub>-eq including LULUCF, which makes the LULUCF sector a carbon sink with a minor impact. In 2012, the country's GHG emissions had increased by only 13.84 percent from 1990 values (UNFCCC, 2020a). In 2019, Kazakhstan's total GHG emissions amounted to 354.87 Mt CO<sub>2</sub>-eq excluding LULUCF, which makes it the biggest GHG emitter in Central Asia, with an upward trajectory evident since the early 2000s.

**FIGURE 11. GHG emission trends in Kazakhstan and Uzbekistan, 1990–2018**

Source: Graph prepared from data gathered from UNFCCC submissions of National Communications.

## EU27+UK AND EFTA

According to the latest GHG inventory submissions, in 2019 the European Union's total GHG emissions (excluding LULUCF and excluding international aviation) were 28.3 percent below 1990 levels. It therefore remained on track to meet the target of a 20 percent reduction in GHG emissions by 2020 (UNFCCC, 2021a). GHG emissions decreased in the majority of sectors between 1990 and 2019, with the notable exception of transport, including international transport, and refrigeration and air conditioning. In the agricultural sector, emissions decreased from 432 Mt CO<sub>2</sub>-eq in 2018 to 429 Mt CO<sub>2</sub>-eq in 2019.

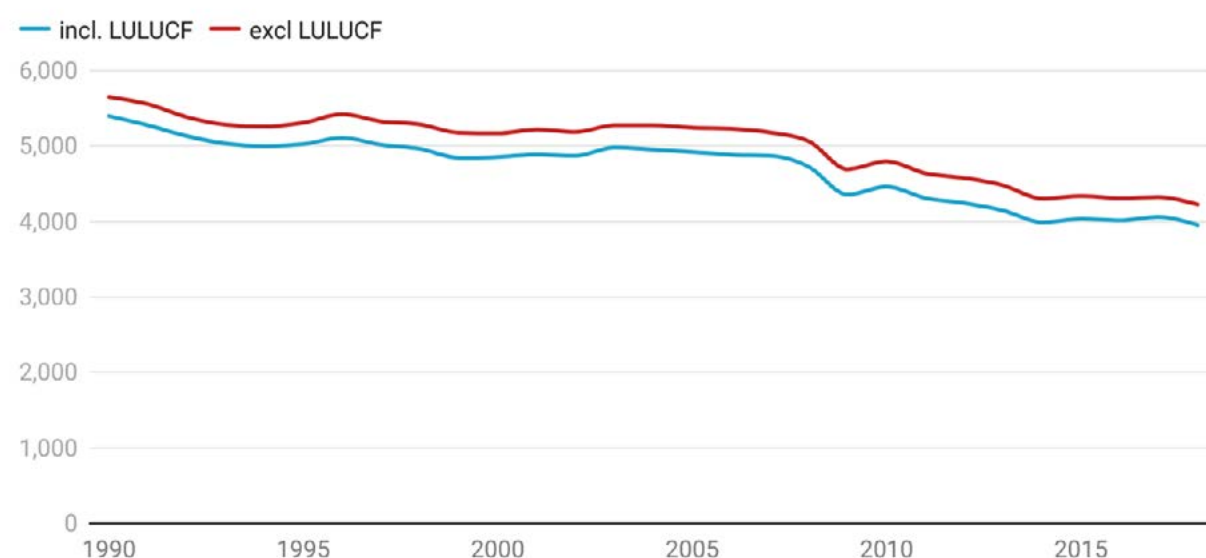
At the sectoral level, emissions reductions were largest for the manufacturing industries and construction, electricity and heat production, iron and steel production (including energy-related emissions), and residential combustion. In addition, based on Eurostat energy statistics, the use of renewable energy sources in electricity generation increased again in 2019, mostly from wind, solar, and bioenergy, thus underpinning the ongoing decarbonisation trend in the sector. A number of policies – both country-specific and European Union policies – have contributed to an overall GHG emissions reduction, including key agricultural and environmental policies of the 1990s and climate and energy policies from the 2000s.

Although net removals from LULUCF grew over the period, the surge in carbon dioxide emissions from biomass combustion highlights the rapidly increasing use of biomass in replacing fossil fuel sources in the European Union. According to the Emissions Gap Report 2020, EU27+UK emissions have steadily declined by 1.5 percent every year over the past decade, with a steeper decline of 3 percent observed in 2019 (UNEP, 2020).

Historically, EFTA countries have shown a variety of GHG emission trends, due to their population and size of economy. In 2019, Norway's total GHG emissions were 50.3 Mt CO<sub>2</sub>-eq, a decrease of 1.9 Mt CO<sub>2</sub>-eq compared with 2018. Norway's GHG emissions from the agricultural sector ranks third, following the energy and IPPU sectors. Emissions from agriculture have decreased by 6 percent since 1990 due to a reduction in activity. The LULUCF sector's contribution as a carbon sink has been quite significant, bringing down total emissions from 50.3 Mt CO<sub>2</sub>-eq (excluding LULUCF) to 31.7 Mt CO<sub>2</sub>-eq (including LULUCF) in 2019. Switzerland is another EFTA country where the LULUCF sector constitutes a net sink, bringing down emissions from 53.6 Mt CO<sub>2</sub>-eq to 46.1 Mt CO<sub>2</sub>-eq (excluding LULUCF) in 2019 (Figure 13). Switzerland's emissions have been gradually decreasing since

1990. In 2019, GHG emissions from the agricultural sector ranked second, after the energy sector, constituting 13 percent of total emissions.

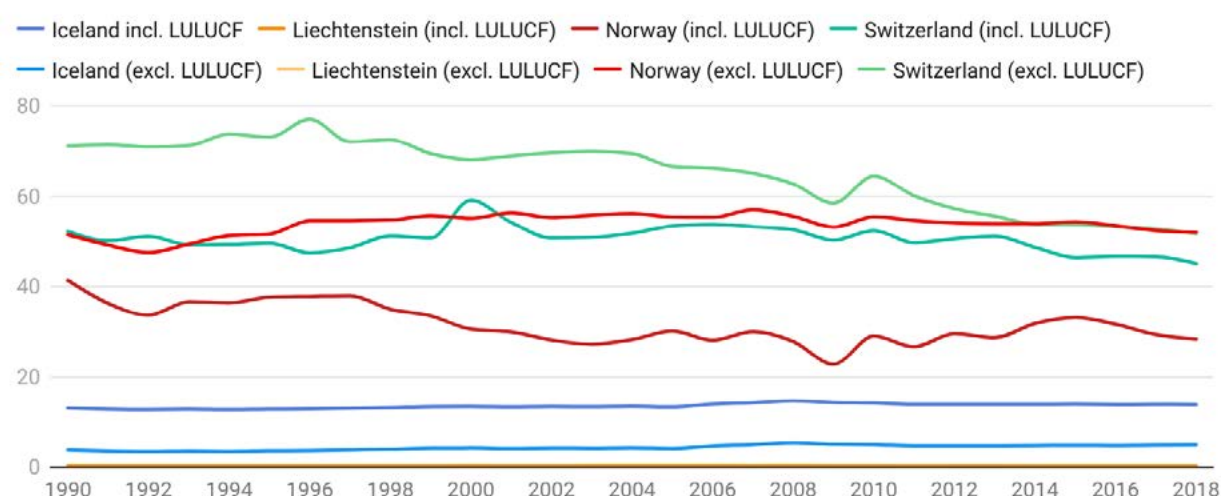
**FIGURE 12. GHG emission trends of EU27+UK, including and excluding LULUCF, 1990–2018**



Source: EEA, 2021.

Since 1990, Iceland's total CO<sub>2</sub> emissions have increased by about 28 percent, reaching 4.722 Mt CO<sub>2</sub>-eq (excluding LULUCF) in 2019. The IPPU sector (43 percent) ranked as the leading source of emissions, followed by the energy (39 percent) and agricultural sectors (13 percent) in 2019. Iceland's LULUCF sector is a net emitter, meaning that the LULUCF sector causes GHG emissions, rather than it being a sink. Due to these emissions, the total net emissions were 13.8 Mt CO<sub>2</sub>-eq, and 4.722 Mt CO<sub>2</sub>-eq excluding LULUCF, in 2019 (Figure 13). The emissions of the LULUCF sector can be attributed to the drainage of wetlands in the latter half of the twentieth century, which had largely ceased by 1990 (Ministry for the Environment, 2018).

**FIGURE 13. GHG emission trends in EFTA countries, including and excluding LULUCF, 1990–2018**



Source: EEA, 2021.

## COMMONWEALTH OF INDEPENDENT STATES (CIS)

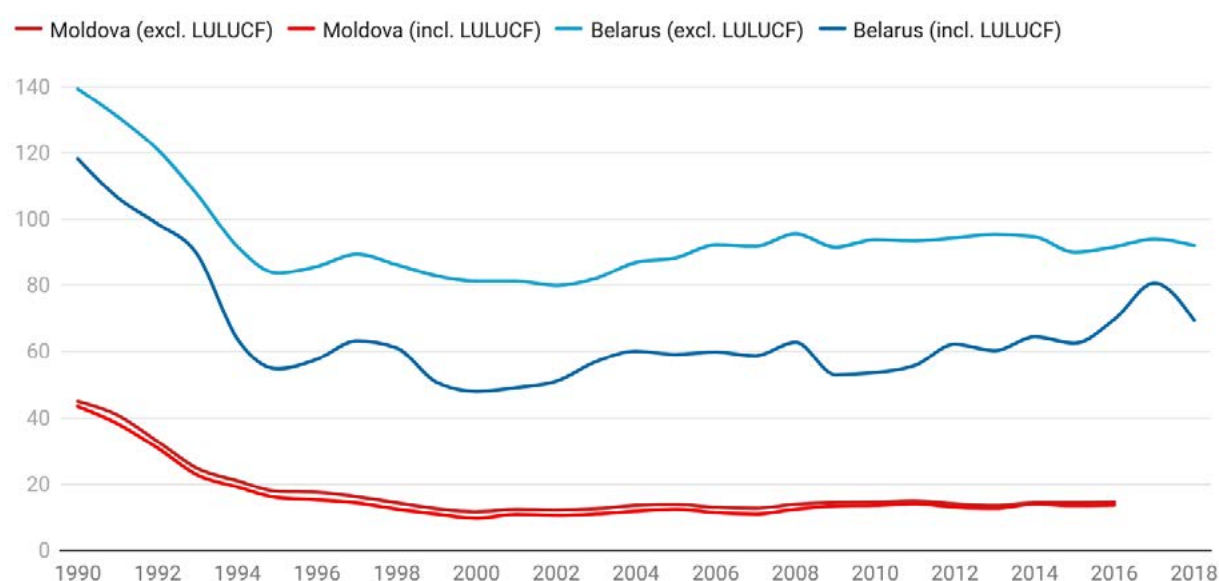
In the CIS sub-region, the Russian Federation and Ukraine are the largest emitters. The Russian Federation is the world's fifth biggest emitter and is by far the biggest emitter in the CIS sub-region. Figure 15 reveals the historic GHG emission trends for the Russian Federation and Ukraine. Like many other former USSR countries, countries in the CIS sub-region experienced a sharp slowdown of the economy in the first half of the 1990s. This has also been reflected in the countries' GHG emissions, which since the late 1990s have regathered pace, albeit slowly.

The Russian Federation's GHG emissions dropped in the 1990s until 1998, from approximately 3.18 Gt CO<sub>2</sub>-eq to 1.88 Gt CO<sub>2</sub>-eq. The country's emissions then gradually increased, reaching 2 119.4 Mt CO<sub>2</sub>-eq in 2019. The energy sector constituted 79 percent of the Russian Federation's emissions, with LULUCF constituting a major sink which brought down the total emissions to 1 584.62 Mt CO<sub>2</sub>-eq in 2019. Agricultural emissions ranked third after the energy and IPPU sectors.

Total GHG emissions in Belarus dropped from 139.27 Mt CO<sub>2</sub>-eq in 1990 to 79.94 Mt CO<sub>2</sub>-eq in 2002, and then slightly increased to 90.1 Mt CO<sub>2</sub>-eq in 2019 (all excluding LULUCF, Figure 14). In 2019, its energy sector constituted the highest share of emissions (56.7 Mt CO<sub>2</sub>-eq), followed by the agricultural sector (21.7 Mt CO<sub>2</sub>-eq). The LULUCF sector provided a net sink, cutting net emissions by 31.7 Mt CO<sub>2</sub>-eq.

Republic of Moldova is the only non-Annex I country among CIS countries, and it has the lowest GHG emissions level in the sub-region. Its GHG emissions dropped from 44.9 Mt CO<sub>2</sub>-eq in 1990 to 11.63 Mt CO<sub>2</sub>-eq in 2000. However, emissions have not increased significantly since then, reaching only 14.57 Mt CO<sub>2</sub>-eq in 2016 (latest inventory). The energy sector constituted the major part of Republic of Moldova's GHG emissions at 68.1 percent (Figure 14), followed by the agricultural sector with 16.7 percent, in 2016. The LULUCF sector constituted a carbon sink, however, its impact not being significant.

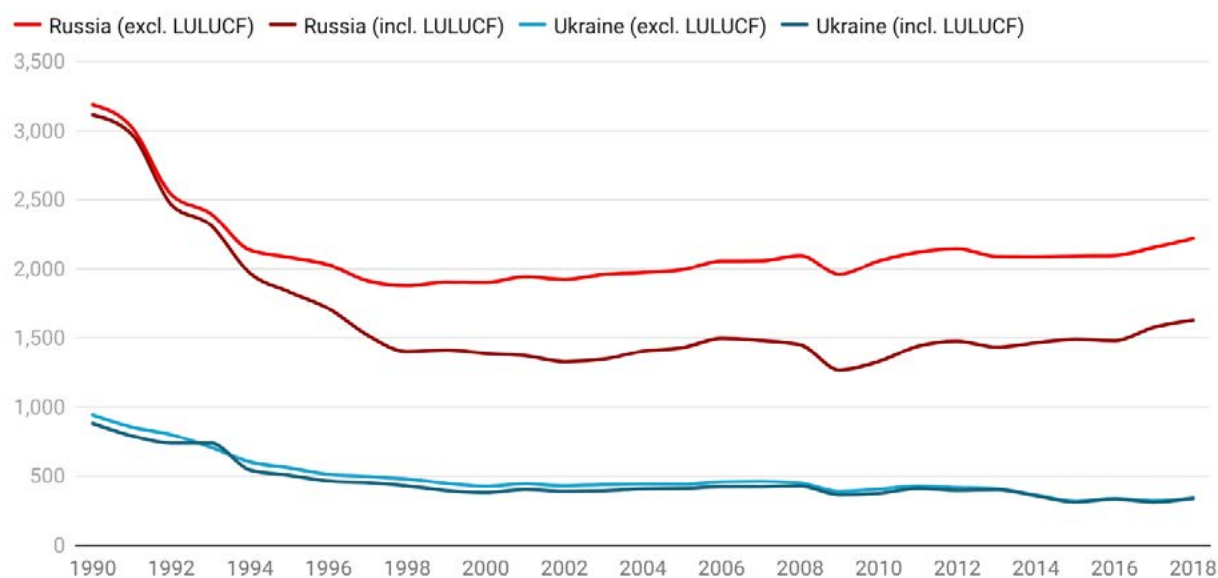
**FIGURE 14. GHG emission trends in Belarus and Republic of Moldova, including and excluding LULUCF, 1990–2018**



Source: Belarus 2021; Republic of Moldova, 2019.

Ukraine is the second-largest emitter in the sub-region. Ukraine's emissions dropped sharply from 942.1 Mt CO<sub>2</sub>-eq in 1990, and then declined steadily to 332 Mt CO<sub>2</sub>-eq in 2019. Ukraine's LULUCF sector represented a carbon sink until 2018, after which it became a net source of carbon emissions.

**FIGURE 15. GHG emission trends in the Russian Federation and Ukraine, including and excluding LULUCF, 1990–2019**



Source: Russian Federation's Common Reporting Format; Ukraine's Common Reporting Format.

### SOUTHEASTERN EUROPE (SEE)

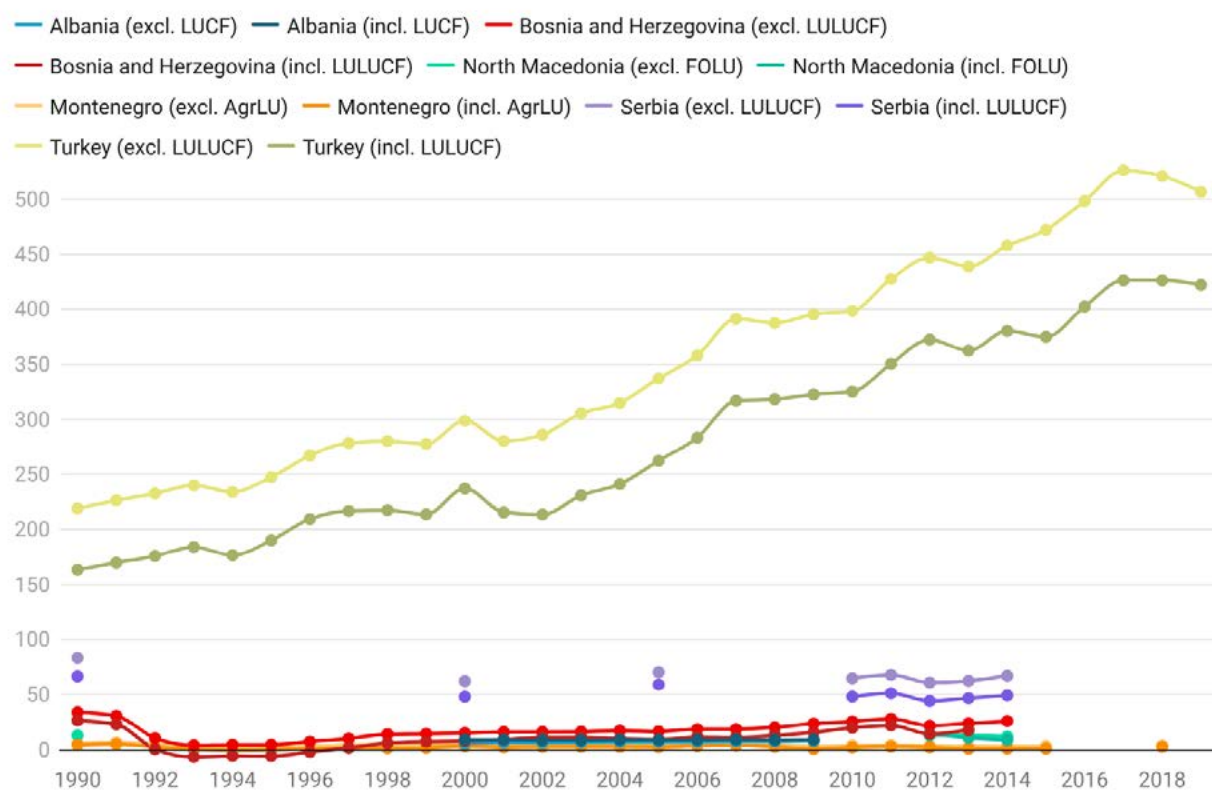
The SEE sub-region mainly consists of non-Annex I countries (except Turkey), and its annual GHG emissions are significantly lower than those of Annex I countries in the ECA region. In SEE, GHG emissions mainly originate from the energy sector, followed by the IPPU sector. Agriculture and LULUCF are also significant emissions and sink sources in the region. Historically, the sub-region has not been a substantial GHG emissions contributor in the ECA region, with the exception of Turkey. Figure 16 reveals recent GHG emission trends in SEE countries.<sup>9</sup>

The highest emissions in the sub-region are for Turkey, with 506.1 Mt CO<sub>2</sub>-eq in 2019 (TurkStat, 2021), followed by Serbia with 62.5 Mt CO<sub>2</sub>-eq in 2013 (Ministry of Environment Protection, 2017). All of the countries in the sub-region show a relatively stable trend, while Turkey's emissions increased significantly until 2017 (Figure 16), due to growth of the economy and population over the past two decades. However, emissions started to decrease in the last two inventory years, due to a shrinking economy. The energy sector has been the biggest contributor to Turkey's emissions, while the LULUCF sector constitutes a significant sink.

9. Some countries of the sub-region have prepared and reported their LULUCF emission inventories in different scopes, such as: land use change and forestry (LUCF), land use and forestry (LUF), agriculture and land use (AgrLU). Therefore, the national GHG inventory trends are indicated and evaluated accordingly.



**FIGURE 16. GHG emission trends in the SEE sub-region, including and excluding LULUCF (including Turkey), 1990–2019**



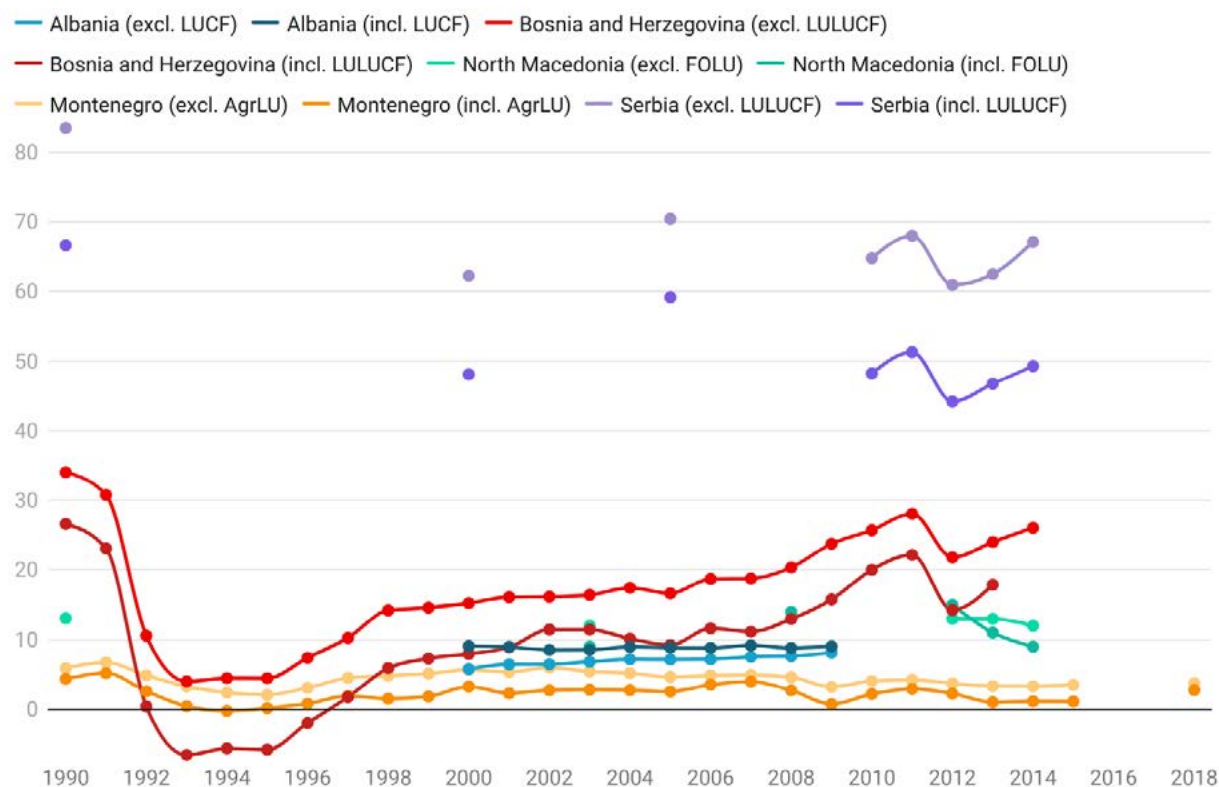
Source: UNFCCC, 2020c; UNFCCC, 2020d.

Serbia's GHG emissions dropped from 83.52 Mt CO<sub>2</sub>-eq in 1990 to 67.15 Mt CO<sub>2</sub>-eq in 2014 excluding LULUCF (Ministry of Environment Protection, 2017). However, the exact pattern is rather difficult to follow due to a lack of data (Figure 17). In 2014, 80 percent of the total GHG emissions originated from the energy sector. The LULUCF sector constitutes carbon sink in Serbia, reducing the emissions to 49.30 Mt CO<sub>2</sub>-eq in 2014 (Ministry of Environment Protection, 2017).

Bosnia and Herzegovina's GHG emissions saw a sharp decrease from 34 Mt CO<sub>2</sub>-eq to 4 Mt CO<sub>2</sub>-eq (UNFCCC, 2020a) in 1993. After that, GHG emissions rose slowly to 28.09 Mt CO<sub>2</sub>-eq in 2011, before decreasing to 24.03 Mt CO<sub>2</sub>-eq in 2013 (latest inventory). The LULUCF sector has constituted a significant carbon sink for Bosnia and Herzegovina, bringing the net emissions down to 17.89 Mt CO<sub>2</sub>-eq in 2013 (Figure 17).

North Macedonia did not show a major increase or decrease between 1990 and 2014 (Figure 17), when GHG emissions were 13.08 Mt CO<sub>2</sub>-eq and 12.2 Mt CO<sub>2</sub>-eq respectively (Ministry of Environment and Physical Planning, 2018). The greatest portion of emissions came from the energy sector, accounting for 65.2 percent of emissions in 2014, followed by the waste sector (19 percent), agriculture excluding FOLU (8.2 percent), and the IPPU sector with 7.6 percent.



**FIGURE 17. GHG emission trends in SEE sub-region, including and excluding LULUCF (excluding Turkey), 1990–2015**

Source: Biennial reports: <https://unfccc.int/BRs>; and biennial update reports: <https://unfccc.int/BURs>.

Albania has the second-least emissions in the sub-region with 8.13 Mt CO<sub>2</sub>-eq excluding LUCF, and 9.04 Mt CO<sub>2</sub>-eq including LUCF in 2009 (Republic of Albania, 2016). Albania's GHG inventory is available for years between 2000 and 2009, which makes it difficult to analyse the overall trends (Figure 17). In Albania, LUCF has been a contributor to GHG emissions, constituting 10 percent of total emissions.

Montenegro historically has the lowest total GHG emissions in the SEE sub-region. Its emissions dropped from 5.9 Mt CO<sub>2</sub>-eq in 1990 to 2.083 Mt CO<sub>2</sub>-eq in 1995, before increasing slightly to just 3.49 Mt CO<sub>2</sub>-eq in 2015 (Ministry of Sustainable Development and Tourism, 2019).



## **PART 2**

# **OVERVIEW OF MITIGATION AND ADAPTATION ASPECTS IN NATIONALLY DETERMINED CONTRIBUTIONS WITH A FOCUS ON AGRICULTURAL AND LAND USE, LAND USE CHANGE AND FORESTRY SECTORS, AND RELEVANT CLIMATE-CHANGE POLICIES OF EUROPE AND CENTRAL ASIA COUNTRIES**

Rajac, Polom, Serbia



## KEY MESSAGES

- Since FAO's last NDC report in 2018, several ECA countries have submitted their updated NDCs. The commitment to emissions reductions varies from country to country. In the Caucasus sub-region, the minimum target has been 35 percent compared to 1990, while in Central Asia the targets were below 20 percent. The European Union and the United Kingdom have taken the lead in emissions reduction targets of 55 percent and 68 percent, respectively, by 2030. The CIS sub-region has also enhanced targets, with Republic of Moldova committing to a 64 percent to 67 percent reduction by 2030. SEE countries have a variety of emissions reduction targets, with Montenegro and North Macedonia having the highest, of 35 percent and 51 percent respectively.
- European Union countries and the United Kingdom have led both in terms of reductions ambitions, and in terms of policy and legislative development. The European Union has recently adopted an adaptation strategy, as well as its 2020 Farm to Fork and Biodiversity Strategy until 2030, which are at the heart of the European Green Deal. Moreover, the European Union's ambition for tackling climate change has already created an impetus for accession countries, candidate countries, and other close allies (such as EFTA countries) to have enhanced emissions reduction targets.
- Countries are not obliged to include adaptation in their NDCs. However, 14 ECA countries did include adaptation as a priority. Agriculture was also mentioned as one of the vulnerable sectors (to the impact of climate change) by 11 countries.
- Twenty-four European Union countries, the United Kingdom, and three EFTA countries established national adaptation strategies; and 14 European Union countries, the United Kingdom and three EFTA countries also have national and/or sectoral adaptation plans in place. The countries in the sub-regions of the Caucasus, Central Asia, CIS and SEE are currently developing their national adaptation plans, while Georgia is the only one, so far, that has established a sectoral adaptation plan.
- Building resilience in the agricultural sector encompasses the reduction of vulnerabilities to climate variability and change within the context of sustainable development. The cross-sectoral adaptation measures that were included in the NDCs were more linked to the SFDRR priority II, while the integration of agriculture-related adaptation measures contributed the most to the implementation of SFDRR priority III. The SDG linkages in the NDCs are closely related to the countries' priorities, and the NDCs of the ECA region have generally more linkages with SDG1 (no poverty), SDG2 (zero hunger), SDG8 (decent work and economic growth), SDG13 (climate action), and SDG15 (life on land).



## 2. Overview of mitigation and adaptation aspects in Nationally Determined Contribution with a focus on agricultural and land use, land use change and forestry sectors, and relevant climate-change policies of Europe and Central Asia countries

### 2.1. Progress made to achieve Nationally Determined Contribution goals for mitigation

Nationally Determined Contributions (NDCs) are at the heart of the Paris Agreement and they indicate national efforts to reduce GHG emissions and increase resilience to the impacts of climate change within the context of sustainable development. So far, 192 (UNFCCC NDC Interim Registry) parties have submitted their first NDCs. Countries were expected to submit their updated NDCs under Article 4.2 by the end of 2020, for the first NDC period. However, the COVID-19 pandemic caused a delay for the submission of the updated NDCs, and several countries have continued submitting updated NDCs during 2021.

Since FAO's 2018 publication Policy Analysis of NDCs in Europe and Central Asia, the Russian Federation (November 2020), Uzbekistan (November 2018), Kyrgyzstan (February 2020), Republic of Moldova (March 2020), the European Union (December 2020), the United Kingdom (December 2020), Switzerland (December 2020), Iceland (February 2021), North Macedonia (April 2021), Bosnia and Herzegovina (April 2021), Georgia (May 2021), Armenia (May 2021), Montenegro (June 2021), and Ukraine, (July 2021) have submitted their updated NDCs, while Tajikistan is currently working towards submission of a more ambitious NDC to be submitted in 2021. The first global stocktake in order to monitor the progress of countries' NDC implementation will take place in 2023, before the submission of revised NDCs by 2025.

The COVID-19 pandemic has changed countries' GHG emissions sources and patterns in an unexpected way, and has increased the uncertainties over achieving NDC goals. After economies started to open, each country followed a different path in providing financial support to facilitate the recovery of economic sectors. The conditions set by countries for the provision of financial support for each sector varied. Some adopted a "green recovery" pathway, including several low-carbon development measures in major emitting sectors, including transport and energy.

On top of shrinking economic activities and slowing demand for fossil fuels, these recent developments are also expected to result in deviations from GHG emissions projections for many countries. On the other hand, reduced demand for fossil fuels has decreased oil and gas prices, which had some rebound effect in fossil-fuel consumption in some countries as they opened their economies. Therefore, at present, it has become even more difficult to assess the possibility of countries achieving their NDC goals for GHG mitigation.

TABLE 7. Summary of NDC analysis for the Caucasus sub-region

Country	NDC mitigation target	Base year emissions Mt CO <sub>2</sub> -eq	Latest inventory emissions Mt CO <sub>2</sub> -eq	Emissions trends	Key policies	Summary for analysis
Armenia	Unconditional: 40% reduction from 1990 emission levels by 2030	N/A	10.45 (2014)	Slowly rising since the sharp fall in early 1990s	<ul style="list-style-type: none"> <li>Agriculture Strategy (2020–2030) in 2019</li> <li>Law on Energy (amended in 2018)</li> <li>Law on Energy Saving and Renewable Energy (amended in 2018)</li> <li>Perspective Development Strategic Programme for 2014–2025 (2014)</li> <li>Action Plan on the Implementation of the Provisions of the Republic of Armenia's Energy Security Concept for 2014–2020 (2014)</li> <li>Paths to the long-term development (up to 2036) of the Republic of Armenia's Energy System (2015)</li> <li>Programme of the Government of Armenia (2019)</li> <li>National Energy Efficiency and Renewable Energy Programme 2021–2030 (2019)</li> <li>Strategic Programme for the Development of the Energy Sector of the Republic of Armenia until 2040 (2021)</li> <li>Agriculture Strategy (2020–2030) in 2019</li> </ul>	Armenia has shown a very slow emission rise over the last decade. There is currently no economy-wide policy/strategy for GHG mitigation yet, but it is currently developing its Long-Term Low Emissions Development Strategy to ensure long-term planning until 2050, with the aim to adopt this document in 2021. Agriculture Strategy (2020–2030) adopted in 2019 aiming for emissions reduction in the sector. The latest GHG inventory dates back to 2014.
Azerbaijan	Unconditional: 35% emissions compared with 1990/base year	73.33 (1990)	61.84 (2018)	The GHG emissions have reached 84% of what they had been in the base year. However, the rate of increase has slowed down over recent inventory years	<ul style="list-style-type: none"> <li>Strategy of Development of Renewable and Alternative Energy Sources in 2012–2020 (2020)</li> <li>National Action Plan on Energy Efficiency (under development)</li> <li>Batumi Initiative on Green Economy (BIG-E) Actions by Azerbaijan until 2030 (2017)</li> <li>National Forest Programme (2013)</li> </ul>	Azerbaijan has an ambitious target considering its increasing emissions. Although the initiatives for green energy has increased its pace, there are no economy-wide policies/strategies for emission reduction. For LULUCF sector, National Forest Programme suggests increased carbon storage through rehabilitation and improvement of forests.
Georgia	Unconditional: 35% reduction compared to 1990 by 2030 Conditional: 50–57% reduction compared to 1990 if global emissions follow the 2 °C or 1.5 °C scenarios respectively, with international support	45.61 (1990)	17.59 (2015)	After a sharp fall in early 1990s, GHG emissions have slowly raised with some minor decrease and increase till the latest inventory to date.	<ul style="list-style-type: none"> <li>2030 Climate Change Strategy and Action Plan (2020)</li> <li>National Renewable Energy Action Plan (NREAP) (2019)</li> <li>National Energy Efficiency Action Plan (2019)</li> <li>Low Emission Development Strategy (LEDS) (drafted)</li> <li>National Energy and Climate Plan (NECP) (to be finalised in 2021)</li> </ul>	Georgia has submitted its updated NDC with more ambitious targets compared to the previous one, followed by short term climate action plan to determine the roadmap for reaching the targets. The updated NDC suggests to increase the carbon capturing capacity of forestry sector by 10 percent for 2030 compared to 2015 level. Recently adopted strategies/plans are strong signals of increased ambition to reduce GHG emissions.

Sources: Armenia's First NDC; Azerbaijan's First NDC; Georgia's First NDC.

## CAUCASUS

Substantial progress has been achieved in the Caucasus during the past few years regarding the development and establishment of climate change-related national legislation and policies, plans and strategies, although it differs according to the country. Besides national policies on GHG mitigation, the CAREC Energy Strategy 2030 is under development for the CAREC region.<sup>10</sup> In 2021, Armenia and Georgia submitted their updated NDCs, in which GHG mitigation targets have been revised.

### ARMENIA

In its first NDC from 2017, Armenia set its total aggregated projected emissions for 2015–2050 at 633 Mt CO<sub>2</sub>-eq, and stated that the country would strive to “achieve ecosystem neutral GHG emissions in 2050” (equivalent to 2.07 tonnes/capita) with the support of sufficient international financial, technological and capacity-development assistance (Armenia’s first NDC). In its updated NDC, Armenia maintained its 2050 mitigation goal of reducing its annual GHG emissions to at most 2.07 tonnes/capita, to be reflected in its Long-term Low Emissions Development Strategy. The updated NDC pledges a new mitigation target of a 40 percent reduction compared with 1990 emissions levels by 2030. Sectoral emissions reduction contribution covers agriculture – enteric fermentation, direct and indirect N<sub>2</sub>O (nitrogen dioxide) emissions from managed soils, and forestry (afforestation, forest protection) and other land-use sectors.

Armenia’s most recent action on GHG mitigation efforts is the Perspective Development Strategic Programme for 2014–2025, which has provisions for maximizing the use of renewable energy sources, promoting energy efficiency in all sectors, and reducing GHG emissions. The Programme of the Government of Armenia (2019) focuses on, among other things, renewable energy sources, the introduction of energy efficient and new technologies to contribute to energy security, and the provision of an affordable and reliable energy supply. The country has also made several amendments and supplements to the Law on energy in 2014, 2016, 2017, and 2018, as well as to the Law on energy saving and renewable energy (2004) in 2016, 2017, and 2018. The country has established the “paths to the long-term development (up to 2036) of the Republic of Armenia’s energy system” (Ministry of Environment of the Republic of Armenia, 2020). In addition, it adopted a National Energy Efficiency and Renewable Energy Programme 2021–2030 (2019), and in 2021 the Strategic Programme for the Development of the Energy Sector of the Republic of Armenia until 2040, which prioritizes the safeguarding of energy security, including renewable energy sources, in particular solar and wind energy. Although Armenia does not have an economy-wide strategy or policy for GHG mitigation, it is currently developing its Long-term Low Emissions Development Strategy to ensure long-term planning until 2050, with the document due to be adopted in 2021 (Government of the Republic of Armenia, 2021).

Armenia adopted its Agriculture Strategy (2020–2030) in 2019, which suggests improved nitrogen fertilizer management and development of organic farming, sustainable intensification of animal breeding through improved species, breeds, improved irrigation systems, promotion of digital agriculture and technological innovation, all of which contributes to the country’s GHG mitigation efforts.

### AZERBAIJAN

Azerbaijan’s GHG emissions have continued to increase since the mid-1990s. It pledged to a 35 percent emissions reduction target with 1990 as the reference year, which can be considered an ambitious target given the fact that the country’s emissions in 2013 represented 84 percent of 1990 emissions, and given also an increasing trend. However, Azerbaijan’s latest GHG inventory dates back to 2013, which prevents an evaluation of recent trends.

In the agricultural sector, the country’s NDC has targets which aim to reduce methane gas emissions from manure of livestock and poultry, and increase use of alternative sources of energy and modern technologies. In the LULUCF sector, Azerbaijan aims to “plant new forest areas, water and land protecting forest strips (windbreaks), urban and roadside greenery, as well as further improve the management of pastures and agricultural lands” (Azerbaijan’s First NDC, 2017).

10. The Central Asia Regional Economic Cooperation (CAREC) programme has a membership of 11 countries, with the original eight members being Afghanistan, Azerbaijan, China (Xinjiang Uygur Autonomous Region joined in 1997; Inner Mongolia Autonomous Region in 2008), Kazakhstan, the Kyrgyzstan, Mongolia, Tajikistan, and Uzbekistan. Pakistan and Turkmenistan joined in 2010; Georgia in 2016.





Laza, Qusar, Azerbaijan



Azerbaijan has adopted several energy-related pieces of legislation, policies and state programmes over the years in order to encourage low-carbon, climate-resilient development. The Law on efficient use of energy resources and energy efficiency was drafted in 2019, and it covers several measures including energy efficiency in buildings, power generation, transmission, distribution, and so on. A National Action Plan on Energy Efficiency is also under development. In addition, Azerbaijan adopted the Strategy of Development of Renewable and Alternative Energy Sources in 2012–2020, which aims to promote the development of a range of renewable energy sources in the country. Moreover, Azerbaijan voluntarily committed in 2017 to actions under the “Batumi initiative on green economy (BIG-E) actions by Azerbaijan until 2030”, which aims to contribute to the SDGs and implement actions such as shifting consumer behaviour towards sustainable consumption patterns, encouraging green and fair trade, and increasing green and decent jobs (Government of Azerbaijan, 2017). At present, Azerbaijan receives support from the EU4Energy programme to support the establishment of its long-term energy strategy. This strategy will be developed within the context of energy-supply security, energy-sector sustainability, and energy efficiency, and is currently being drafted (EU Neighbours, 2018). Despite the development of energy-related strategies and legislation, Azerbaijan has not integrated climate change into sectoral policies and legislation. In the forestry sector, the National Programme on Restoration and Expansion of Forest in the Azerbaijan Republic has been adopted (Ministry of Ecology and Natural Resources, 2016). In Azerbaijan, there is no particular policy for GHG mitigation in agriculture or the LULUCF sector. However, the National Forest Programme that was adopted in 2013 aims to first, identify and monitor carbon storage volumes of the forests; and second, to increase carbon storage through rehabilitation and improvement of the existing forests and by expanding forest areas and tree planting on suitable land.

## GEORGIA

Georgia has demonstrated an increased commitment towards international efforts to tackle climate change through accelerating its policy development for GHG mitigation and updating its NDC with more ambitious targets in 2021. In its updated NDC, Georgia has revised its unconditional emissions reduction pledge from 15 percent below the BAU (business as usual) scenario by 2030 to 35 percent below 1990 by 2030. In case the global GHG emissions reduction efforts follow the 2 OC or 1.5 OC scenarios, Georgia pledges to achieve a 50 percent or 57 percent reduction, respectively, with international support (Georgia’s Updated NDC, 2021).

The updated NDC supports the low-carbon development of the agricultural sector through encouraging climate-smart agriculture and agrotourism. Although emissions from LULUCF are not included in Georgia’s economy-wide emissions reductions target, the updated NDC proposes to increase carbon-capturing capacity through the forestry sector by 10 percent for 2030 compared with the 2015 level.

An important policy document, the 2030 Climate Change Strategy and Action Plan, was adopted in 2020, and it sets out the short-term agenda for the implementation of Georgia’s 2030 targets in the updated NDC. In 2021, Georgia will prepare a “national energy and climate plan”, which aims to set out climate and energy-related plans, covering the period from 2021 to 2030, including a perspective until 2050. Georgia also plans to elaborate a “long-term strategy for GHG emissions development” in 2021, which would be aligned with the targets and objectives of the updated NDC. In 2019, two important action plans were adopted:

- The National Renewable Energy Action Plan (NREAP), which sets out targets for renewable energy in 2030, with specific actions for electricity generation and transport fuels.
- The National Energy Efficiency Action Plan, which sets indicative energy-efficiency targets for 2020, 2025, and 2030 versus the BAU case, with concrete actions for energy transmission and demand sectors in the years 2017–2020.
- The country drafted its Low Emissions Development Strategy in 2017. Georgia has developed and finalised nationally appropriate mitigation actions (NAMAs) on biomass energy, buildings, sustainable forest management, transport, and water power.

In the agricultural sector, the Rural and Agricultural Development Strategy of Georgia 2021–2027 contains some measures relevant for climate-change mitigation targets, such as decreased synthetic fertilizer use. The National Forest Concept for Georgia 2016 has some measures relevant for increasing the carbon-capture capacity of forests for climate-change mitigation.





Canyon Okatse, Georgia



## CENTRAL ASIA

Every country in the Central Asia sub-region is party to the Paris Agreement and has presented proposed contributions to prevent climate change. So far, they have followed different political paths, so there are differences in climate-change policy implementation and GHG emissions reduction targets. In this context, when analysing the NDCs, each country of the region needs to be considered within their national circumstances, as some countries may be able to reduce their emissions more effectively than others.

Countries in the Central Asia region have specific legal frameworks in place to promote energy saving, energy efficiency, and the development of renewable energy sources. The majority have already, or are currently developing, national programmes, strategies and action plans for climate-change mitigation and adaptation. Apart from national policies on GHG mitigation, the CAREC Energy Strategy 2030 is currently being developed for the CAREC region.

Due to the fact that climate-change policy strategies for 2030 have been developed relatively recently in almost all Central Asia countries, climate policy research analysing the prospects of them meeting those targets is scarce.

## KAZAKHSTAN

In countries such as Kazakhstan, an economy dominated by the oil industry, renewable energy promotion has developed quite slowly. After the sharp GHG emissions fall between 1990 and 2000, the country's emissions increased until 2018, but only slightly exceeding the base year emissions of 1990. Kazakhstan has an economy-wide unconditional target of 15 percent (25 percent conditional) emissions reduction compared with 1990 by 2030 (Kazakhstan's First NDC). Kazakhstan's NDC does not have sector-specific indications for the agricultural or LULUCF sectors.

Kazakhstan has implemented several policies and legislation in order to move towards a low-carbon economy. The Strategy Kazakhstan 2050 (2012) focused on a transition to a low-carbon economy, and recognised the need to develop renewable energy sources. This is also in line with the Concept of transition of the Republic of Kazakhstan to the green economy 2013–2020 (2013) and Law on the transition to green economy (2016), which mentions the widespread adoption of renewable energy technologies (Republic of Kazakhstan, n.d.). The Strategy Kazakhstan 2050 also mentions the need for Kazakhstan to modernize the agricultural sector, including a shift to the application of modern water-saving agricultural technologies within the context of efficient use of the country's water resources. Climate-change mitigation policies and measures are not integrated in the economic sectors in Kazakhstan; however, a sustainable energy policy framework does exist.

## KYRGYZSTAN

Although it is one of the smallest emitters in Central Asia and in the world, Kyrgyzstan saw slightly increasing GHG emissions between 1995 and 2010 (last inventory was 2010). Over recent years, due to the reduced capacity of hydroelectric power plants as a result of climate change, an increased dependence on fossil-fuel consumption for the purposes of power generation may be expected unless other renewable energy sources are explored. Kyrgyzstan pledged to reduce its emissions by 11.49 percent to 13.75 percent below BAU by 2030 as an unconditional target; and suggests a reduction in the range of 29 percent to 30.89 percent in the event of international support (Kyrgyzstan's First NDC). Due to a lack of data regarding GHG emissions since 2010, it is challenging to evaluate the likeliness of Kyrgyzstan reaching its NDC goals.

Kyrgyzstan's climate-change-related policies and legislation that have been adopted over the past decade mainly focus on adaptation, due to the high vulnerability of several sectors in the country. Policies and measures regulating emissions or incentivising green energy options are rather limited in Kyrgyzstan. The country has approved the National Development Strategy of the Kyrgyz Republic for 2018–2040, which recognises the country's need to transition to more sustainable development path and promotes renewable energy and energy efficiency. Green economy concepts have already been integrated into the strategy.

In 2018, Kyrgyzstan adopted a Development Programme of the Kyrgyz Republic (2018–2022), which also includes plans to support sustainable agricultural practices, as well as measures that contribute to GHG emissions reductions in higher emitting sectors. The current policy landscape prioritises energy-sector emissions over the agricultural and LULUCF sectors, and for those sectors the main focus is on adaptation aspects rather than on mitigation.





Altyn Arashan, Kyrgyzstan



## TAJIKISTAN

Tajikistan has the least GHG emissions in the Central Asia sub-region. The country's GHG emissions decreased drastically between 1990 and 1996 due to independence from the USSR, and they have remained at the same lower level since then (UNFCCC, 2020a). In its first NDC, the country pledged not to exceed 80 percent to 90 percent of 1990 emissions levels by 2030 as the unconditional target; and not to exceed 65 percent to 75 percent of 1990 levels as the conditional target (Tajikistan's first NDC). Tajikistan's NDC does not have targets in the agricultural and LULUCF sectors. Tajikistan is now conducting an NDC enhancement process with the objective of raising the ambitions of the previous NDC by renewing the GHG emissions reduction targets. The updated NDC is expected to cover targets in the following sectors: power industry and water resources; industry and construction; land use, agriculture, gardening and grazing; forestry and biodiversity; and transportation and infrastructure. The updated NDC is expected to be submitted in 2021.

Tajikistan has adopted a Renewable Energy Law (2010) and Law of Republic of Tajikistan on energy saving and energy efficiency (2013) in the energy sector. The country also adopted a National Action Plan for Climate Change Mitigation in 2003. The plan includes aspects that aim to reduce GHG emissions from the agricultural and LULUCF sectors, such as protection and enhancement of natural sinks and reservoirs of GHGs; promotion of sustainable forest management practices, afforestation and reforestation; and promotion of sustainable agriculture. Tajikistan has developed its National Development Strategy for the period to 2030 (2016), which includes actions to increase energy saving, energy efficiency, as well as diversification of energy-generation sources such as from biomass. Climate-change mitigation policies and measures have not been integrated at sectoral level.

## TURKMENISTAN

Turkmenistan is another Central Asia country whose economy is dependent on the oil industry. The GHG emissions of Turkmenistan increased by 90 percent from 1994 to 2010, although it has seen some decrease since 2004. Turkmenistan aims to keep its GHG levels in 2030 the same as those of the base year (2000). Due to a lack of GHG emissions data since 2010, it is challenging to make further assessments regarding Turkmenistan's emission trends.

However, Turkmenistan has implemented several policies and measures to reduce GHG emissions over the past decade. Among them, the National Strategy on Climate Change (2012) and the National programme for Socio-economic Development of Turkmenistan for 2011–2030 (2010, updated in 2019) include direct measures that can reduce GHG emissions. The country's National Economic Programme of Action on Adaptation and Mitigation to Climate Change is also being finalised. The extent to which these are implemented may determine whether or not Turkmenistan reaches its NDC targets.

## UZBEKISTAN

Uzbekistan has the second-highest GHG emissions in Central Asia, with 205.27 Mt CO<sub>2</sub>-eq (excluding LULUCF) in 2012 (latest inventory). Unlike many other Central Asia countries, Uzbekistan's GHG emissions have not decreased since independence from the USSR. Uzbekistan's NDC target is "to decrease specific emissions of GHG per unit of GDP by 10 percent by 2030 from the level of 2010" (Uzbekistan's first NDC), with the support of climate finance from developed countries.

The country has accelerated efforts for GHG emissions reduction through the legislative framework, such as the Law on renewable energy (2019), which provides incentives for the construction of solar, wind, geothermal, biomass plants, and hydroelectric power plants. Furthermore, the Towards Sustainable Energy: Strategy for Low Carbon Development of the Republic of Uzbekistan (2020) has also been developed – it aims to increase Uzbekistan's alternative energy use, thereby striving to reduce the proportion of fossil-fuel generation from 83 percent to 50 percent and increase its nuclear, solar, and wind power production by 15 percent, 8 percent and 7 percent, respectively. These targets were also outlined in the Strategy for the Transition of the Republic of Uzbekistan to the Green Economy for the period 2019–2030, which strives to promote the systemic adoption of measures to introduce green technologies and the transition towards a green economy. In the agricultural sector, a Programme for Further Development of Agricultural Production for 2015–2019 has been indicated as a mitigation policy in the NDC.

Table 8 gives an overview and summary of Central Asia countries' NDC goals, GHG emission trends, and key legislative and policy developments with an analysis of their progress towards reaching their targets.

TABLE 8. Summary for NDC analysis for the Central Asia sub-region

Country	NDC mitigation target	Base year emissions Mt CO <sub>2</sub> -eq	Latest inventory emissions Mt CO <sub>2</sub> -eq	Emissions trends	Key policies	Summary for analysis
Kazakhstan	Economy-wide target of 15% (unconditional) and 25% (conditional) reduction in GHG emissions by 2030 compared with 1990	401.87 (1990)	396.57 (2018)	Kazakhstan's GHG emissions had a steep decrease between 1990 to 1995 coming down to 255.8 Mt CO <sub>2</sub> -eq. However, since 1995 the GHG emissions have been gradually increasing every year	<ul style="list-style-type: none"> <li>• Strategy Kazakhstan 2050 (2012)</li> <li>• Concept of Transition of the Republic of Kazakhstan to the green economy 2013–2020 (2013)</li> <li>• Law on 'energy saving and energy efficiency'</li> <li>• Law on 'supporting the use of renewable energy sources'</li> </ul>	Kazakhstan's base year emissions are high. Although GHG emissions have been increasing over recent decades, Kazakhstan has put in place several policies that target green development. However, there are no particular policies and measures that target GHG mitigation in the agricultural and LULUCF sectors.
Kyrgyzstan	Reduce GHG emissions in the range of 11.49% to 13.75% below BAU by 2030. With international support total reduction in the range of 29% to 30.89% below BAU by 2030	BAU scenario reduction target	12.77 (2010)	Kyrgyzstan's GHG emissions saw a steep decrease between 1990 and 1995, reaching 9.84 Mt CO <sub>2</sub> -eq, due to independence from USSR. Since then, there has not been a significant GHG emissions increase or decrease	<ul style="list-style-type: none"> <li>• National Development Strategy of the Kyrgyz Republic for 2018–2040 (2018)</li> </ul>	Kyrgyzstan's current climate change related policies and measures mainly focus on climate-change adaptation. And the current mitigation policy landscape prioritises the energy sector emissions over agricultural and LULUCF sectors. However, the absolute emissions of the country remains low in the latest inventory year.
Tajikistan	Unconditional target: not exceeding 80% to 90% of the 1990 level by 2030  Conditional target: 65% to 75% of the 1990 level by 2030	24.18 (1990)	8.18 (2010)	Tajikistan's GHG emissions have decreased from 24.18 to 8.18 Mt CO <sub>2</sub> -eq from 1990 to mid-1990s due to independence from USSR. Since then, there has not been a significant GHG emissions increase or decrease	<ul style="list-style-type: none"> <li>• National Development Strategy for the period to 2030 (2016)</li> <li>• The Law 'on the use of renewable energy sources' (2010)</li> <li>• The Law 'on energy saving and energy efficiency' (2013)</li> <li>• National Action Plan for Climate Change Mitigation (2003)</li> </ul>	Tajikistan had significantly higher emissions in 1990 compared with 2010, which can support the country to achieve its unconditional NDC goals. However, GHG mitigation policies are limited to the energy sector. Tajikistan is in the process of reviewing its updated NDC document for submission to the UNFCCC in 2021, where sectoral targets are expected in forestry, land use and agriculture.
Turkmenistan	Stabilization of GHG emissions in 2030 at the same level as base year	50.3 (2000)	66.4 (2010)	GHG emissions of Turkmenistan followed an increasing trend between 1994–2004 and a slightly decreasing trend between 2004–2010	<ul style="list-style-type: none"> <li>• National Strategy on Climate Change (2012)</li> <li>• National Programme for socio-economic development of Turkmenistan for 2011–2030 (2010, updated in 2019)</li> <li>• National economic programme of action on adaptation and mitigation to climate change (to be approved)</li> </ul>	Turkmenistan's latest GHG inventory dates back to 2010, which may hinder assessments of progress regarding recent emissions trends. Turkmenistan has developed several policies and measures for GHG emissions reduction. However, there are none that target GHG mitigation in the agricultural and LULUCF sectors.
Uzbekistan	Decreasing specific emissions of GHG per unit of GDP by 10% by 2030 from level of 2010	199.23 (2010)	205.26 (2012)	Uzbekistan's GHG emissions have increased slightly from 180.3 Mt CO <sub>2</sub> -eq in 1990 to 205.26 Mt CO <sub>2</sub> -eq in 2010 with a linear trend. The trend has been the same between the base year, 2010 and 2012	<ul style="list-style-type: none"> <li>• Law 'on renewable energy' (2019)</li> <li>• Strategy for Development of Renewable Energy Sources for the period 2019–2023</li> <li>• Strategy for Fuel and Energy Supply for the period 2020–2030</li> <li>• Towards Sustainable energy: Strategy for Low Carbon Development of the Republic of Uzbekistan (2020)</li> <li>• Programme for Further Development of Agricultural Production for 2015–2019</li> </ul>	The country is among the big emitters of the Caucasus region. The country does not have economy-wide policies/strategies for GHG mitigation, nor for the agricultural and LULUCF sectors. However, there are recently developed policies and measures for the most emitting sectors, such as energy.

Sources: Kazakhstan's first NDC; 's first NDC; Tajikistan's first NDC; Turkmenistan's first NDC; 's first NDC.





Pico Funchetta, Saceda, Italy



## EU27+UK AND EFTA COUNTRIES

The European Union has been a pioneer in global climate mitigation endeavours with an accelerating effort, while supporting many developing countries to be part of the solution. The European Union has committed to a range of long-term sustainability and climate-change goals over recent decades. EU27+UK countries have so far acted collectively as well as individually to reduce their GHG emissions progressively until 2050.

### EU27+UK

The European Union's (EU27) GHG emissions has been continuously decreasing from 4 770.9 Mt CO<sub>2</sub>-eq in 1990 to 3 610 Mt CO<sub>2</sub>-eq in 2019, excluding LULUCF (European Union, 2021). In December 2020, the European Union submitted its updated NDC to the UNFCCC, which commits to a binding target of a net domestic reduction of at least 55 percent in GHG emissions by 2030 compared with 1990 levels.<sup>11</sup> This has been among the most dedicated GHG mitigation pledges included in Annex I countries' NDCs. The European Union's updated NDC constitutes significant upgrade on its initial submission, which pledged at least a 40 percent emissions reduction.

According to the Trends and Projections in Europe 2020 report, the pace of emissions reductions are so far sufficient to reach the 2020 target of a 20 percent reduction in 1990 emissions levels; however, it will not reduce emissions enough to reach the 2030 target of a 40 percent reduction (EEA, 2020a).

In 2021, the European Union adopted the EU Climate Law, which constitutes a comprehensive framework to enable climate-change mitigation efforts, including carbon removal, across the Union. The Law also frames the commitment of the Union to an enhanced target of GHG emissions reduction by 2030, and to climate neutrality by 2050.

As a major response to COVID-19 pandemic, the Recovery Plan for Europe, was enacted by Regulation (EU) 2021/241, setting the European Union's budget response to the pandemic crisis. It specifies that the recovery should be aligned with climate objectives and targets.

The 2020 Climate and Energy Package (2009) had set a binding legal framework to make sure that the European Union meets its climate and energy targets for 2020 in line with the Europe 2020 Strategy (2010). In 2014, the European Union adopted the 2030 Climate and Energy Framework, which included EU-wide targets and policy objectives for the period 2021 to 2030. The framework has targeted a 40 percent GHG emissions reduction from 1990 levels, which is far more ambitious than any other region in the world. With the increased level of engagement for emissions reduction, the Emission Trading System (ETS) and Effort Sharing Regulation were revised in 2018 to cover the 2021–2030 period.

Within this framework, European Union countries are obliged to establish a ten-year integrated National Energy and Climate Plan (NECP) for the 2021 to 2030 period. Introduced under the Regulation on the Governance of the Energy Union and Climate Action (EU/2018/1999), the rules required the final NECP to be submitted to the Commission by the end of 2019. The NECPs outline how European Union countries intend to address several issues, such as energy efficiency, renewables, GHG mitigation, inter linkages, and research and innovation.

On top of the 2020 Climate and Energy Package, and 2030 Climate and Energy Framework, the European Union has adopted its flagship European Green Deal (European Commission, 2019) with the vision to become the world's first climate-neutral continent by 2050. It is a comprehensive and ambitious package of measures, including GHG emissions reduction, research and innovation, biodiversity protection, and nature conservation. Among the first climate-action initiatives, the Green Deal includes:

- European Climate Law to enshrine the 2050 climate-neutrality objective into EU law, which has been adopted in 2021;
- European Climate Pact to engage citizens and all parts of society in climate action.

The European Union has also taken several steps to mainstream climate change in the sectoral legislative and policy framework in order to ensure that 2030 targets are reached. Under legislation of the European Union adopted in May 2018, European Union countries have to ensure that GHG emissions from the LULUCF sector are offset by at least an equivalent removal of carbon dioxide from the atmosphere in the period 2021 to 2030, known as the "no-debit" rule (regulation EU/2018/841).

11. Following the Withdrawal Agreement between the EU and the UK, and the Transition Period that will end on 31 December 2020, the United Kingdom will no longer be part of the European Union NDC from that date. Whereas the EU's original NDC submission was applicable also to the United Kingdom, this update is applicable to the EU and its 27 Member States.



Eibsee, Grainau, Germany

The European Union also adopted its “Farm to Fork” Strategy in 2020, which sets out the European Commission’s plans to reform the agricultural system in the climate context. The strategy aims to “lay down a new approach to ensure that agriculture, fisheries and aquaculture, and the food value chain, contribute appropriately” to the overall emissions reduction targets.

## GERMANY

Germany is among the biggest economies of the European Union, which is also borne out in the country’s GHG emissions. However, it is also among the countries with a significantly decreasing emissions trend, which came down from 1 248.58 Mt CO<sub>2</sub>-eq in 1990 to 809.8 Mt CO<sub>2</sub>-eq in 2019, excluding LULUCF (Germany, 2021). The country has given significant importance to renewable energy and energy-efficiency measures.

In 2020, Germany adopted the Law on the Reduction and Termination of Coal-Fired Power Generation, which suggests phasing out coal. National plans such as Germany’s Integrated National Energy and Climate Plan (2019), Federal Climate Protection Act (2019), and Climate Action Plan 2050 (2016), are among Germany’s many important policy documents that frame the country’s efforts to reach its national and European Union goals. A law to introduce a federal climate protection law, and to change further regulations, was adopted in 2019. As a member of the European Union, Germany has adopted all of the legislative framework set by the European Union as indicated above.

## ITALY

Italy’s emissions have been following a decreasing trend since 1990, dropping from 519 Mt CO<sub>2</sub>-eq in 1990 to 418 Mt CO<sub>2</sub>-eq in 2019, excluding LULUCF (Italy, 2021). Besides following European Union policies on climate change, Italy has adopted the FER1 Decree to incentivise the production of energy from renewable sources (2019), in order to achieve the European targets by 2030 as defined in the Integrated National Plan for Energy and Climate (2019). The Ministerial Decree providing incentives to electricity production from renewable-energy sources (2016 RES Decree) came into force to update the allocation scheme of incentives to renewable energy other than photovoltaic. The Decree was amended in 2019. As a European Union country, Italy has adopted all of the legislative framework set by the European Union as indicated above.

## UNITED KINGDOM

The United Kingdom’s emissions have dropped significantly, from 794.9 Mt CO<sub>2</sub>-eq in 1990 to 453.1 Mt CO<sub>2</sub>-eq in 2019 (United Kingdom, 2021). In 2016, 47 percent of the country’s electricity came from low-carbon sources, and it had the largest installed offshore wind capacity in the world in 2018 (IEA, 2019). The country had aligned its NDC targets and domestic climate policies with the EU acquis as a member state. The country continued its climate mitigation ambitions, submitting an updated NDC in December 2020 with a target to slash emissions by 68 percent by 2030, compared with 1990 levels.

A landmark piece of legislation is the 2008 Climate Change Act, which contained the world’s first legally binding national commitment to cut GHG emissions. It commits the government to cut national GHG emissions by at least 100 percent of 1990 levels (net zero) by 2050. The United Kingdom’s updated NDC commitments are backed up by a Ten Point Plan for a Green Industrial Revolution, which represents GBP 12 billion of government investment for tackling GHG emissions.<sup>12</sup> This Ten Point Plan includes key measures aiming at delivering the promises of the 2015 Paris Agreement and drive progress towards global net zero by 2050. In this context, the economy-wide NDC and the ‘Ten Point Plan’ are aligned and cover the energy (including transport) sector, IPPU sector, LULUCF sector, and waste sector. In 2020, the Agricultural Act was adopted, which establishes a new system of agricultural subsidies for a number of purposes, including “managing land, water, or livestock in a way that mitigates or adapts to climate change”.

12. The Ten Point Plan for Green Industrial Revolution: <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution/title>

The Act replaces the European Union's Common Agricultural Policy, following the United Kingdom's withdrawal from the European Union. The Act also includes a number of provisions aimed at enhancing transparency in agrifood supply chains.<sup>13</sup>

In 2020, the United Kingdom left the European Union. So while it will not be covered by the European Union's 2030 targets, the United Kingdom's obligations under the Kyoto Protocol and the Effort Sharing Decision remain part of the European Union's 2020 contributions under the Withdrawal Agreement. The United Kingdom will host and chair COP26, which is expected to play a key role for the future of global ambitions in mitigation targets.

In 2017, the United Kingdom adopted the Clean Growth Strategy,<sup>14</sup> which describes the government's current policies and measures to decarbonise all sectors of the United Kingdom economy through the 2020s and beyond. Box 1 below provides details of the United Kingdom's ambitions to become the pioneer in national GHG emissions reduction targets following its departure from the European Union.

### BOX 1: UNITED KINGDOM'S ENHANCED COMMITMENT TO GHG EMISSIONS REDUCTION

The United Kingdom submitted its updated NDC in 2020 with an ambitious 68 percent GHG emissions reduction target compared with 1990, by 2030. The sectors covered in the updated NDC are: energy (including transport), IPPU, agriculture, LULUCF, and waste.

On top of the 68 percent reduction target by 2030, the United Kingdom has put the world's most ambitious climate-change target into law, to reduce emissions by 78 percent by 2035 compared with 1990 levels, on the way to reaching net zero emissions by 2050.

Delivery of the NDC will draw on a range of policies and measures already in place, as well as policies and measures that will be developed in the future. As an example, the United Kingdom's updated NDC commitments are backed up by a 'Ten Point Plan for a Green Industrial Revolution', which represents a GBP 12 billion government investment in tackling GHG emissions. The Scottish government is committed to delivering a green recovery after the impact of COVID-19, and plans outlined in the Programme for Government 2020-21 are among a range of measures to protect biodiversity, create green jobs, and accelerate a just transition to net zero.

The Government of the United Kingdom sought views on the approach to decarbonising the economy in 2017, recognising that clean growth has to be a shared endeavour for government, individuals, companies from different sectors, academia, trade associations, non-governmental organizations, and local government. This included several specific public consultations that were launched in 2017 and 2018. Since the publication of the Clean Growth Strategy, the government has also run many other public consultations and calls for evidence relevant to the United Kingdom's climate ambitions.

The United Kingdom is also a big provider of climate finance. At the 2019 UN Climate Action Summit, it committed to doubling its provision of climate finance to GBP 11.6 billion for the 2021/22 and 2025/26 periods through its International Climate Finance (ICF) mechanism (UK Department for Business, Energy & Industrial Strategy, 2019).

## EFTA COUNTRIES

Iceland, Liechtenstein, Norway, and Switzerland constitute the countries in the EFTA region – an economic union rather than a political one. Although policies in EFTA countries are aligned with those of the European Union in many areas, they are free to decide to integrate European Union policies or not as individual countries.

There is no collective EFTA approach regarding adoption of the European Union's climate-change policies, but all EFTA countries have aligned their legislation and national policies with the European Union to varying extents. Like the European Union, EFTA states that are part of the European Economic Area (EEA) – Iceland, Liechtenstein, Norway – have binding GHG emissions reduction targets for 2020,<sup>15</sup> and a set of instruments to achieve them. The EEA EFTA states announced equivalent GHG emissions reduction

13. Further detail on the Government's plans for achieving a transition to Net Zero and a recovery for nature are set out in the policy document 'The path to sustainable farming: An agricultural transition plan 2021 to 2023': <https://www.legislation.gov.uk/ukpga/2020/21/contents/enacted/data.htm>

14. UK's Clean Growth Strategy <https://www.gov.uk/government/publications/clean-growth-strategy>

15. The Agreement on the European Economic Area, which entered into force on 1 January 1994, brings together EU Member States and the three EEA EFTA states in a single market, referred to as the "Internal Market". However, each individual state may have bilateral agreements with the EU besides the EEA.





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targets as spelt out in the European Union's 2030 Climate and Energy Framework after its adoption. Both Norway and Iceland announced that they intended to fulfil their GHG emissions reduction targets by 2030 jointly with the European Union and European Union countries.

## ICELAND

Being the second smallest emitter of EFTA countries, Iceland's GHG emissions have not increased significantly since 1990. The country pledged a 40 percent emissions reduction compared with 1990 levels by 2030, in case of an agreement with the European Union and European Union countries.

Iceland has adopted a Climate Action Plan for 2018–2030, which aims to make Iceland carbon neutral before 2040, phasing out fossil fuels in transport and increasing carbon sequestration in land use. The plan has 34 government measures, including reforestation, increasing carbon sequestration in land use through the restoration of woodlands and wetlands, revegetation and afforestation. In 2012, an Act on Climate Change was adopted, which aimed to reduce GHG emissions economically and efficiently.

Based on the EEA Joint Committee Decision No 269/2019, Iceland takes part in three key climate mitigation legislative frameworks: the Emissions Trading System, Effort Sharing Regulation, and LULUCF, which covers emissions and carbon removals from the LULUCF sector. This means that Iceland's contribution towards the joint fulfilment target is comparable in effort and governed by the same set of rules as for European Union countries and for Norway.

## LIECHTENSTEIN

Liechtenstein is the smallest GHG emitter of the EFTA countries, with only 0.18 Mt CO<sub>2</sub>-eq of emissions in 2018, which is slightly less than its 1990 emissions. Liechtenstein has pledged a 40 percent emissions reduction compared with 1990 levels by 2030, on condition that the parliament approves.

The country has adopted a CO<sub>2</sub> Emissions Reduction Ordinance (2013), and Law on the Reduction of CO<sub>2</sub> Emissions (2013), which proposes a carbon tax on fossil fuels. The Law on Energy Efficiency has been in force since 2008. However, climate change has not been integrated in sectoral policies, and strategies and the NDC target is subject to approval of parliament. Nevertheless, Liechtenstein follows European Union policies regarding GHG emissions reduction. In 2012, the country adopted the Emission Trading Act, which aims to reduce domestic GHG emissions through the implementation of energy, transport, environmental, forestry, agricultural, economic, and financial measures.

Considering the European Union's increasing commitments and Liechtenstein's already low emissions, the country may be able to reach its target.

## NORWAY

Norway is among the biggest emitters of EFTA countries, with almost the same emissions as Switzerland, and a slight increase since 1990. However, Norway's LULUCF sector sink capacity has increased since 1990, bringing down total emissions from 41.3 Mt CO<sub>2</sub>-eq in 1990 to 28.3 Mt CO<sub>2</sub>-eq in 2018.

Norway submitted its updated NDC in February 2020, which proposes deeper emissions cuts than its initial NDC. Under its updated NDC, Norway will cut emissions by at least 50 percent by 2030, aiming towards 55 percent below 1990 levels, an improvement compared with its previous 2030 target of an "at least 40 percent" cut. Norway will implement its NDC jointly with the European Union and Iceland. As part of this agreement, Norway has committed to achieving net zero emissions from its land sector in 2030, pursuant to European Union land-sector regulations.

Norway has adopted a Climate Change Action Plan in 2021. The plan includes, among many other sectors, the agricultural sector. The main emphasis of the plan is emissions that are not included in the Emissions Trading System, or non-ETS emissions. These include emissions from transport, waste, agriculture, and buildings, as well as some emissions from industrial production, and the oil and gas industry. In Norway, the Climate Change Act came into force in January 2018, with the aim to promote the implementation of country's climate targets as part of the transition to a low-carbon society by 2050. The country also established the Better Growth, Lower Emissions Strategy (2017), which focused on mitigation and adaptation in businesses through green markets (including emissions trading and taxation), green and innovative procurement, energy infrastructure, and climate risk. In 2017, the White Paper on the 2030 Climate Strategy was adopted, which is Norway's strategy to meet its climate commitments by 2030.

Norway is also considering the use of carbon credits – therefore, the achievement of NDC goals is possible.





Seljalandsfoss, Iceland



## SWITZERLAND

Switzerland is the other big emitter among EFTA countries, together with Norway. The country's emissions have dropped from 71.2 Mt CO<sub>2</sub>-eq in 1990 to 46.22 Mt CO<sub>2</sub>-eq in 2019. The country submitted an updated version of its first NDC in December 2020. The updated NDC pledges an emissions reduction of 50 percent compared with 2010 levels by 2030, and to achieve carbon neutrality by 2050, in order to limit warming to 1.5 °C. The updated pledge represents a more ambitious target than the original version, which proposed a 50 percent emissions reduction by 2030 compared with 1990 levels.

Switzerland has its own legislative and policy framework for tackling climate change. In 2021, the country adopted its Long-Term Climate Strategy, which aims to outline the path to reach net zero emissions by 2050. The CO<sub>2</sub> Act from 2013 is at the core of Swiss climate legislation and has been updated several times. In 2021, its revision was rejected following a public referendum. This Act requires domestic reduction targets (aligned with Switzerland's international reduction commitments), set incentives for increasing the use of renewable energies, and development of innovative technologies. Switzerland also has its own emissions trading scheme (cap and trade system), which was linked to the European Union Emissions Trading System in January 2020. Its Energy Strategy 2050 was approved in the parliament in September 2016 – this aims to increase energy efficiency and promote GHG emissions reduction in several sub-sectors within the energy sector, such as buildings and transport. The country also adopted its Climate Policy in 2018, in order to meet its commitments made under the Paris Agreement. It is a multi-sectoral document that primarily focuses on reducing GHG emissions from fossil fuels.

Switzerland has already achieved some emissions reduction compared with 1990. The country is also considering the use of carbon credits to achieve its goals. Therefore, the achievement of NDC goals is possible.

**TABLE 9. Summary NDC analysis for the EU27+UK sub-region** (Part 1)

Country	NDC mitigation target	Base year emissions Mt CO <sub>2</sub> -eq	Latest inventory emissions Mt CO <sub>2</sub> -eq	Emissions trends	Key policies	Summary for analysis
EU27	Economy-wide net domestic reduction of at least 55% in GHG emissions by 2030 compared with 1990	4 770.9 (1990)	3 610 (2019)	With some minor increasing and decreasing trends since the 1990s, EU's GHG emissions have been continuously decreasing since 1990	<ul style="list-style-type: none"> <li>2021 Recovery Plan for Europe</li> <li>2020 Climate and Energy Package</li> <li>2030 Climate and Energy Framework</li> <li>European Green Deal</li> <li>European Climate Law (2021)</li> <li>European Climate Pact</li> <li>Farm to Fork strategy (2020)</li> </ul>	EU has pioneered in the development and implementation of climate change mitigation policies and measures. EU updated NDC has more ambitious mitigation pledges, in line with the Green Deal. The EU also targets climate neutrality by 2050. Recovery Plan for Europe integrates COVID-19 recovery with climate change targets. Farm to Fork Strategy aims to reform the agricultural system in the climate context.
Germany	Economy-wide net domestic reduction of at least 55% in GHG emissions by 2030 compared with 1990	1 248.58 (1990)	809.8 (2019)	Germany's GHG emissions reflect a continuously decreasing trend since the 1990s	<ul style="list-style-type: none"> <li>Climate Action Plan 2050</li> <li>Law on the reduction and termination of coal-fired power generation (2020)</li> <li>Germany's Integrated National Energy and Climate Plan (2019)</li> <li>Law to introduce a federal climate protection law and to change further regulations</li> </ul>	Germany is among the pioneer countries in the EU with significant efforts to reduce GHG emissions which have been reflected both in GHG emissions reductions and national climate policies.
Italy	Economy-wide net domestic reduction of at least 55% in GHG emissions by 2030 compared with 1990	519 (1990)	418 (2019)	With some minor increasing and decreasing trends since the 1990s, Italy's GHG emissions have been continuously decreasing since 1990	<ul style="list-style-type: none"> <li>Italy's Integrated National and Energy Climate Plan (2019)</li> <li>FER1 Decree to incentivise the production of energy from renewable sources (2019)</li> <li>RES Decree 2016 and RES Decree 2019–2021</li> </ul>	Italy follows EU-wide policies on climate change mitigation. However, the country's emissions are decreasing at a slow pace.
United Kingdom	At least 68% emissions reduction compared with 1990, by 2030	794.9 (1990)	451.1 (2019)	The UK's total GHG emissions have been decreasing since 1990	<ul style="list-style-type: none"> <li>Clean Growth Strategy (2017)</li> <li>2008 Climate Change Act</li> <li>Ten Point Plan for a Green Industrial Revolution (2020)</li> <li>Agricultural Act (2020)</li> </ul>	Despite leaving the EU, the UK has continued following low carbon development pathways, with an increased ambition with the updated NDC, together with its ambition for net zero target by 2050.
Iceland	55% reduction by 2030 compared with 1990	3.73 (1990)	4.72 (2019)	No significant change since 1990	<ul style="list-style-type: none"> <li>Iceland's Climate Action Plan for 2018–2030</li> <li>2012 Act no. 70 on Climate Change</li> </ul>	Iceland is aligned to EU policies regarding GHG emissions reduction. Therefore, Iceland's contribution towards the joint fulfilment target is comparable in effort and governed by the same set of rules as for EU countries and Norway.
Liechtenstein	40% reduction compared with 1990 levels by 2030 in case the parliament approves	0.228 (1990)	0.18 (2019)	No significant change since 1990	<ul style="list-style-type: none"> <li>CO<sub>2</sub> Emissions Reduction Ordinance (2013)</li> <li>Law on the Reduction of CO<sub>2</sub> Emissions (2013)</li> </ul>	Liechtenstein follows EU policies regarding GHG emissions reduction targets. However, the country has not submitted an updated NDC, therefore the mitigation target remained 40%.

Source: European Union's First NDC (updated version); United Kingdom of Great Britain and Northern Ireland's NDC; Iceland's First NDC; Liechtenstein's First NDC; Norway's First NDC (updated); Switzerland's First NDC (updated).

**TABLE 9. Summary NDC analysis for the EU27+UK sub-region** (Part 2)

Country	NDC mitigation target	Base year emissions Mt CO <sub>2</sub> -eq	Latest inventory emissions Mt CO <sub>2</sub> -eq	Emissions trends	Key policies	Summary for analysis
Norway	Emissions reduction by at least 50% and towards 55% compared with 1990 levels by 2030	51.46 (1990)	50.33 (2019)	No significant change since 1990	<ul style="list-style-type: none"> <li>Climate Change Action Plan (2021)</li> <li>Climate Change Act (2018)</li> <li>Better Growth, Lower Emissions Strategy (2017)</li> <li>White Paper on the 2030 Climate Strategy (2017)</li> </ul>	Norway has pledged more ambitious targets with its updated NDC. The country has also updated its climate policies and strategies to align with EU policies to achieve a low-carbon society by 2050. The country also considers utilizing carbon credits to achieve its goals. The Climate Change Action Plan includes measures to reduce emissions from the agricultural sector among other sectors.
Switzerland	Emissions reduction by 50% compared with 2010 levels by 2030 and to achieve carbon neutrality by 2050	54.73 (2010)	46.22 (2019)	Constant decrease since 1990, with some minor increases and decreases.	<ul style="list-style-type: none"> <li>Long-Term Climate Strategy (2021)</li> <li>Climate Policy (2018)</li> <li>Ordinance for the Reduction of CO<sub>2</sub> Emissions (2013)</li> <li>CO<sub>2</sub> Act (2013)</li> <li>Energy Strategy 2050 (2016)</li> </ul>	Switzerland has already achieved some emissions reduction compared with 1990. The updated NDC has been submitted in December 2020 with increased commitment for emissions reduction and carbon neutrality target by 2050. The country is currently updating its CO <sub>2</sub> Act, and is considering utilizing carbon credits to achieve its goals. Switzerland aims to reduce its greenhouse gas emissions to net zero by 2050.

Source: European Union's First NDC (updated version); United Kingdom of Great Britain and Northern Ireland's NDC; Iceland's First NDC; Liechtenstein's First NDC; Norway's First NDC (updated); Switzerland's First NDC (updated).

## CIS

CIS countries are all former USSR countries, whose GHG emissions dropped significantly following the collapse of the USSR. The GHG emissions reduction targets of the countries seem ambitious compared with their 1990 emissions. However, they all have the potential to reach their targets using their existing policies. Similar to the Central Asia region, CIS countries have already established legal and policy frameworks, as well as state programmes, to enhance energy efficiency and renewable energy. The latest GHG inventories in the sub-region are still significantly below base-year emissions. However, the economies are still dependent on fossil fuels and a major shift towards renewable energy is not expected soon.

## BELARUS

In 2021, the National Sustainable Development Strategy for the period 2021–2030 is under development with an emphasis on low-emissions development. The strategy focuses on green innovation, improving the quality of life and increasing the competitiveness of the national economy. Belarus has adopted a Law on Energy Saving in 2015. In 2013, it adopted a National Programme on Climate Change Mitigation Measures for 2013–2020, which aimed to cut GHG emissions by 12 percent by 2020 compared with 1990 levels. A National Strategy for Sustainable Socioeconomic Development until 2030 (in 2015), and the Decree on “some GHG emission reduction issues” (2010) were also adopted. The country does not have particular policies and measures dedicated to reduce GHG emissions from the agricultural and LULUCF sectors.

## REPUBLIC OF MOLDOVA

Republic of Moldova is the smallest emitter among CIS countries. The country's emissions have not increased significantly since the fall in the mid-1990s. It submitted its updated NDC in March 2020, when the country revised its unconditional emissions reduction commitments from 64 percent to 67 percent, to 70 percent, compared with 1990 levels by 2030. This reduction corresponds to 12.8 Mt CO<sub>2</sub>-eq in 2030, which is 3.4 times less than 1990 levels over the 40-year timespan (Republic of Moldova's updated NDC). On the other hand, the more ambitious conditional target suggests that the previous 78 percent reduction commitment could be increased to 88 percent below the 1990 level, in case a global agreement in addressing the need for low-cost financial resources, technology transfer, and technical cooperation, is reached (Government of Republic of Moldova, 2020).

In 2019, the country adopted an Action plan for 2020-23 which focused on strengthening the legal framework for air protection and climate change. Republic of Moldova established the Low Emission Development Strategy of the Republic of Moldova until 2030 and an action plan for its implementation (Government of Moldova, 2016), which consolidated several of the GHG emissions reduction objectives, including energy efficiency and renewable energy sources. The National Programme for Energy Efficiency 2011-2020, which has a 20 percent target for renewable energy use by 2020, and the Energy Strategy until 2030 and its 'roadmap for implementation' (2013), which includes various targets for emissions reduction by 2020 (Government of Moldova, 2013), were also adopted. By November 2022, it is expected that the government will establish a "2050 Low Emissions Development Strategy" (Climate Change News, 2020).

In 2014, Republic of Moldova signed the Moldova–European Union Association Agreement that establishes a political and economic association between the two parties. The agreement commits Moldova to economic, judicial, and financial reforms, in order to converge its policies and legislation with those of the European Union. Therefore, it is expected that the country also aligns its GHG mitigation ambitions with those of the European Union over the upcoming period. The updated NDC already shows a positive sign in this respect.

## RUSSIAN FEDERATION

The Russian Federation is the fifth-largest GHG emitter in the world, and by far the biggest source of GHG emissions among countries in CIS countries. In its first NDC, the Russian Federation pledged to limit its GHG emissions to 70 percent of 1990 levels by 2030, which is subject to the maximum possible account of the absorbing capacity of forests (that is, including LULUCF). The NDC proposes to reach this goal through energy efficiency, renewable energy sources, natural sinks, and through financial incentives and taxes stimulating the reduction of emissions.

In 2021, the country adopted the Federal Law on limiting greenhouse gas emissions, with the aim of creating conditions for sustainable and balanced development, while reducing the level of GHG emissions. The document, notably, sets the legal framework for mandatory carbon reporting that is due to start in 2023 for the most polluting companies, and carbon offsetting schemes. In March 2020, the Russian Federation released its draft 2050 Long-term Development Strategy for public consultation. The strategy aims to achieve carbon neutrality during the second half of the twenty-first century. It also proposes a reduction in emissions of 33 percent by 2030 compared with 1990 levels (including LULUCF).

The UNEP Emission Gap Report (UNEP, 2019) projects that the Russian Federation can meet its NDC target with current policies, with a possibility of reaching more than 15 percent lower GHG emissions than the NDC target.

## UKRAINE

Ukraine is the second-biggest emitter in the sub-region. The country's economy was hit hard by the collapse of the USSR, its emissions dropping by 55 percent from 942 Mt CO<sub>2</sub>-eq to 427 Mt CO<sub>2</sub>-eq (excluding LULUCF) between 1990 and 2000 (Ukraine, 2020). Between 2017 and 2018, emissions increased by 5 percent to 339.2 Mt CO<sub>2</sub>-eq. In its first NDC, the country pledged not to exceed 60 percent of its 1990 GHG emissions level in 2030 (including LULUCF). In July 2021, Ukraine submitted an updated NDC which pledged to reduce GHG emissions by 65 percent compared with 1990 (including LULUCF), by 2030.

In 2021, a National Economic Strategy was adopted for the period up to 2030, and it sets a net zero goal by 2060 for Ukraine. During the past few years, it has also adopted several energy and climate-change mitigation strategies, such as the Energy Strategy until 2035 (2017), which outlines the country's energy goals – it wants to provide 50 percent of its energy from nuclear power, 25 percent from renewable sources, and 25 percent from water power, by 2035 (Government Portal, 2017). In the same year, it adopted the State Climate Policy Concept until 2030, and the Action Plan to Implement State Climate Policy Concept until 2030, which focuses on priorities such as climate-change mitigation and transition to the low-emissions development (Ministry of Ecology and Natural Resources of Ukraine, 2018). The country also developed the Ukraine 2050 Low Emissions Development Strategy





Herd of sheep, Ukraine



(2017), which focuses on the country's transition to low carbon emissions growth in a variety of sectors such as energy, agriculture, forestry, and waste (Government of Ukraine, 2017).

The Strategy of the State Environmental Policy of Ukraine for the period until 2030 (2019) proposes reaching 17 percent of total energy consumption from renewables by 2030.

**TABLE 10. Summary of NDC analysis for the CIS sub-region**

Country	NDC mitigation target	Base year emissions Mt CO <sub>2</sub> -eq	Latest inventory emissions Mt CO <sub>2</sub> -eq	Emissions trends	Key policies	Summary for analysis
Belarus	Unconditional: at least 28% reduction from 1990 levels by 2030	139.27 (1990)	90.12 (2019)	No significant increase of emissions to date after the fall in mid-1990s.	<ul style="list-style-type: none"> <li>National Strategy for Sustainable Socioeconomic Development until 2030 (2015)</li> <li>National Programme on Climate Change Mitigation Measures for 2013–2020</li> <li>National Sustainable Development Strategy 2021–2030 (not yet adopted)</li> </ul>	Belarus already has quite low GHG emissions, and has some level of GHG reduction policies and measures.
Moldova	Unconditional: 64–67% to 70% below 1990 level in 2030  Conditional: 78% below its 1990 level in 2030	44.9 (1990)	14.58 (2016)	A sharp fall of emissions in 1990s, without a significant increase to date	<ul style="list-style-type: none"> <li>Action Plan for 2020–2023 (2019)</li> <li>Low Emission Development Strategy of the Republic of Moldova until 2030 and the Action Plan for its implementation (2016)</li> <li>2050 Low Emissions Development Strategy (to be finalised in 2022)</li> </ul>	Moldova has relatively low emissions which may help to reach the country's NDC targets. The country continues its efforts to approximate to EU policies. The country has already submitted its updated NDC with more ambitious targets.
Russian Federation	Limiting GHG emissions to 70% (incl. LULUCF) of 1990 levels by year 2030	3 186.8 (1990)	2 119.43 (2019)	A major fall of emissions until late 1990s, followed by slow rise to date	<ul style="list-style-type: none"> <li>Federal Law on Limiting Greenhouse Gas Emissions (2021)</li> <li>Presidential Decree on Greenhouse Gas Emission Reduction (2013)</li> <li>Action Plan on Achieving the Greenhouse Gas Emission Reduction Target by 2020 (2014)</li> <li>Strategy for the long-term development of Russia with a low level of GHG emissions until 2050 (drafted in 2020)</li> </ul>	Being the biggest emitter in the sub-region, Russia has increased interest in climate change mitigation efforts and commitments through submitting its first NDC with a target of 70% (incl. LULUCF) by 2030.
Ukraine	Emissions reduction of 65% compared with 1990 by 2030 (incl. LULUCF)	882.9 (incl. LULUCF, 1990)	332.16 incl. LULUCF, 2019)	A major fall until 2000, followed by a slight fall to date	<ul style="list-style-type: none"> <li>National Economic Strategy 2030 (2021)</li> <li>2050 Green Energy Transition Concept (Ukraine Green Deal)</li> <li>Strategy of the State Environmental policy of Ukraine for the period to 2030 (2019)</li> <li>Energy Strategy until 2035 (2017)</li> <li>State Climate Policy Concept until 2030 (2017) and the Action Plan</li> <li>Ukraine 2050 Low Emission Development Strategy (2017)</li> </ul>	Ukraine is already considered to have low emissions which may help the country to reach its emissions targets. Ukraine has submitted its updated NDC with significantly more ambitious reduction targets. There are no particular policies and measures for emissions reduction in the agricultural or LULUCF sectors.

Source: Belarus' First NDC; Republic of Moldova's First NDC (updated); Ukraine's First NDC Russian Federation's First NDC.

## SOUTHEASTERN EUROPE (SEE)

Over the recent years, countries in SEE that are in the European Union accession process have been gathering momentum in terms of strengthening their institutional and legal framework for climate-change mitigation. The submission of updated or enhanced NDCs by countries such as Bosnia and Herzegovina, Montenegro, and North Macedonia, is an indication of increased commitment.

Countries in this sub-region do not have significant GHG emissions compared to other sub-regions, with the exception of Turkey. However, there are significant data gaps regarding GHG inventories in several SEE countries over recent years, which makes it difficult to make an assessment of their progress towards the achievement of NDC goals. Table 11 provides a summary analysis on the progress achieved to date in the implementation of NDC targets.

### ALBANIA

Albania has the second-lowest GHG emissions in the sub-region, and equivalent to 0.017 percent of global GHG emissions. The latest GHG inventory dates back to 2010, and there is data uncertainty according to the NDC, which needs to be overcome in order to make calculations on GHG trends and projections. Albania has pledged to reduce GHG emissions compared to the baseline scenario between 2016 and 2030 by 11.5 percent. This reduction means a 708 KT CO<sub>2</sub>-eq (kilotonnes) reduction by 2030. Albania is also in the process of updating its NDC and significant work is being conducted to ensure that mitigation targets for the agricultural, forestry and land use sectors are mainstreamed into the updated NDC document.

Albania has made progress with its policy and legislative framework that aims to address climate change within efforts towards approximation of EU acquis. The National Energy Strategy was endorsed by the government in 2019 together with the National Action Plan on Mitigation. The Law 138/2013 on renewable sources of energy (2013), and the Law 7/2017 Promoting the use of energy from renewable resources (2017) are now in force. The Law on Energy Efficiency (2015) has been adopted as well. Albania also adopted a National Action Plan for Renewable Energy Sources 2018–2020. However, the country has not progressed with the integration of climate change into other sectoral policies.

### BOSNIA AND HERZEGOVINA

Bosnia and Herzegovina submitted its updated NDC in May 2021, when its GHG mitigation scenarios became significantly more ambitious, moving from a 2 percent GHG emissions reduction by 2030 compared with the BAU scenario in its first NDC, to a 12.8 percent reduction (updated NDC) compared with 2014 (or 33.2 percent reduction compared with 1990), as an unconditional target (Bosnia and Herzegovina, 2021). The conditional target (with more intensive international assistance for the decarbonisation of mining areas) for 2030 is 17.5 percent compared with 2014, or 36.8 percent compared with 1990, in the updated NDC.

Bosnia and Herzegovina also has an emissions reduction target for 2050 which is 50 percent (unconditional) and 55 percent (conditional) compared with 2014, which also equals to 61.7 percent (unconditional) and 65.6 percent (conditional) compared with 1990 (Bosnia and Herzegovina, 2021). For the conditional targets, the updated NDC suggests increased international assistance for faster decarbonisation of the power sector with an emphasis on fair transition of mining areas. In the forestry sector, measures are planned to increase carbon sinks by 93 Gg CO<sub>2</sub>-eq until 2030.

Bosnia and Herzegovina has so far lacked a systematic approach to climate-change mitigation, and climate change has not been integrated into sectoral policies. A Climate Change Adaptation and Low Emissions Development Strategy was adopted in 2013. The strategy includes measures such as the efficient use of resources, increase in energy efficiency, wider use of renewable energy resources, and improved energy and transport infrastructure and services. The updated NDC reveals that a new Climate Change Adaptation and Low-Emission Development Strategy for the 2020–2030 period is currently being finalised (Ministry of Spatial Planning, Civil Engineering and Ecology of Republika Srpska and Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina, 2021). Following the adoption of this strategy, Bosnia and Herzegovina has moved a step further and established a framework, which will enable the implementation of national appropriate mitigation action (NAMA). In 2017, the Law on energy efficiency was adopted; however, no particular GHG mitigation policies and measures exist at sectoral level, including for agriculture and forestry.





Bosnia and Herzegovina



## MONTENEGRO

Montenegro – with a population of less than a million people – has the least GHG emissions in the sub-region, with no significant increase or decrease over the past couple of decades. The country submitted its updated NDC in June 2021, with an increased commitment of at least a 35 percent emissions reduction (excluding LULUCF) by 2030 compared with 1990, which is an upgrade from the 30 percent from the first NDC. Montenegro plans to achieve its targets through expanding renewable-energy capacity, and adopting energy-efficiency policies and measures, among many other measures.

The National Strategy and Action Plan for Transposition, Implementation and Enforcement of the EU Acquis on the Environment and Climate Change 2016–2020 has provided the strategic framework for approximation to the EU acquis for addressing climate change. Montenegro adopted a Climate Protection Law in 2019 as an umbrella law on climate-change mitigation and adaptation measures, and this also addresses Montenegro's commitments under the Paris Agreement, as well as being a step towards accession to the European Union. Montenegro also adopted a National Strategy for Climate Change until 2030 in 2015, and adopted a National Strategy for Sustainable Development to 2030 in 2007, in which climate-change mitigation is one of the main issues addressed. Its National Forestry Policy (2008) seeks to improve the country's forests, which support mitigation efforts. Finally, a national inventory system for GHG emissions is under development.

## NORTH MACEDONIA

North Macedonia's GHG emissions have not shown a significant increase over the period for which GHG emissions inventories are available. The country submitted its enhanced NDC in April 2021 with an enhanced GHG mitigation target. The enhanced NDC pledges 51 percent emissions reduction compared with 1990, by the year 2030. For net GHG emissions, the country pledged 82 percent emissions reduction compared with 1990, by the year 2030 (Republic of North Macedonia – Ministry of Environment and Physical Planning, 2021). The enhanced NDC also provides a sectoral breakdown, with 29 percent of emissions reduction planned in the agricultural sector, and a 95 percent increase in removals from the LULUCF sector.

With these targets, the country aims to align with European Union targets. North Macedonia aims to achieve these targets through focusing on mitigation actions in the energy, agricultural, LULUCF, and waste sectors. However, a lack of GHG emission trends data over recent years makes it difficult to make any assessment. The country heavily depends on domestic lignite for power generation, which makes up a significant share of GHG emissions.

North Macedonia has significantly accelerated its progress towards climate-change mitigation over recent years. As a part of the European Union accession process, a Long-term Climate Change Strategy and Law on climate action are currently being finalised. North Macedonia has also made significant progress towards mainstreaming climate change in sectoral policies. In the energy sector, the National Energy and Climate Plan is under preparation. The Law on Energy Efficiency (2020) and Rulebook on Renewable Energy Sources, together with several decrees that promote use of renewable power generation, were adopted in 2020. The Strategy for Energy Development in Republic of North Macedonia until 2040 (2019) was also adopted. Apart from the energy sector, the legislative framework for the transport and waste sectors also progressed in integrating climate change in 2019 and 2020. The National Transport Strategy 2018–2030 was adopted in 2018, while the National Waste Management Plan of the Republic of Macedonia for 2020–2026 is currently under preparation. The country has also drafted a Strategy for Regional Development 2019–2029 with regard to the transition to renewable energy and energy efficiencies throughout the different regions, which is currently being adopted (Republic of North Macedonia – Ministry of Environment and Physical Planning, 2021).

## SERBIA

Serbia's GHG emissions saw a sharp fall in the early 1990s, but then did not change substantially over recent decades. However, like other non-Annex I countries in SEE, Serbia's latest national GHG inventory dates back to 2013. In its NDC, Serbia has pledged to reduce GHG emissions by 9.8 percent by 2030 compared with 1990 levels. Although GHG emissions of recent years are not known, the GHG emissions from the latest inventory are already below the 2030 target.

Serbia has accelerated its efforts to adopt climate-change policies and measures over recent years, mainly induced by the efforts to join the European Union. Serbia submitted its new climate-change strategy and action plan to the UNFCCC in 2015. Currently, the Low-Carbon Development Strategy of the Republic of Serbia (with an action plan) is under preparation through an EU-funded project. The country adopted the Law on Climate Change in December 2019, and in the same year started a project to improve its monitoring, reporting and verification system and transparency framework, which is due to end in 2022. The Forest Law from 2010 aims for the preservation, protection, planning, cultivation and use of forests, which have helped to expand GHG





Durmitor National Park, Dinaric Alps, Montenegro



carbon sinks in Serbia. However, there are no particular policies and measures in Serbia for GHG emissions reduction in the agricultural or LULUCF sectors.

## TURKEY

Turkey is by far the biggest emitter in the SEE sub-region. The country's emissions have been increasing since the late 1990s due to the economic and population growth of the past couple of decades, with some slight decrease over recent years. Turkey's main source of emissions is the energy sector, which is dominated by fossil fuels. Turkey pledged to have a 21 percent emissions reduction compared with the BAU scenario in 2030 in its NDC. According to the Emissions Gap Report 2019 (UNEP, 2020), Turkey is projected to have more than 15 percent lower GHG emissions compared with its first NDC target emissions levels. Turkey has ratified the Paris Agreement in October 2021.

Being a European Union candidate country, Turkey has progressed further in the development of a legislative and institutional framework for climate-change mitigation compared to other countries in the sub-region. Following the adoption of Turkey's National Climate Change Strategy (2010–2023) and Turkey's National Climate Change Action Plan (2011–2023), Turkey also adopted the 'Regulation on monitoring GHG emissions' in 2014, which aimed at approximation to EU acquis. There is also a degree of integration of climate-change policies in sectoral policies, which is mainly driven by the accession process. In the agricultural sector, climate change has been alluded to in some sectoral documents over recent years. Legislation such as the Organic agriculture law (2004) and By-law on chemical fertilizer control (2015) include measures to reduce GHG emissions. The Energy Efficiency Action Plan 2017–2023 proposes actions on increasing energy efficiency in the agricultural sector. A Climate Law is also currently under development.

**TABLE 11. Summary NDC analysis for the SEE sub-region** (Part 1)

Country	NDC mitigation target	Base year emissions Mt CO <sub>2</sub> -eq	Latest inventory emissions Mt CO <sub>2</sub> -eq	Emissions trends	Key policies	Summary for analysis
Albania	11.5% emissions reduction compared with 2016 emissions by 2030	BAU scenario reduction target	8.13 (2010)	Albania's GHG emissions almost doubled from 1990 to 2010 reaching 8.13 Mt CO <sub>2</sub> -eq (latest inventory), without a major increase in absolute terms	<ul style="list-style-type: none"> <li>National Energy Strategy (2019)</li> <li>National Action Plan on Mitigation (2019)</li> <li>Law on Renewable Sources of Energy (2013)</li> <li>Law 7/2017 promoting the Use of Energy from Renewable Resources (2017)</li> <li>National Action plan for renewable energy (2009–2020)</li> </ul>	Due to the impacts of global pandemic combined with limited availability of GHG inventory data and level of data uncertainty in the last decade, it is challenging to make projections for BAU scenario in 2030 for Albania. Albania has made progress with its policy and legislative framework that aims to address climate change due to efforts for approximation to EU acquis.
Bosnia and Herzegovina	Unconditional: 12.8% reduction compared to 2014 (or 33.2% reduction compared with 1990) by 2030  Conditional: 17.5% reduction compared with 2014 (or 36.8% compared with 1990) by 2030	26.06 (2014)	26.06 (2014)	After a sharp fall between 1990 and 1993, GHG emissions slowly rose until the last inventory calculations from 2013	<ul style="list-style-type: none"> <li>Climate Change Adaptation and Low Emission Development Strategy (2013)</li> <li>Law on Energy Efficiency (2017)</li> <li>Climate Change Adaptation and Low Emission Development Strategy for 2020–2030 period (being finalised)</li> </ul>	The limitations that exist on the data availability for GHG emissions trends since 2014 makes it challenging to track the country's progress with its targets. However, the country has already submitted an updated NDC with enhanced targets for emissions reduction. It does not have comprehensive sectoral integration of mitigation policies, other than for energy and partially the transport sector.

Source: Albania's First NDC; Bosnia and Herzegovina's First NDC; Montenegro's First NDC; North Macedonia's First NDC; Serbia's First NDC; Turkey's INDC.





Zaovine Lake, Serbia



TABLE 11. Summary NDC analysis for the SEE sub-region (Part 2)

Country	NDC mitigation target	Base year emissions Mt CO <sub>2</sub> -eq	Latest inventory emissions Mt CO <sub>2</sub> -eq	Emissions trends	Key policies	Summary for analysis
Montenegro	Unconditional: At least 35% emissions reduction by 2030 compared with 1990	5.7 (1990)	3.49 (2015)	After a sharp fall between 1991 and 1995, GHG emissions have increased slowly until the latest inventory year of 2015	<ul style="list-style-type: none"> <li>2016–2020 National Strategy with the Action Plan for Transposition, Implementation and Enforcement of the EU acquis on the Environment and Climate Change</li> <li>Climate Protection Law (2019)</li> <li>National Strategy for Climate Change until 2030 (2015)</li> </ul>	Montenegro's GHG emissions are the smallest in the SEE sub-region. Therefore the required GHG emissions reduction in absolute terms is limited to less than 1.6 Mt CO <sub>2</sub> -eq. Also, due to the approximation to EU acquis on environment, Montenegro has been progressing towards addressing climate change through its policies and legislation.
Bosnia and Herzegovina	51% emissions reduction compared with 1990 by 2030	26.06 (2014)	12.2 (2014)	North Macedonia's GHG emissions have not significantly changed since 1990	<ul style="list-style-type: none"> <li>Long-term Strategy and Law on Climate Action (under preparation for 2020)</li> <li>National Energy and Climate Plan (to be finalised in 2020)</li> <li>Law on Energy Efficiency (2020)</li> <li>Rulebook on Renewable Energy Sources (2020)</li> <li>Strategy for Energy Development in RNM until 2040 (2019)</li> <li>Strategy for Regional Development 2019–2029 (drafted, not yet adopted)</li> <li>Energy Efficiency Strategy and Energy Efficiency Action Plan</li> <li>Strategy on Renewable Energy Sources and Action Plan on Renewable Energy Sources</li> </ul>	North Macedonia has submitted its updated NDC with an enhanced target of 51% reduction compared with 1990. The country has been progressing on establishing its climate-change policy and legislative framework, partially due to the EU accession process.
Serbia	Reducing GHG emissions by 9.8% by 2030 compared with 1990 levels	80.8 (1990)	62.52 (2013)	Following a decrease in the early 1990s, Serbia's GHG emissions have slowly increased without a major change over recent years	<ul style="list-style-type: none"> <li>Low-Carbon Development Strategy of The Republic of Serbia with Action Plan (under preparation)</li> <li>Law on Climate Change (under preparation)</li> <li>Forest Law (2010)</li> </ul>	The latest reported GHG emissions are already below the baseline year emissions, and there has been no major increase in emissions trends. However, the limited data availability regarding the latest GHG inventories creates a bottleneck to track the progress of the country. Serbia has been developing its policy framework for climate change.
Turkey	Up to 21% reduction in GHG emissions from the BAU level by 2030	BAU scenario reduction target	506.8 (2019)	Turkey's GHG emissions have been continuously increasing since the mid-1990s, and they have more than doubled since then, except in 2018 and 2019	<ul style="list-style-type: none"> <li>National Climate Change Strategy (2010-2023)</li> <li>Turkey's National Climate Change Action Plan (2011–2023)</li> <li>Regulation on Monitoring GHG Emissions (2014)</li> <li>Energy Efficiency Action Plan 2017–2023</li> <li>Organic Agriculture Law (2004)</li> <li>By-Law on Chemical Fertilizer Control By-Law (2015)</li> <li>Climate Law (under development)</li> </ul>	Turkey's GHG emissions have been rising since the mid-1990s, without any significant decreasing trend over recent decades, except 2018 and 2019. The country's EU candidacy has paved the way for development of a legislative framework for GHG mitigation, and there are already some sectoral mitigation actions. But fossil-fuel dominance in the energy sector continues, despite increased interest in renewable power generation.

Source: Albania's First NDC; Bosnia and Herzegovina's First NDC; Montenegro's First NDC; North Macedonia's First NDC; Serbia's First NDC; Turkey's First NDC.

## 2.2. Progress made to achieve Nationally Determined Contribution goals for adaptation

The agricultural sector is a contributor to climate change, and it is also adversely impacted by it. Therefore, an integrated parallel approach should be undertaken that focuses, on one hand, on countries' implementation of policies to reduce GHG emissions and enhance carbon sinks, while on the other hand undertaking efforts to implement adaptation, aimed at reducing adverse impacts on agriculture and food security. The following sub-sections will include an analysis of the adaptation components of NDCs for countries in the ECA region, and progress on the adoption and alignment of policy frameworks.

Given the often limited sectoral relevant information in the NDCs, agriculture-relevant adaptation measures have been identified from National Communication reports to help provide an overview of those prioritised actions. These adaptation measures are clustered according to different types of interventions, including:

- Agroclimatic and disaster risk information systems – can help to better understand risks, and includes agroclimatic monitoring, disaster risk and vulnerability assessments, collection of agriculture damage, and data loss.
- Early warning systems – as part of information systems, early warning systems should provide localized, timely, relevant, reliable, and accurate multi-hazard alerts so as to help reduce the adverse impacts of climate-related hazards on lives and agricultural livelihoods.
- Climate and disaster risk governance – covers a wide area, including planning and decision-making processes, policies and strategies, inter-institutional alignment and coordination, partner capacity development and awareness-raising, financial resources allocations and investments.
- Risk transfer mechanisms (social protection and insurance) – can protect assets and livelihoods to help to better manage risks, and includes contingency funds, savings, loans and risk-sharing schemes (that is, grain reserves, warehouse receipt systems and revolving funds), and insurance (that is, crop insurance and weather index-based insurance).
- DRR/CCA (climate-change adaptation) agriculture good practices and technologies at farm level – aim to reduce the underlying risks and vulnerabilities. These good practices and technologies may increase yields, enhance diversification and decrease vulnerability against production failure due to the impact of climate variability and change.
- Nature-based solutions at territorial/ecosystems level – actions that help to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits (IUCN, 2019).
- Emergency preparedness, early action and response – aim to be better prepared for response to reduce adverse impacts of disasters, and includes contingency planning, and moving of supplies, people or livestock.
- Climate risk proofing of grey infrastructure – involves making agriculture-related infrastructure climate resilient against different hazards through addressing the physical vulnerabilities of these infrastructures, for example drainage and irrigation systems, seed storage facilities and animal shelters.

Countries should implement the various risk reduction and adaptation measures that are part of these different types of interventions, based on their country-specific characteristics and needs, which together will help to enhance their adaptation and resilience to climate variability and change in the agricultural sector (FAO, IFAD, UNICEF, WFP and WHO, 2018; AR2 and FAO, n.d.).

### CAUCASUS

All three Caucasus countries have indicated in their NDCs that adaptation is a priority for them, given their vulnerability to the adverse impacts of climate change, including drought and flooding. Armenia and Azerbaijan, in particular, are expected to experience very high levels of water stress by 2040, as described in section 1.2. Although the countries differ in terms of the development and implementation of their national and sectoral policy frameworks for adaptation, it is noteworthy that Georgia and Armenia have made significant progress.

## ARMENIA

Armenia has indicated in its NDC that it considers adaptation as a priority and that it adopts the ecosystem approach to adapt to climate change. Its agricultural sector, that contributes 11.7 percent to Armenian GDP, is recognised as vulnerable to the adverse impacts of climate change (World Bank, 2021).

In terms of its policy development for adaptation, in 2016 the country initiated a National Adaptation Plan (NAP) process with the approval of Government Decree 49-8 to “develop and submit to the Republic of Armenia Government’s approval of the concept of ecosystem approach to climate change adaptation, and National Adaptation Programme”. The ecosystem approach adapting to climate change is a basis for the development of the NAP 2021–2030, which is currently under development. The ecosystem approach to adaptation is linked to its national environmental policy, the Long-Term Strategy to 2050, and to the country’s development priorities (UNDP, 2017; Government of the Republic of Armenia, 2021). Its National Disaster Risk Management Strategy and Action Plan (2017) includes linkages between climate change and climate-related disasters and mentions agricultural insurance as one of its sectoral priority actions (Government of the Republic of Armenia, 2017).

The country has, among other initiatives, developed a Strategy of the Main Directions Ensuring Economic Development in Agricultural Sector of the Republic of Armenia for 2020–2030, which focuses on sustainable innovative, high value-added agriculture that is in harmony with the environment, including sustainable management of its natural resources, and organic agricultural production (Ministry of Economy of the Republic of Armenia, 2020a). The Strategy also includes an Action Plan for the implementation of the Strategy for 2020–2022, which outlines relevant DRR and CCA activities, such as the promotion of product and market diversification, and the introduction of risk-management measures ranging from hail protection systems to universal access to high-quality agricultural insurance for producers and the agro-industrial sector. The action plan also covers awareness-raising with respect to climate change, sectoral climate-change monitoring, and the promotion of climate-smart agricultural practices. It supports the dissemination of DRR/CCA inputs such as drought-resistant seeds, sustainable intensification of animal breeding through improved species, breeds, while also focusing on resource sustainability including good water and soil-management practices, and improved irrigation systems (Ministry of Economy of the Republic of Armenia, 2020b; Government of the Republic of Armenia, 2021). In addition, a National Forestry Programme (2021) aims to increase forest cover to 12.9 percent of Armenia’s territory by 2030 (Government of the Republic of Armenia, 2021). A Sustainable Development Strategy of the Republic of Armenia (Vision 2029) is also currently being developed (Hetq, 2019).

## AZERBAIJAN

Azerbaijan also considers adaptation a priority as mentioned in its NDC, but the agricultural sector is not indicated as vulnerable to the effects of anticipated climate changes. Having said that, the Action Plan on the Improvement of the Ecological Situation and Efficient Use of Natural Resources for 2015–2020 indicated the importance of developing a NAP, and Azerbaijan initiated this process in 2017. The NAP is still under development. Azerbaijan’s Ministry of Ecology and Natural Resources has identified, through stakeholder consultations, three priority sectors – namely agriculture, water, and coastal areas – for the implementation of specific CCA actions. The State Programme on the Social and Economic Development of Regions 2019–2023 aims to enhance achievements in the area of socioeconomic development, especially in regional and rural areas, and to ensure the implementation of a “strategic road map” that anticipates risks and enhances resilience to potential threats, thereby contributing to the SDGs and the Sendai Framework for DRR 2015–2030. In particular, it focuses on the protection of vulnerable people who depend on natural resources for their livelihoods and survival. Relevant activities included are the improvement of the hydrometeorological networks, reforestation, instalment of drip irrigation, identification of location and assessment of underground freshwater sources, and enhancement of people’s environmental awareness (Huseynov, 2020).

## GEORGIA

Georgia is the furthest progressed of the three Caucasus countries in terms of focusing on adaptation in its NDCs as well as in the development and implementation of national and sectoral climate-change adaptation policy instruments. Its Climate Change Strategy (2014) indicates the need to establish its national adaptation programme of action as well as to design and establish DRR strategies for arid areas together with local authorities and farmers. The Climate Change National Adaptation Plan for Georgia’s Agricultural Sector (2017) aims to assist farmers to build resilience to climate change, through the climate-proofing of productive infrastructure and production systems. It includes climate-change adaptation strategies for the Lentekhi region, the Autonomous Republic of Adjara, and the Kakheti and Upper Svaneti regions. The country also established a National Disaster Risk Reduction Strategy 2017–2020 and Action Plan (2017), which includes specific agriculture-related DRR measures, such as the development of an action plan for forest and valley fire risk reduction, training sessions on fire prevention and drought risk reduction measures,





Herd of sheep in Kotayk Province, Armenia



the dissemination of drought-risk information among farmers, enhancement of irrigation systems, and the use and application of agrometeorological information (Government of Georgia, 2017a; Government of Georgia, 2017b).

Georgia's National Climate Change Strategy 2030 and its Action Plan 2021–2023 primarily focuses on reducing GHG emissions, but for the agricultural sector its aim is to support the low-carbon development of the sector through encouraging climate-smart agricultural technologies and services. It encourages mitigation practices that have adaptation co-benefits, such as the replanting and rehabilitation of windbreaks to limit land degradation, regulation of irrigation practices, regulation of overgrazing and unsustainable use of soils, promotion of agroforestry, and the conservation of pasture biodiversity. The country has further developed a draft Rural and Agricultural Development Strategy 2021–2027 and draft action plan 2021–2023, which is currently in the process of being adopted. This new sectoral strategy focuses on rural and agricultural development in Georgia over the next seven years, and adaptation to climate change and the efficient use of natural resources are key elements in the document. The strategy and action plan have been developed with support from the EU, FAO, and UNDP (Ministry of Environmental Protection and Agriculture of Georgia, 2019a). Moreover, identified adaptation measures are mentioned in Georgia's updated NDC, which is to be adopted as part of its NAP. The relevant measures include the assessment and development of adaptive capacities for agricultural production (for example grape, hazelnut, tangerine, as well as unique domestic products such as Georgian honey, non-timber forest products); the assessment of climate-change impacts on coastal zones, mountain ecosystems, forests and water resources, and the introduction of relevant adaptation measures; promoting

**TABLE 12. Summary analysis of adaptation mainstreaming in NDCs of the Caucasus sub-region (Part 1)**

Country	Adaptation indicated as a priority in NDC	Adaptation pledge/aim	Agriculture included as vulnerable sector to impacts of climate change	Relevant agricultural adaptation measures included	Key policies	Summary analysis
Armenia (updated NDC)	Yes	The country mentions the importance of adaptation policies and measures, in particular for its vulnerable mountainous ecosystems that are already adversely impacted by climate change and reduced water availability. It considers the ecosystem based approach as the basis for the development of its national adaptation	Yes	Yes	<ul style="list-style-type: none"> <li>Strategy of the main directions ensuring economic development in agricultural sector for 2020–2030 (2020) and its Action plan for the implementation of the strategy for 2020–2022 (2020)</li> <li>National disaster risk management strategy and action plan (2017)</li> <li>National forestry programme (2021)</li> <li>Sustainable development strategy (Vision 2029, under development)</li> <li>National adaptation plan (under development)</li> </ul>	Armenia considers adaptation a key priority and initiated the development of its national adaptation plan in 2016. It has also identified specific DRR and CCA activities for its agricultural sector in its sectoral strategy and action plan for 2020–2030, e.g. the promotion of climate-smart agriculture practices. Its national adaptation plan and sustainable development strategy are being established.
Azerbaijan	Yes	The country is considering to develop relevant sectoral adaptation measures to decrease or minimise losses that may occur at national, local and community levels	X	Yes	<ul style="list-style-type: none"> <li>Action plan on the improvement of the ecological situation and efficient use of natural resources for 2015–2020 (2020)</li> <li>State programme on the social and economic development of regions 2019–2023 (2019)</li> <li>National adaptation plan (under development)</li> </ul>	Azerbaijan is advancing in its implementation of sectoral CCA actions, including for its agricultural sector within the context of relevant national action plan and programme. These are linked to the SDGs and Sendai Framework, e.g. aiming to enhance efficient and sustainable use of natural resources and building resilience to climate related hazards and climate change. Its national adaptation plan is still being developed.

Source: Armenia's First and updated NDC; Azerbaijan's First NDC; Georgia's First and updated NDC

**TABLE 12. Summary of adaptation analysis in NDCs of the Caucasus sub-region (Part 2)**

Country	Adaptation indicated as a priority in NDC	Adaptation pledge/aim	Agriculture included as vulnerable sector to impacts of climate change	Relevant agricultural adaptation measures included	Key policies	Summary analysis
Georgia (updated NDC)	Yes	The country will improve its preparedness and adaptive capacity by developing climate resilient practices that reduce vulnerability of highly exposed communities. In its updated NDC it further mentions it is committed to studying its adaptive capacity of particularly vulnerable sectors to the adverse impacts of climate change as well as to plan and implement identified adaptation measures	Yes	Yes	<ul style="list-style-type: none"> <li>Climate change strategy (2014)</li> <li>Climate change national adaptation plan for Georgia's agricultural sector (2017)</li> <li>National disaster risk reduction strategy 2017-2020 and action plan (2017)</li> <li>National climate change strategy 2030 and its action plan 2021–2023 (2021)</li> <li>Rural and agricultural development strategy 2021–2027 and draft action plan 2021–2023 (not yet adopted)</li> </ul>	Georgia is significantly progressed with regard to the formulation, adoption and implementation of relevant national adaptation strategies and plans, and also for the agricultural sector. Adaptation is mainstreamed as one of the key areas in its latest sectoral strategy and action plan that will guide its activities during the 2021–2027 period. In addition, it has recently adopted its national climate change strategy 2030 and its action plan for the 2021–2023 period.

Source: Armenia's First and updated NDC; Azerbaijan's First NDC; Georgia's First and updated NDC

biodiversity conservation with a focus on endemic, indigenous and endangered species that are highly important for food and agriculture, and implementing measures to reduce loss and damage caused by extreme weather events (Ministry of Environmental Protection and Agriculture of Georgia, 2021).

## AGRICULTURE-RELEVANT ADAPTATION MEASURES IN THE CAUCASUS

The NDC of Azerbaijan includes a few mitigation measures that also contribute to adaptation, such as the planting of new forest areas, water and land-protecting forest strips (windbreaks), as well as the enhancement of pasture management and agricultural lands, which will help to reduce the adverse impacts of natural hazards such as flooding, drought, and storms, on agriculture. In the NDC of Georgia, the following planned measures for agriculture are mentioned: research and development of agricultural emergency response plans for drought and flooding; introduction of innovative irrigation and water-management practices and technologies; application of anti-erosion measures; creation of information centres for farmers to provide guidance on adaptive agricultural management. Furthermore, in Georgia's updated NDC, additional adaptation actions were included, such as the assessment and development of adaptive capacities for the agricultural production of grapes, hazelnut, tangerine, Georgian honey, non-timber products, the assessment of climate-change impact on the available ground and surface-water resources for sustainable use in irrigation, research of the most vulnerable forest areas, support measures to reduce loss and damage caused by extreme weather events, and promote the conservation of endemic, protected, and indigenous species. Particular emphasis is put on Armenia's ecosystem-based approach to adaptation in its updated NDC. The country will focus on policies and mechanisms that will support the enhancement of biodiversity and ecosystem services, climate-resilient infrastructure, mitigation co-benefits and poverty reduction, which will be integrated into sectoral and sub-national activities to reduce Armenia's overall vulnerability to climate change. These measures were also included in the National Communication reports, as well as additional measures that are described in the following paragraphs.

The National Communication reports outline agriculture-relevant adaptation measures that can be clustered into five different types of interventions as shown in Figure 18. All countries included various DRR/CCA agriculture good practices and technologies for the crop sub-sector, such as practices to prevent the spread of plant diseases (Armenia), the cultivation of long-vegetation, heat/drought/salt-resistant crop species (Azerbaijan), and local production of disease-free and drought-resistant seeds (Georgia). Both Azerbaijan and Georgia prioritized the implementation of forestry-related adaptation measures, such as the establishment of forest windbreaks, rehabilitation of windbreaks (including the need for regulation of the legislative framework), forest restoration in flood-risk regions, and protection to restore degraded forests. Azerbaijan also included the need to apply forest-fire prevention measures. Armenia was the only country that incorporated measures for the livestock sector, such as the development of cattle-breeding – and specifically new breeds – that are better adapted, and the prevention of the spread of animal diseases.



Tyuleniy Archipelago in the Caspian Sea, Kazakhstan



**FIGURE 18. Relevant adaptation-related measures for the agricultural sector in the Caucasus sub-region**

	GEORGIA	AZERBAIJAN	ARMENIA
AGRO-CLIMATIC AND DISASTER RISK INFORMATION SYSTEMS	X		X
CLIMATE AND DISASTER RISK GOVERNANCE	X		
RISK TRANSFER MECHANISMS (SOCIAL PROTECTION AND INSURANCE)	X		X
DRR/CCA AGRICULTURE GOOD PRACTICES AND TECHNOLOGIES AT FARM LEVEL	X	X	X
CLIMATE RISK PROOFING OF GREY INFRASTRUCTURE	X	X	X

Sources: Republic of Armenia, 2020; Ministry of Ecology and Natural Resources, Republic of Azerbaijan, 2016; Ministry of Environment and Natural Resources Protection of Georgia, 2016.

Every country in the sub-region has prioritized irrigation and drainage systems, either rehabilitating existing ones or modernizing and establishing new systems, with Armenia specifically mentioning drip irrigation as well as its need to install new hail-protection stations and nets. Georgia has indicated the need to develop an effective insurance system, while Armenia seems a little more advanced in this area – it is planning to launch pilot crop insurance programmes, for which it established a state assistance programme in 2019. The importance of enhancing the forecasts of hydrometeorological hazards, and enhancing the network of agrometeorological stations and services, are both reiterated by Armenia and Georgia, with the latter adding that it aims to enhance the preciseness of parameters against agroclimatic zones and the provision of existing extension, service, and information consultation centres.

## CENTRAL ASIA

Countries in Central Asia are particularly at risk of flooding and drought, and have substantially degraded land (in particular Tajikistan), and all are expected to experience high to very high levels of water stress by 2040, which further reduces the capacity of their ecosystems to mitigate the adverse impacts of climate-related hazards, as outlined in section 1.2. Every country in the sub-region is focusing on adaptation to climate change as mentioned in its NDC, except for Kazakhstan. However, the countries are advancing in putting in place national adaptation policy instruments and are, to a certain extent, integrating adaptation in their relevant sectoral and sustainable development policies and strategies.

## KAZAKHSTAN

Despite the fact that Kazakhstan did not include adaptation in its NDC, the country already drafted in 2010 its National Concept on Adaptation to Climate Change. This document was developed with the assistance of the United Nations Development Programme (UNDP) and formulated to implement national adaptation measures and increase the country's resilience to climate change. However, it has yet to be adopted by the government (FAO, 2017b). The Strategy Kazakhstan 2050 (2012) mentions the need for the country to modernize the agricultural sector and to increase the amount of water for agriculture. Among other measures, it proposed a shift to the application of modern water-saving agricultural technologies within the context of efficient use of the country's water resources. The strategy recognises water as one of the country's most precious natural assets and the importance for the government to develop a long-term programme on water, which will ensure the supply of irrigation water until 2040 (Republic of Kazakhstan, n.d.). Kazakhstan's agricultural sector is highly vulnerable to the impacts of climate change, such as frequent drought and water shortages, which negatively affect its domestic production. In order to cope with this situation, the country is focusing on strategies to implement both climate-change mitigation and adaptation measures. The latter involves the implementation of specific programmes, for example, those that aim to combat desertification, ensure access to water, preserve forests, and encourage the sustainable use of biological diversity. Kazakhstan is currently developing its NAP.

## KYRGYZSTAN

Kyrgyzstan is progressing substantially in making adaptation to climate change a national priority, as indicated in its NDC, through the implementation of programmes focusing on reducing the vulnerability of the agricultural sector to climate change. For instance, in order to reduce the adverse impact of climate change on food security, in 2013 the country adopted the 'Priority directions for adaptation to climate change until 2017', which emphasised the promotion of drought and salt-resistant crops, pastoral livelihoods under climate-change conditions, enhanced irrigation and infrastructure, and strengthening of food-security monitoring and yield prediction systems. Moreover, the country approved and is currently implementing the Programme for the Adaptation of Agriculture and Water Management to Climate Change for 2016–2020. This programme focuses on the assessment of the vulnerability of agriculture and water management systems and the development and implementation of CCA measures in the agricultural and water sectors (MAFILR, 2016).

With regard to mainstreaming CCA into Kyrgyzstan's sustainable development planning process, it has approved the National Development Strategy of the Kyrgyz Republic for 2018–2040, which calls for the development of climate-change adaptation strategies to reduce its vulnerability and improve resilience. It provides a clear mandate to establish the NAP process and align it with the country's efforts to achieve its targets as per the SDGs (GKR, 2018a). Within this context, it is currently implementing the Development Programme of the Kyrgyz Republic for the period 2018–2022 "unity, trust, creation" (2018), which includes a specific section on the "environment, adaptation to climate change, and disaster risk reduction". This is inter-related with its strategic planning on economic development, poverty reduction, ecological sustainability of ecosystems, and sustainable development through elements of "green development, including the introduction of measures to adapt to climate change and reduce disaster risks that threaten the country's food security" (GKR, 2018b).

Furthermore, the Secretariat of the Green Climate Fund (GCF) has recently approved Kyrgyzstan's readiness proposal to develop a NAP, which has the objective to reduce vulnerability and build resilience to climate change by integrating adaptation across sectors and government levels (UNDP, 2020b). Moreover, the State Agency for Environment Protection and Forestry of the Kyrgyz Republic, in collaboration with ministries and departments, is also developing a Strategic Programme for the Adaptation to Climate Change, which will serve as a planning mechanism for climate investments in Kyrgyzstan. It will outline priority CCA areas for investment for specific economic sectors. The development of this programme is supported by international financial institutions, led by the European Bank for Reconstruction and Development, the Asian Development Bank, the World Bank, and the community of development partners in Kyrgyzstan (DPCC, 2020).

## TAJIKISTAN

Tajikistan is advancing rapidly in ensuring that adaptation is high on the country's policy agenda, and it considers the agricultural sector vulnerable to the impacts of climate change, as mentioned in its NDC. It has already established certain key documents that indicate CCA and DRR actions, thereby linking the Paris Agreement, Sendai Framework for DRR, and the SDGs. For instance, in 2016 Tajikistan developed its National Development Strategy for the period to 2030, which includes relevant CCA and DRR actions, such as integrated water resources management, protection of terrestrial ecosystems, and reduction of land degradation (Ministry of Economic Development and Trade of the Republic of Tajikistan, 2016). The country has adopted the National Strategy of the Republic of Tajikistan for Disaster Risk Reduction for 2019–2030, which is linked to Sendai, but also to the Paris Agreement and the 2030 Agenda for Sustainable Development. Climate change is mainstreamed in the DRR Strategy, as is agriculture, which is considered one of the priority sectors; while food security is one of the strategic objectives (Government of the Republic of Tajikistan, 2018a). Tajikistan has also established the National Strategy for Adaptation to Climate Change until 2030, where agriculture is also mentioned as one of the priority sectors since it risks being adversely impacted by climate change (Government of the Republic of Tajikistan, 2019). Tajikistan is currently developing its NAP.

## TURKMENISTAN

Turkmenistan is, like other countries in Central Asia, in the process of developing national adaptation plans and programmes in order to implement CCA measures, including for the agricultural sector, which it views as vulnerable to adverse effects of climate change as indicated in its NDC. It already developed its National Strategy on Climate Change in 2012, which has set its direction for mitigation and adaptation. It recognises agriculture as one of the sectors highly vulnerable to the impacts of climate change, and therefore proposes several CCA measures related to drought-resistant and salt-resistant crops, rotational pasture use, and the establishment of pasture protection belts. In addition, the National Programme for Social and Economic Development of Turkmenistan until 2030 focuses on prevention and mitigation of climate-change impacts, biodiversity and environmental protection, and institutional reforms through an integrated and multi-sectoral approach in socioeconomic policies linked to achieving sustainable development in line with





Kol-Tor lake, Kyrgyzstan



the implementation of the 17 SDGs (UN, 2019). Turkmenistan has also developed a National Economic Programme of Action on Adaption and Mitigation to Climate Change, which has yet to be approved. This programme has identified a series of climate-related objectives, which also include the promotion of long-term sectorial planning in government ministries, including for agriculture. The government views this programme as the basis for its NAP. It initiated its NAP development process in 2017 with support from UNDP (UNDP, 2016; UNDP, 2020c).

## UZBEKISTAN

Uzbekistan is advancing its policy development and implementation regarding climate-change adaptation, which is considered a priority, including for its agricultural sector, as it has indicated in its NDC. Some of the relevant policy instruments that the country has established include the Strategy for the Transition of the Republic of Uzbekistan to the Green Economy for the period 2019–2030. This document includes among its priority areas adaptation to the impacts

**TABLE 13. Summary of adaptation analysis in NDCs of the Central Asia sub-region** (Part 1)

Country	Adaptation indicated as a priority in NDC	Adaptation pledge/aim	Agriculture included as vulnerable sector to impacts of climate change	Relevant agricultural adaptation measures included	Key policies	Summary analysis
Kazakhstan	X	X	X	X	<ul style="list-style-type: none"> <li>National concept on adaptation to climate change (2010)</li> <li>Strategy Kazakhstan 2050 (2012)</li> <li>National adaptation plan (under development)</li> </ul>	Kazakhstan developed its national policy on adaptation as well as its development strategy until 2050, which include CCA activities for the agricultural sector, in particular regarding water-saving and the efficient use of water as a natural resource. The development of its NAP process has only recently been initiated.
Kyrgyzstan	Yes	The country views the implementation of adaptation actions as vital	Yes	X	<ul style="list-style-type: none"> <li>Priority directions for adaptation to climate change in the Kyrgyz Republic until 2017 (2013)</li> <li>Programme for the adaptation of agriculture and water management to climate change for 2016–2020 (2016)</li> <li>National development strategy for 2018–2040 (2018)</li> <li>Development programme for period 2018–2022 (2018)</li> <li>National adaptation plan (under development)</li> <li>Strategic programme for the adaptation to climate change (under development)</li> </ul>	Kyrgyzstan considers adaptation to climate change a priority and has put this high on its agenda by implementing programmes that focus on the promotion of CCA measures in agriculture as well as mainstreaming these into its development strategy. It is currently developing its key national adaptation plan and programme.
Tajikistan	Yes	The country views adaptation as a priority and mentioned that it prepared a list of adaptation measures in advance	Yes	Yes	<ul style="list-style-type: none"> <li>National strategy on climate change (2012)</li> <li>National programme for social and economic development until 2030 (2019)</li> <li>National economic programme of action on adaptation and mitigation to climate change (not yet adopted)</li> <li>National adaptation plan (under development)</li> </ul>	Turkmenistan was one of the first Central Asian countries, after Kazakhstan, to develop a national climate change strategy, which also encompassed adaptation. It is currently implementing a programme, where sectoral CCA and DRR measures are mainstreamed and linked to the SDGs. It is still in the process of establishing its national adaptation action plan and programme to further push forward the implementation of CCA.

Source: Kazakhstan's First NDC; Kyrgyzstan's First NDC; Tajikistan's First NDC; Turkmenistan's First NDC; Uzbekistan's First NDC



Aral Sea, Uzbekistan

**TABLE 13. Summary of adaptation analysis in NDCs of the Central Asia sub-region (Part 2)**

Country	Adaptation indicated as a priority in NDC	Adaptation pledge/aim	Agriculture included as vulnerable sector to impacts of climate change	Relevant agricultural adaptation measures included	Key policies	Summary analysis
Turkmenistan	Yes	The country views adaptation as a priority and mentioned that it prepared a list of adaptation measures in advance	Yes	Yes	<ul style="list-style-type: none"> <li>National strategy on climate change (2012)</li> <li>National programme for social and economic development until 2030 (2019)</li> <li>National economic programme of action on adaptation and mitigation to climate change (not yet adopted)</li> <li>National adaptation plan (under development)</li> </ul>	Turkmenistan was one of the first Central Asian countries, after Kazakhstan, to develop a national climate change strategy, which also encompassed adaptation. It is currently implementing a programme, where sectoral CCA and DRR measures are mainstreamed and linked to the SDGs. It is still in the process of establishing its national adaptation action plan and programme to further push forward the implementation of CCA.
Uzbekistan	Yes	The country considers adaptation a priority	Yes	Yes	<ul style="list-style-type: none"> <li>Development strategy for 2017–2021 and action strategy on five priority areas of development 2017–2021 (2017)</li> <li>Strategy for the transition to the green economy for 2019–2030 (2019)</li> <li>Strategy for the development of agriculture for 2020–2030 (under development)</li> <li>National adaptation plan (under development)</li> </ul>	Uzbekistan is advancing in the development and implementation of the relevant policy instruments for adaptation. It has integrated sectoral CCA measures in relevant national strategic development documents, although climate change is not identified as a strategic priority in its latest sectoral strategy that is still being prepared.

Source: Kazakhstan's First NDC; Kyrgyzstan's First NDC; Tajikistan's First NDC; Turkmenistan's First NDC; Uzbekistan's First NDC

of climate change as well as the increase in the efficient use and conservation of natural resources and ecosystems. Specific objectives are mentioned for agriculture, forestry, and water management, such as sustainable water resources and pasture management, local varieties and species resistant to drought and salinity and afforestation (LexUz on-line, 2020a). The need to expand research in new crop varieties and animal breeds that are resistant to disease and pests, and adapted to local soil-climatic and environmental conditions, is included in the Development Strategy of Uzbekistan for 2017–2021 and Action Strategy on five priority areas of development of the Republic of Uzbekistan in 2017–2021 (LexUz on-line, 2020b). However, climate change is not identified as one of the nine strategic priorities in the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020–2030 that is currently being drafted (Uzdaily, 2019). At the same time, since 2018, the country has submitted a readiness proposal to the GCF to initiate the development of its NAP, which is still under development.

## AGRICULTURE-RELEVANT ADAPTATION MEASURES IN THE NDCS IN CENTRAL ASIA

Only the NDCs of Tajikistan, Turkmenistan, and Uzbekistan contain some agriculture-relevant adaptation measures. For instance, Tajikistan and Turkmenistan included the climate risk proofing of agriculture-related infrastructure such as irrigation and water systems, and the monitoring and forecasting of water resources. Tajikistan and Uzbekistan have also included the promotion of crop varieties that are adapted to the conditions of a changing climate, with the latter also including the development of early-warning systems for hydrometeorological hazards and climate risk management. Most of these measures were also included in the National Communication reports, as well as the additional measures described in the following paragraphs.

The National Communication reports outline agriculture-relevant adaptation measures that can be clustered into seven types of interventions, as shown in Figure 19. Every country in the Central Asia region has prioritized adaptation measures in the crop sub-sector, such as the promotion of no-till farming, new and improved crop varieties that are drought-resistant and salt-tolerant, crop diversification, and programmes aimed at combating desertification and soil erosion, and supporting the optimal and sustainable use of land. Kyrgyzstan and Uzbekistan have both identified livestock measures, including sustainable pasture management, as well as new animal breeds, to ensure sustainability of cattle breeding and productivity under changing climatic conditions. Both



countries also outline forest adaptive measures such as afforestation and reforestation within the context of improving existing forestry management. The five countries also include activities to promote climate risk proofing of agricultural infrastructure, specifically the rehabilitation and modernization of irrigation systems (such as drips, sprinklers), and water-saving technologies. The upgrading of drainage systems was also included as a requirement by Uzbekistan.

Furthermore, the development of early warning and agrometeorological monitoring and forecasting systems is prioritized by Kyrgyzstan and Tajikistan, while Kazakhstan only focuses on the latter and Turkmenistan only on the former. In terms of climate and disaster-risk governance, Kazakhstan is planning to strengthen the capacities of its agricultural specialists, Tajikistan will introduce regulations and financial incentives to enhance land-use planning, retention of soil carbon and effective use of irrigation, while Kyrgyzstan is striving to enhance international cooperation for the adaptation of transboundary water basins. With regard to agricultural insurance, Tajikistan has included the development of an insurance system for the agricultural sector as a priority, while Kazakhstan is aiming to improve its existing crop insurance system.

**FIGURE 19. Relevant adaptation-related measures for the agricultural sector in the Central Asia sub-region**

	UZBEKISTAN	TURKMENISTAN	TAJIKISTAN	KYRGYZSTAN	KAZAKHSTAN
AGRO-CLIMATIC AND DISASTER RISK INFORMATION SYSTEMS		X		X	X
EARLY WARNING SYSTEMS		X	X	X	
CLIMATE AND DISASTER RISK GOVERNANCE			X	X	X
RISK TRANSFER MECHANISMS (SOCIAL PROTECTION AND INSURANCE)			X		X
DRR/CCA AGRICULTURE GOOD PRACTICES AND TECHNOLOGIES AT FARM LEVEL	X	X	X	X	X
CLIMATE RISK PROOFING OF GREY INFRASTRUCTURE	X	X	X	X	X
NATURE BASED SOLUTIONS AT TERRITORIAL/ECOSYSTEMS LEVEL	X	X		X	

Sources: Ministry of Environment and Water Protection of the Republic of Kazakhstan, 2013; Kyrgyz Republic, 2016; Government of the Republic of Tajikistan, 2014; Ministry of Nature Protection of Turkmenistan, 2015; Centre of Hydrometeorological Service (Uzhydromet), 2016.

## CIS

CIS countries are at risk of flooding and somewhat prone to drought. Republic of Moldova and Ukraine, in particular, are experiencing substantial land degradation, and the Russian Federation, Ukraine, and Republic of Moldova are expected to have high levels of water stress by 2040, as described in section 1.2. In the NDCs, adaptation is considered a priority complementary to mitigation, apart from the Russian Federation. However, all four countries are advancing on the development and implementation of national adaptation strategies and plans, as well as the mainstreaming of CCA in their national sectoral strategies and the initiation of programmes to implement adaptation measures in the agricultural sector.

## BELARUS

Belarus mentioned in its NDC its progress towards the development of a national and sectoral adaptation policy framework, and the establishment of a legislative and institutional basis for the integration of adaptation measures into its sector-specific and sustainable development programmes. In this regard, Belarus adopted, in 2016, the National Strategy of the Republic of Belarus for Sustainable Socioeconomic Development for the period until 2030, which is its policy in the area of environmental protection that links to climate change, particularly in terms of its effects on water resources. This strategy is complemented by the National Social and Economic Development Programme for 2016–2020, which also outlines policy with regard to climate change and adaptation to climate change. With regard to sectoral-relevant policies, the country developed its Strategy for Adaptation of

Agriculture to Climate Change in the Republic of Belarus (2017), in which various priorities for adaptation are outlined, including for example the introduction of water-saving technologies, the modernization of existing irrigation and drainage systems, enhancing research and innovation to tackle the impact of climate change on the sector, monitoring of climate change and extreme weather events, and strengthening the regulatory and institutional framework for adaptation (Zoi Environment Network, 2017). The State Programme for the Development of Agricultural Business in the Republic of Belarus for 2016–2020 focuses on the implementation of flood-protection measures, such as the construction of flood protection facilities with the aim to protect against the flooding of settlements and agricultural lands in the most flood-prone areas of the Polesky region. The document does include climate change, but the link between climate change and the expected increase in the frequency and severity of flooding in the future is lacking, as well as other agriculture-specific adaptation measures (Ministry of Agriculture and Food of the Republic of Belarus, 2016). In 2019, the country also developed its Strategy for the Adaptation of Forestry to Climate Change until 2050, and the National Implementation Plan for Adaptation in the Forestry Sector, which contain among other items climate impact monitoring on the state of forests, enhancement of technologies and methods for reforestation and afforestation, as well as the protection of forests with specific implementation timelines. It has also drafted its Water Strategy until 2030, which includes some adaptation measures, such as conducting assessments of risks and impacts, and strengthening climate monitoring, but it has not yet been adopted. Similarly, a NAP is currently under development in Belarus.

## REPUBLIC OF MOLDOVA

A specific and extensive section is included on adaptation in Republic of Moldova's NDC, which outlines its climate-change trends, impacts, and vulnerabilities, its mid-term adaptation vision, goal and targets, as well as its current and planned adaptation activities, including for the agricultural sector (see for more information in Section 2.5). Within this context, the country has developed several national and sectoral policy instruments for adaptation.

In 2014, Republic of Moldova adopted the Climate Change Adaptation Strategy until 2020 and the Action Plan on its implementation, which aims to serve as an umbrella strategy to create the enabling environment to mainstream climate-change adaptation and DRR and management into national adaptation plans and sectoral adaptation plans. As climate-change risks for agriculture are considered a priority, the Strategy addresses the risk of drought and water scarcity, pests and diseases, soil erosion, salinisation, and desertification. Among the activities implemented in the context of the Strategy, it is worth highlighting the establishment of early warning systems for climate-related hazards, assessment of risks for the crop, livestock, and forestry sub-sectors, and capacity-development training and awareness-raising on climate change for farmers (Government of the Republic of Moldova, 2014).

Other national strategies to enhance climate-change adaptation – in particular promoting climate-resilient agriculture with a focus on sustainable management of natural resources – include the National Strategy on Agriculture and Rural Development for the period 2014–2020, which identifies drought as one of the main natural hazards affecting agriculture. It also includes adaptation measures related to sustainable land and water management practices. The Programme for Conservation Agriculture (2015), the National Plan for the Implementation of the Programme for Increase of Soil Fertility for 2015–2020, and the National Environmental Strategy 2014–2023, also focus on actions to enhance soil quality and ecological reconstruction of degraded lands that are affected by landslides. This includes the implementation of farmland protection strips by applying sustainable land management practices, such as conservation agriculture. Its National Strategy of Natural Hazards Mitigation and Climate Change 2014–2020, as well as the National Development Strategy: Moldova 2030, link climate-change adaptation to reducing climate-related hazards, and include related measures for agriculture and related sectors.

The country has started its NAP process, with the first phase (NAP-1) implemented between 2013 and 2017. This focused on enhancing government capacities for medium to long-term adaptation and budgeting, with the overall objective to reduce the vulnerability of key sectors and the population to the adverse impacts of climate change. Guidelines for budgeting were developed under NAP-1; however, they were not implemented due to a lack of funding for training. At present, Republic of Moldova is in the second phase of the NAP development process (UNDP, 2018). Additionally, with the support of FAO serving as a delivery partner, the country has accessed resources from the GCF for the implementation of a sectoral adaptation planning process, enabling the agricultural sector to increase its adaptive capacity.

Republic of Moldova has updated its NDC report and submitted it to the UNFCCC on 4 March 2020. In its updated NDC, it outlines national priorities spanning cross-sectoral socioeconomic areas and sector-specific development in the agricultural, water resources, human health, forestry, energy, and transport sectors. It is the country in the ECA region with the most detailed adaptation perspective, including the country's CCA vision, goal, and agricultural investment priorities, which are outlined in Box 2.





Republic of Moldova

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### BOX 2: MOLDOVA CASE STUDY: ITS ADAPTATION VISION, GOAL, AND AGRICULTURAL INVESTMENT PRIORITIES

Republic of Moldova has updated its climate-change adaptation vision to integrate CCA into medium- and long-term development planning in order to increase the country's transition towards low-carbon and resilient development. It has expanded its CCA goal by integrating inclusive and sustainable social and economic development and ensuring gender sensitivity:

"The Republic of Moldova's medium and long-term adaptation goal is to reach a sustainable social and economic development resilient to the impact of climate change by establishing a strong enabling environment for a coherent and effective adaptive action with mitigation benefits, integrating climate risk into investment decision-making and business planning, while remaining socially inclusive and sensitive to the gender impacts of climate change" (Government of Republic of Moldova, 2020).

Climate change is expected to increase the frequency and severity of extreme weather events such as drought, forest fires, flooding, hail, wind, frost, and landslides, as well as the outbreak of plant and animal pests and diseases, while existing environmental issues, including water scarcity, soil degradation and pollution are worsening the impacts of these shocks and stresses on the Moldovan agricultural sector. It is estimated that current damage and losses in the agricultural sector are USD 34 million a year, with projections of USD 335 million a year by 2050. The medium-term investment needed to address the current agricultural productivity gap, and increase climate-change resilience, is estimated at USD 2.4 billion by 2040.

Agricultural investment priorities include the rehabilitation and modernization of centralized irrigation systems and drainage infrastructure, establishment of flood early warning systems, which can help to substantially increase current productivity and reduce future climate impacts. Other priority adaptation measures are small-scale on-farm irrigation systems, small-scale storage tanks, sustainable soil and crop management practices such as the application of conservation agriculture and the mixing of crops towards the cultivation of perennial crops (that is, grapes and fruit trees), the implementation of afforestation and reforestation, as well as the restoration of degraded forests and pasture lands, and raising public awareness and strengthening the population's capacity to respond in emergency situations (Government of Republic of Moldova, 2020).

emergency vaccinations and evacuations. The document makes a link between the increase in the frequency of natural and biological hazards, such as drought, flooding, wildfires, infectious and parasitic diseases, and climate change (Haclimate, 2020). Furthermore, the country has adopted the Strategy for Development of Agriculture and Fisheries through 2030, which outlines the key objectives and economic policy measures to facilitate positive structural changes in agriculture and rural development. It recognises natural hazards and climate change as key risks and challenges to the sector, and acknowledges the adverse impacts of COVID-19 on global food supply. However, the Strategy does not include any specific activities to address these issues (Ayala, 2020).

### UKRAINE

Ukraine has indicated in its NDC that it considers adaptation equally as important as mitigation. Adaptation to climate change and the reduction of climate-related risks are priorities in Ukraine's State Climate Policy Concept until 2030, and the Action Plan to Implement State Policy Concept until 2030. The aim of the concept is to improve state policy on climate change in order to achieve sustainable development in the country. The action plan includes the development and implementation of CCA activities and the strengthening of resilience to climate-related risks and natural hazard-induced disasters in the economic sectors, including agriculture and natural ecosystems (Cabinet of Ministers of Ukraine, 2016;

### RUSSIAN FEDERATION

The Russian Federation submitted its NDC in November 2020 and has included a specific section dedicated to adaptation. It indicates the increase in the frequency, intensity and duration of drought in some regions, extreme precipitation, flooding, waterlogging and forest fires as risks to agriculture, as well as the degradation of permafrost and the spread of infectious and parasitic diseases. Its Climate Doctrine was approved in December 2009 and defines the strategic goal of its national climate policy, with priorities including the safety and sustainable development of the country related to climate change and the implementation of proactive adaptation to the impacts of climate change (Government of the Russian Federation, 2020). In terms of the development and implementation of relevant policies, it has recently developed and adopted the National Action Plan for the First Phase of Adaptation to Climate Change for the period up to 2022. With this action plan, the government outlines various relevant DRR and CCA measures, such as the construction of dams and the promotion of more drought-resistant crops, as well as better preparedness and emergency response, such as

Cabinet of Ministers of Ukraine, 2017). The government is in the process of approving Ukraine's 2030 Climate Change Adaptation Strategy. Furthermore, its Ministry of Development of Economy, Trade and Agriculture has developed and is currently in the process of public consultations on the Adaptation Strategy of Agriculture, Forestry and Fishery of Ukraine until 2030, and other sectoral adaptation plans are also being developed. UNDP is supporting the government with the national adaptation planning and facilitating the development of a NAP. In its updated NDC, it states that by 2030 the country plans to establish a baseline for adaptation to climate change in order to increase resilience and reduce vulnerability to climate change (Government of Ukraine, 2021).

TABLE 14. Summary of adaptation analysis in NDCs of CIS countries

Country	Adaptation indicated as a priority in NDC	Adaptation pledge/aim	Agriculture included as vulnerable sector to impacts of climate change	Relevant agricultural adaptation measures included	Key policies	Summary analysis
Belarus	Yes	The country recognises the significant impact of climate change and mentions that it is developing and implementing national CCA strategies and sectoral programmes and plans	Yes	Yes	<ul style="list-style-type: none"> <li>National social and economic development programme until 2020 (2016)</li> <li>State programme for the development of agricultural business for 2016–2020 (2016)</li> <li>Strategy for adaptation of agriculture to climate change in the Republic of Belarus (2017)</li> <li>Strategy for the adaptation of forestry to climate change until 2050 (2019)</li> <li>National implementation plan for adaptation in the forestry sector (2019)</li> <li>Water strategy until 2030 (not yet adopted)</li> <li>National adaptation plan (under development)</li> </ul>	Belarus is making substantial progress in the formulation, adoption and implementation of its sectoral adaptation strategies and integrating adaptation into its national sustainable development programme. It is currently formulating its national adaptation plan.
Republic of Moldova	Yes	The country mentions that it is implementing its CCA strategy and action plan aimed at becoming resilient to climate change impacts	Yes		<ul style="list-style-type: none"> <li>Climate change adaptation strategy until 2020 and action plan on its implementation (2014)</li> <li>National strategy of natural hazards mitigation and climate change 2014–2020 (2014)</li> <li>National strategy on agriculture and rural development for 2014–2020 (2014)</li> <li>National environmental strategy 2014–2023 (2014)</li> <li>Program for conservation agriculture (2015)</li> <li>National plan for implementation of the program for increase of soil fertility for 2015–2020 (2015)</li> <li>National development strategy: Moldova 2030 (2019)</li> <li>National adaptation plan (under development)</li> </ul>	Moldova is significantly advanced in establishing specific national CCA strategies as well as for the agricultural sector and is implementing different plans and programmes. The linkages between CCA and DRR within the context of sustainable development is also covered by various strategy documents. Although its national adaptation plan is still being development, Moldova is in parallel working on sector-specific adaptation planning process for the agricultural sector.
Russian Federation	Yes	The country has indicated its belief in the importance of addressing climate change and ensuring sustainable development, and will focus on adaptation	Yes	X	<ul style="list-style-type: none"> <li>Climate doctrine (2009)</li> <li>National action plan for the first phase of adaptation to climate change for the period up to 2022 (2019)</li> <li>Strategy for development of agriculture and fisheries through 2030 (2020)</li> </ul>	Adaptation was not included in the NDC of the Russian Federation. However, the country has developed a national action plan for adaptation, where agriculture is considered a priority and specific DRR/CCA measures are outlined. Although climate change and natural hazard-induced disasters are recognised as adversely impacting its agricultural sector, specific measures to address these issues are absent in its sectoral strategy.
Ukraine	Yes	The country gives adaptation the same priority as mitigation activities	X	X	<ul style="list-style-type: none"> <li>State climate policy concept until 2030 (2016)</li> <li>Action plan to implement state policy concept until 2030 (2017)</li> <li>Ukraine's 2030 Climate Change Adaptation Strategy (not yet adopted)</li> <li>Adaptation Strategy of Agriculture, Forestry and Fishery of Ukraine until 2030 (not yet adopted)</li> <li>National Adaptation Plan (under development)</li> </ul>	In the past few years, Ukraine has put adaptation high on its agenda. The country has developed national and sectoral adaptation strategies and action plans, some are in the process of being adopted. These policy instruments prioritize adaptation to climate change and reduction of related risks for the agricultural sector.

Source: Belarus's First NDC; Republic of Moldova's First and updated NDC; Ukraine's First NDC; Russian Federation's First NDC



## AGRICULTURE-RELEVANT ADAPTATION MEASURES IN CIS COUNTRIES

Only the NDC of Belarus included the establishment of adaptation measures to monitor climate risks and to enhance information systems for the collection and dissemination of information, as well as strengthen emergency response taking into account the current and future risks related to climate change. The NDC of Republic of Moldova included, for instance, the development and implementation of crop, livestock, and forestry-related DRR and CCA good practices, climate risk proofing of irrigation and drainage systems, and establishment of early warning systems for natural hazards. These measures were also included in the National Communication reports, as well as additional measures that are described in the following paragraphs.

The National Communication reports outline agriculture-relevant adaptation measures that can be clustered into seven different types of interventions, as shown in Figure 20. All CIS countries included adaptation-relevant measures for the crop, livestock, and forestry sub-sectors in the National Communications, except for the Russian Federation, which only mentions those related to crops. In this sense, the countries included the need to expand the sowing of more drought-resistant and winter crops, as well as earlier sowing of spring crops, sustainable water and land management practices, and technologies that minimize surface evaporation and soil erosion. The rehabilitation and improved use of hayfields and cultivated pastures is a priority for Belarus and Republic of Moldova, while optimization of animal breeding and breed composition under changing climatic conditions is emphasised by Belarus and Ukraine. The planting of windbreaks, forest breaks, afforestation of degraded lands and forests is specified by Belarus, Republic of Moldova and Ukraine, with Belarus also focusing on the implementation of preventive measures to counteract the spread of insect pests. Belarus is the only country that focuses on the prevention and management of forest fires through forest thinning and timely thinning, establishment of fire-resistant areas and edges by planting mixed coniferous forest crops, and the restoration of water regime in peatlands to reduce fire risk. All four countries prioritized water-saving and irrigation infrastructure, with Ukraine also including the reconstruction of drainage systems.

**FIGURE 20. Relevant adaptation-related measures for the agricultural sector in the CIS sub-region**

	UKRAINE	RUSSIA	REPUBLIC OF MOLDOVA	BELARUS
AGRO-CLIMATIC AND DISASTER RISK INFORMATION SYSTEMS	X			X
EARLY WARNING SYSTEMS			X	
CLIMATE AND DISASTER RISK GOVERNANCE	X		X	X
RISK TRANSFER MECHANISMS (SOCIAL PROTECTION AND INSURANCE)	X			X
DRR/CCA AGRICULTURE GOOD PRACTICES AND TECHNOLOGIES AT FARM LEVEL	X	X	X	X
EMERGENCY PREPAREDNESS, EARLY ACTION AND RESPONSE			X	
CLIMATE RISK PROOFING OF GREY INFRASTRUCTURE	X	X	X	X
NATURE BASED SOLUTIONS AT TERRITORIAL/ECOSYSTEMS LEVEL	X		X	X

Sources: Ministry of Natural Resources and Environmental Protection of the Republic of Belarus, 2018; Ministry of Agriculture, Regional Development and Environment of the Republic of Moldova, 2018; Ministry of Natural Resources and Ecology of the Russian Federation, 2017; Ministry of Ecology and Natural Resources of Ukraine, 2013.

The monitoring of climatic changes, extreme weather events, as well as its impacts on forest and forest ecosystems, are included by Belarus and Ukraine, with the former also emphasising the need to assess surface and ground water levels and the condition of its soil. Belarus and Republic of Moldova mention inter-institutional strengthening and capacity development of government bodies on CCA, with the former also aiming to develop and implement a sectoral adaptation strategy and adaptation programme, create permanent inter-sectoral mechanisms, improve regulatory frameworks, and provide economic incentives to support adaptation in agriculture and raising government, private-sector and public awareness and disseminate information on various ways to adapt. Ukraine also makes a reference to the need to revise its forest management standards based on climate change-related forecasts. The introduction of risk insurance, specifically for the agricultural sector, is included by Belarus and Ukraine. Republic of Moldova is the only country that includes early warning systems as well as the aim to enhance emergency prevention and preparedness, including the establishment of training facilities, new emergency command centres in the north and south parts of the country as well as improve its emergency response capacities.

## EUROPEAN UNION AND EFTA REGIONS

There are different levels of risk to climate-related hazards in the European Union and EFTA regions, with countries in the central and eastern parts of the European Union generally more prone to flooding, and southern countries more susceptible to drought. In addition, some of these central, eastern and southern countries are also experiencing to varying degrees land degradation, which further reduces the capacity of the countries' ecosystems to mitigate the adverse impacts of climate-related hazards as outlined in section 1.2. Adaptation was not included in the NDCs of the European Union and EFTA countries.

### EU27+UK

The European Union has accelerated its efforts in climate-change adaptation since the adoption of its Adaptation Strategy in 2013. At present, the speed of adaptation action varies among countries, although in 2019, 25 European Union and three EFTA countries established national adaptation strategies, with 15 European Union and two EFTA countries also having national or sectoral adaptation plans in place. Bulgaria, Croatia, Latvia, and Iceland are still developing their national adaptation strategies, while Finland, Hungary, the Netherlands, Portugal, and Romania have already updated their national adaptation strategies. In the EFTA sub-region, only Iceland does not yet have a NAP or national/sectoral adaptation plan, as shown in Figure 21.

The European Union has established the Farm to Fork Strategy (2020), and Biodiversity Strategy for 2030 (2020), which are at the heart of the European Green Deal. The former aims to make food systems fair, healthy and environmentally friendly, while the latter aims to put Europe's biodiversity on a path to recovery by 2030 with benefits for people, the climate and the planet. In its updated NDC submission of December 2020, it highlights the Council of the European Union's emphasis on the importance of nature-based solutions in solving global challenges such as biodiversity loss and ecosystems degradation, poverty, hunger, health, water scarcity and drought, gender inequality, DRR and climate change (European Commission, 2020b). Moreover, in February 2021, the European Commission adopted the new and more ambitious EU Strategy on Adaptation to Climate Change as part of the European Green Deal. The new Strategy engages a holistic approach, ensuring that businesses, cities, and citizens are able to integrate climate change into their risk-management practices (European Commission, 2020a). The Strategy has four aims: to make adaptation smarter, swifter, and more systemic, as well as to enhance international action on CCA. It includes the need to ensure that adaptation actions are informed by robust data and risk-assessment tools, are based on more and better data on climate-related risks and losses, and are systemic, including the use of nature-based solutions for adaptation and local adaptation actions (European Commission, 2021). The Strategy will also aim to further mainstream and integrate climate adaptation in legislation and instruments of the European Union. Moreover, there is also a proposal for an EU Climate Law, which will provide a framework for progress in pursuit of the global adaptation goal established in Article 7 of the Paris Agreement; the adaptation strategy is designed to support the achievement of the objectives of the proposal.

### UNITED KINGDOM

The United Kingdom has submitted its Adaptation Communication to the UNFCCC in parallel with its NDC. The Adaptation Communication sets out the United Kingdom's domestic and international ambition and action on adaptation and resilience and provides a detailed list of adaptation priorities, strategies, policies, plan goals, and actions implemented at central level, as well as those measures advanced by decentralized governments.

The United Kingdom's legally binding Climate Change Act (2008) is the country's framework for the country to reduce its GHG emissions and build its adaptive capacity and strengthen resilience to climate risks. The country's National Adaptation Programme 2018–2023 includes a set of actions to address risks as identified in its 2017 climate-change risk assessment. In terms of agriculture, it aims to tackle risks related to flooding, drought, soil erosion (such as coastal erosion), and new and emerging plant and animal pests and diseases. It plans to achieve this through measures such as enhancing people's access to risk information, restoring natural processes within river systems to improve water storage capacity, incentivising appropriate soil-management practices, developing a sustainable fisheries policy, and preparing marine plans that include climate-change adaptation components. The last item has been done via the updating of the 2012 UK Marine Protection Strategy in 2019. In addition, Wales established the first Welsh National Marine Plan (2019) and a draft Marine Plan for Northern Ireland was published in 2018. Furthermore, in 2004 the Scottish government drafted a Scottish Biodiversity Strategy up to 2030 – which was updated in 2013 – and an Environment Strategy for Scotland: Vision and Outcomes (2020). Its goal is to focus on green recovery after the impact of COVID-19. A variety of measures to protect biodiversity, create green jobs, and transition to net zero is outlined in its 2020 Programme for Government 2020/2021. Wales has also adopted the Nature Recovery Action Plan – the Biodiversity Strategy and Action Plan (2015), the 2020 First Welsh National Peatland Action Programme 2020–2025, while last year Northern Ireland adopted an Environment Strategy (2020).

**FIGURE 21. Overview of national adaptation strategies and plans in the EU27+UK and EFTA sub-regions**

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
EU-28															
Austria															
Belgium															
Bulgaria															
Croatia															
Cyprus															
Czechia															
Denmark															
Estonia															
Finland															
France															
Germany															
Greece															
Hungary															
Ireland															
Italy															
Latvia															
Lithuania															
Luxembourg															
Malta															
Netherlands															
Poland															
Portugal															
Romania															
Slovakia															
Slovenia															
Spain															
Sweden															
United Kingdom															
EFTA															
Iceland															
Liechtenstein															
Norway															
Switzerland															

	National adaptation strategy and/or plan are being developed
	National adaptation strategy In place
	National adaptation strategy and national and/or sectoral adaptation plans in place
*	National adaptation strategy updated

Sources: European Commission, 2017; Climate ADAPT, 2020.





Aurora Borealis, Iceland

The United Kingdom has also submitted its Finance Biennial Communication in fulfilment of Article 9.5 of the Paris Agreement. In this context, the United Kingdom provides a detailed overview of its contribution to international climate-finance flows, including through the GCF and other climate-finance programming developed in partnership with developing countries. In its Finance Biennial Communication, the country pledged to delivering a total of GBP 11.6 billion over the next five years, seeking to drive transformational action to address climate change through a range of delivery channels across the following four themes:

- clean energy
- nature for climate and people
- resilience
- sustainable cities, infrastructure and transport.

While these are presented separately, the United Kingdom will ensure the necessary crossover and coherence between the themes. Integral to this is a strong focus on the adaptation, resilience, and mitigation co-benefits of working with and through nature – for example, in clean cities and green infrastructure.

## EFTA SUB-REGION

### ICELAND

Iceland's Climate Change Strategy (2007) is the country's long-term strategy for addressing climate-change issues. It emphasises the government's need to prepare for adaptation to climate change, including the importance of implementing measures in the agricultural and fisheries sectors (Ministry for the Environment, 2007). Its Climate Action Plan for 2018–2030 focuses primarily on the reduction of GHG emissions to meet its Paris Agreement targets for 2030 and achieve the government's aim to make Iceland carbon neutral by 2040. However, some of its mitigation measures in land use and forestry, such as reforestation, revegetation, and afforestation, also contribute to adaptation. Furthermore, it aims to combat soil erosion, revegetating denuded land, and restore and enhance biological diversity (Ministry for the Environment and Natural Resources, 2018a).

### LIECHTENSTEIN

Both adaptation and mitigation are components of Liechtenstein's National Climate Strategy that was passed in 2007 and which integrated sectoral policies, for example agriculture, forestry, environment, and energy. The country revised the Strategy in 2015 and emphasised the coordination of climate-relevant measures within its sectoral policies. Liechtenstein adopted its National Climate Change Adaptation Strategy in 2018, which focused on agriculture, forestry, biodiversity, water-resources management, natural hazards, energy, and land-use planning. The Strategy acknowledged the importance of reducing the impacts of drought, heat waves, flooding and the spread of new vector-borne diseases and alien invasive species (Office for Environment, 2018). Moreover, Liechtenstein has developed a National Forest Development Plan, which is periodically updated and takes into account future forest management. In addition, local forest service plans exist, and these are updated every ten years and include adaptation measures to reduce the adverse impacts of drought and wind storms, such as the selection of tree species that are able to resist or are tolerant to the expected conditions – for instance, the conversion of spruce and fir stocks into mixed broadleaved and coniferous forests (Government Principality of Liechtenstein, 2017).

### NORWAY

Norway has undertaken several actions within the context of adapting to climate change. Among other measures, it published a White Paper on Climate Change Adaptation in 2013, which outlines sectoral actions to be implemented at different governmental levels. It also developed a guidance document, 'Forestry roads and risk of landslides', in 2011, which describes the risk of landslides when constructing forestry roads in steep terrain, and entails risk-reduction measures to appropriately construct roads and drainage systems. In this regard, the regulations for the planning and construction of agricultural and forestry roads were revised in 2015. Moreover, in 2017, a White Paper on the 2030 Climate Strategy was adopted, which constitutes the Government of Norway's strategy to meet its climate commitments by 2030. Act No. 7 of 1994 'on the protection against natural damage' provides the terms and conditions for obtaining compensation for loss or damage that occurs as a result of natural hazard-induced disasters; it was amended in 2019. Similarly, the Natural Damage Insurance Act from 1989 and the Natural Hazards Compensation Act (No. 59 of 2014) were amended in 2018 and 2017, respectively (Norwegian Ministry of Climate and Environment, 2018).



Sunnmøre Alps, Bjørke, Norway



## SWITZERLAND

Switzerland adopted its National Adaptation Strategy to Climate Change in 2012, which prioritized the agricultural, forestry, and water sectors, as well as the management of its biodiversity and natural hazards. Moreover, it established the National Adaptation Plan 2014–2019, where the linkages between climate change adaptation and DRR are made explicit, including the inclusion of specific measures for the agricultural sector, such as analyses of risks, adoption of fire-fighting services, development of new and cost-effective agricultural drought insurance, and the promotion of soil and water management practices such as crop rotation, use of drought-resistant varieties, and livestock heat stress reduction measures. Switzerland also adopted its Climate Strategy for Agriculture in 2011, which provided guidance for the sector to reduce GHG emissions and adapt to a changing climate. In 2014, direct payments for conservative soil cultivation were introduced, and the regulation on erosion prevention was enhanced. In 2016, Switzerland has also revised its Forest Act, which includes Article 28a on 'precautionary measures against climate change', which is the first legal provision in a sectoral law that explicitly addresses the issue of adaptation to climate change (Swiss Confederation, 2018).

**TABLE 15. Summary of adaptation analysis in NDCs of the EU27+UK and EFTA countries** (Part 1)

Country	Adaptation indicated as a priority in NDC	Adaptation pledge/aim	Agriculture included as vulnerable sector to impacts of climate change	Relevant agricultural adaptation measures included	Key policies	Summary analysis
EU27 (updated NDC)	X	X	X	X	<ul style="list-style-type: none"> <li>EU adaptation strategy (2013)</li> <li>Farm to fork strategy (2020)</li> <li>EU biodiversity strategy for 2030 (2020)</li> <li>EU strategy on adaptation to climate change (2021)</li> </ul>	The EU has established the farm to fork and biodiversity for 2030 strategies (2020), which are at the heart of the European Green Deal. It also adopted in February 2021 a new adaptation strategy as part of the European Green Deal. At present, the majority of the countries in the EU have established national adaptation strategies and several also sectoral adaptation strategies.
UK (updated NDC)	Not in the NDC, although it is mentioned that the UK submitted its Adaptation Communication to the UNFCCC in parallel with its NDC	X	X	X	<ul style="list-style-type: none"> <li>UK Climate change act (2008)</li> <li>UK National adaptation programme 2018 to 2023 (2018)</li> <li>UK Marine protection strategy (2012; 2019)</li> <li>Scottish government: Climate change plan 2018–2032 (2018); Second Scottish climate change adaptation programme 2019–2024 (2019); Programme for government 2020/21 (2020); Environment strategy for Scotland: vision and outcomes (2020); Scottish biodiversity strategy up to 2030 (2004; 2013)</li> <li>First Welsh national marine plan (2019); nature recovery action plan – the biodiversity strategy and action plan for Wales (2015); first Welsh national peatland action programme 2020–2025 (2020)</li> <li>Draft marine plan for Northern Ireland (2018); Environment Strategy for Northern Ireland (2020)</li> </ul>	The UK's climate change act is the country's framework for both mitigation and adaptation, reducing GHG emissions as well as building adaptive capacity and strengthen its resilience to climate risks. Its national adaptation programme includes key actions related to flooding and coastal change risks to communities, businesses and infrastructure, including risks to agriculture, biodiversity, ecosystems, natural resources and the environment. The Scottish and Welsh governments have established a range of marine, biodiversity and environment plans, strategies and programmes.

Source: EU's First and updated NDC; UK's First NDC; Iceland's First NDC; Liechtenstein's First NDC; Norway's First NDC; Switzerland's First NDC

**TABLE 15. Summary of adaptation analysis in NDCs of the EU27+UK and EFTA countries** (Part 2)

Country	Adaptation indicated as a priority in NDC	Adaptation pledge/aim	Agriculture included as vulnerable sector to impacts of climate change	Relevant agricultural adaptation measures included	Key policies	Summary analysis
Iceland	X	X	X	X	<ul style="list-style-type: none"> <li>Climate change strategy (2007)</li> <li>Climate action plan for 2018–2030 (2018)</li> <li>National adaptation strategy (under development)</li> </ul>	Iceland has established its national climate change strategy and action plan, which include adaptation and measures for the agricultural, forestry, and fisheries sub-sectors. The country is still developing its national adaptation strategy.
Liechtenstein	X	X	X	X	<ul style="list-style-type: none"> <li>National climate strategy (2007 and revised in 2015)</li> <li>National climate change adaptation strategy (2018)</li> <li>National forest development plan (n.d.)</li> </ul>	Liechtenstein has established specific national adaptation strategies and a sectoral strategy, where specific agriculture-relevant adaptation measures are integrated.
Norway	X	X	X	X	<ul style="list-style-type: none"> <li>White paper on climate change adaptation (2013)</li> <li>White paper on the 2030 climate strategy (2017)</li> <li>Natural damage insurance act (1989 amended in 2018)</li> <li>Natural hazards compensation act (2014 amended in 2017)</li> <li>Act on protection against natural damage (1994 amended in 2019)</li> </ul>	Norway has established two white papers on climate change and climate-change adaptation, which include specific sectoral measures; it has recently amended various acts related to damage and compensation due to natural hazards.
Switzerland	X	X	X	X	<ul style="list-style-type: none"> <li>Climate strategy for agriculture (2011)</li> <li>National adaptation strategy to climate change (2012)</li> <li>National adaptation plan 2014–2019 (2014)</li> <li>Forest Act (2016)</li> </ul>	Switzerland had already developed its national and sectoral adaptation strategy in 2012 and 2011 respectively, and established its adaptation plan with specific measures for the agricultural sector.

Source: EU's First and updated NDC; UK's First NDC; Iceland's First NDC; Liechtenstein's First NDC; Norway's First NDC; Switzerland's First NDC

## AGRICULTURE-RELEVANT ADAPTATION MEASURES IN NATIONAL COMMUNICATIONS, EU27+UK AND EFTA

Countries in the EU27+UK and EFTA mainstreamed various agriculture-relevant adaptation measures in National Communications, which include seven different types of interventions, as shown in Figure 22. Specific adaptation measures were not included in the NDCs of European Union and EFTA countries, therefore additional analysis has been conducted by reviewing National Communication reports. All reports included crop-specific measures, such as the identification and selection of crop varieties that perform better under the expected future climatic conditions. The European Union, through its direct payments within the Common Agricultural Policy (CAP), is promoting the implementation of good agricultural and environmental condition practices. These practices aim to preserve landscape features and contribute to climate-change mitigation by reducing GHG emissions and increasing carbon sequestration in soil at the farm level – such as through the installation of buffer strips along water courses, retention of hedges, trees, and terraces, and the application of sustainable land-management practices to reduce soil erosion.

**FIGURE 22. Relevant adaptation-related measures for the agricultural sector in EU27+UK and EFTA countries**

	SWITZERLAND	NORWAY	LIECHTENSTEIN	ICELAND	EU27+UK
AGRO-CLIMATIC AND DISASTER RISK INFORMATION SYSTEMS	X	X	X		X
EARLY WARNING SYSTEMS			X		
CLIMATE AND DISASTER RISK GOVERNANCE	X	X	X		X
RISK TRANSFER MECHANISMS (SOCIAL PROTECTION AND INSURANCE)	X				X
DRR/CCA AGRICULTURE GOOD PRACTICES AND TECHNOLOGIES AT FARM LEVEL	X	X	X	X	X
EMERGENCY PREPAREDNESS, EARLY ACTION AND RESPONSE			X		
CLIMATE RISK PROOFING OF GREY INFRASTRUCTURE		X			X
NATURE BASED SOLUTIONS AT TERRITORIAL/ECOSYSTEMS LEVEL	X	X		X	X

Sources: European Commission, 2017; Ministry for the Environment and Natural Resources, 2018b; Government Principality of Liechtenstein, 2017; Swiss Confederation, 2018; Norwegian Ministry of Climate and Environment, 2018.

Liechtenstein, Norway, and Switzerland also included livestock-related adaptation measures, such as the selection of livestock breeds that are better adapted to future climatic conditions, supporting agricultural good practices that help to reduce abiotic and biotic stress in livestock, and increase conservation and use of animal genetic resources. Among the forestry-related adaptation measures mentioned in the National Communications were those that aim to select tree species suitable within the context of expected future conditions (for example, the conversion of spruce and fir stocks into mixed broadleaved and coniferous forests), and cultivate forest stocks that are better adapted to the expected climatic changes as outlined by Norway and Switzerland. The importance of appropriate and sufficient regeneration of forests and afforestation are mentioned by Switzerland and Iceland, respectively.

The European Union supports adaptation in vulnerable areas relevant to agriculture and natural-resources management, including the promotion of sustainable land and water management and combating desertification and forest fires in drought-prone areas. Both the European Union and Norway have prioritized the establishment of more resilient infrastructure, which in Norway's case includes investment in drainage systems for agriculture. Liechtenstein has prioritized the enhancement of its emergency planning in the case of flooding and forest fires, and aimed to develop early warning systems for plant diseases; it will continue to improve its early warning systems for flooding. Both the EU27+UK and Switzerland mentioned in their National Communication reports that they will promote insurance and other financial products, although Switzerland was more specific, indicating that it has developed an index-based insurance product – Grasland Pauschal KLIMA – for drought in grasslands.

## SEE

Countries in SEE are vulnerable to the impact of climate change and climate-related hazards, including flooding (particularly Serbia, and Bosnia and Herzegovina, and to a certain extent the other countries in the sub-region) and drought (especially Albania), while the countries also experience to a limited degree land degradation, and expect by 2040 to have high to very high levels of water scarcity (for instance in North Macedonia, Turkey, and Albania). Adaptation was not included in the NDCs of the countries.



## ALBANIA

Being among the most vulnerable countries in the Western Balkans, Albania has been giving increasing importance to climate-change adaptation in recent years, even though it has not yet included adaptation in its NDC. In 2014, the country adopted its Inter-Sectoral Strategy for Agriculture and Rural Development in Albania 2015–2020, which outlines several actions to reduce the impact of climate change, such as the rehabilitation of irrigation and flood-protection systems, practices to avoid soil erosion, and animal health-related measures. That same year, Albania established the Inter-Ministerial Working Group on Climate Change as a result of the NAP process, which started in 2015. This process is expected to deliver the National Strategy on Climate Change and two action plans – the NAP document, and the national mitigation plan.

In the context of the NDC enhancement process being conducted by Albania, adaptation targets for agriculture, forestry and coastal areas (including fisheries and aquaculture) will be included as key elements of the updated NDC document, which is expected to be submitted to the UNFCCC Secretariat in early 2021.

## BOSNIA AND HERZEGOVINA

The recognition of the importance of adaptation planning has led to the adoption of Bosnia and Herzegovina's Climate Change Adaptation and Low Emissions Development Strategy by the Council of Ministers of Bosnia and Herzegovina in 2013. This cross-sectoral strategy identified four interlinked priority areas: effective adaptation approaches; effective institutions and regulatory frameworks; knowledge generation, evidence, and dissemination; and adequate funding for adaptation. Planned outputs and activities include improved irrigation systems such as drip irrigation, water-management programmes, adoption of improved hail protection techniques, promotion of agricultural practices such as crop rotation, and changes in crop mixes (Council of Ministers of Bosnia and Herzegovina, 2013). The country's updated NDC states that the new Climate Change Adaptation and Low-Emission Development Strategy for the 2020–2030 period is currently being finalised. The aim of the Strategy is to enhance the resilience of the country to climate variability and change, thereby ensuring its economic progress (Ministry of Spatial Planning, Civil Engineering and Ecology of Republika Srpska and Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina, 2021). The Strategy for Agriculture and Rural Development of Bosnia and Herzegovina 2018–2021 and the Strategy of Agriculture for Federation of Bosnia and Herzegovina 2015–2020 both include linkages between CCA and DRR and outline several adaptation measures for the agricultural sector, such as supporting crop insurance schemes, the importance of assessing and monitoring climate-change impacts, improving agroclimatic monitoring and early warning systems to enhance preparedness for response, and promoting sustainable land and water management practices. In 2015, the country initiated medium- and long-term climate-change adaptation planning processes, and in 2016, the NAP process was officially launched. The NAP builds on the country's 2013 Climate Change Adaptation and Low Emission Development Strategy and is expected to be finalised in 2021.

## MONTENEGRO

Montenegro adopted the National Strategy for Climate Change until 2030 in 2015, which prioritized agriculture as one of the sectors impacted by climate change, and various climate-change adaptation measures were included – such as the adjustment of sowing and planting dates, crop relocation, improved land-management practices to control erosion, and protection of soil through planting trees. Its Strategy with the Development Plan of Forests and Forestry for the period 2014–2023 – National Forestry Strategy (2014) emphasises the role of the Montenegrin forests within the context of climate-change mitigation, and includes several measures to reduce forest-fire risks, such as enhancing institutional capacities to prevent and reduce forest fires, establishing and maintaining open areas within the forest, and investing in fire-fighting equipment, infrastructure, and training. The Water Management Strategy for the period 2016–2035 has as one of its goals to reduce the risk of flooding and its adverse impacts on the economy. The measures mentioned include coordinated protection against flooding, effective and continuous flood monitoring and forecasting, erosion protection, soil conservation, periodic maintenance and control of water courses and drainage systems. The preparation of the country's adaptation plan was mandated through the adoption of the Law on protection against climate change in 2019. The NAP, currently being developed, will include adaptation actions, as well as the financial evaluation of adaptation measures. The Government of Montenegro, together with UNDP and the GCF, initiated a project in 2021 called 'Enhancing Montenegro's capacity to integrate climate change risks into planning'. Under this project, adaptation measures have been identified for the agricultural sector, which is considered a priority for the country. The mitigation co-benefits of adaptation actions in the sector include the enhancement of carbon sinks through the increase in resilient tree varieties in areas exposed to forest fires, the development of micro-reservoirs, harvest storage and adjustments to food processing, and reduction of land degradation via green-belt barriers (Government of Montenegro, 2021).





Great European canyon, Tara River, Montenegro



## NORTH MACEDONIA

North Macedonia established its Climate Change Communication Strategy and Action Plan in 2013, which recognises the importance of awareness-raising on climate change among key cross-sectoral partners at national and local levels. The country has drafted a long-term Climate Change Strategy, which is currently going through a parliamentary adoption procedure. Its current National Strategy for Agriculture and Rural Development 2014–2020, in contrast to the Agriculture Strategy 2007–2013, views climate change as a threat and recognises the increased risk of extreme weather events for the sector. It also acknowledges the adverse impacts of climate-induced extreme weather events on agricultural sub-sectors such as crop, livestock, and forests. It envisages support measures for reducing vulnerabilities of smallholders, although not many measures are listed. It mainly mentions the need to enhance awareness and sustainable resource management, as well as pledging support for climate-change adaptation and mitigation. North Macedonia is currently in the process of formulating its NAP, which will focus on areas such as food, water, forestry, biodiversity, DRR, loss and damage. The NAP will include cross-sectoral and sector-specific adaptation actions and measures, and identify adaptation investment priorities based on a review of national and sectoral development policies and plans, and on the outcome of an extensive partner-consultation process. Moreover, the climate-change adaptation component will be part of the Disaster Risk Reduction Strategy that is being developed in line with the Sendai Framework (Republic of North Macedonia Ministry of Environment and Physical Planning, 2021).

## SERBIA

Serbia is advancing in the formulation, development, and implementation of its national and sectoral climate change-related strategies. It has developed, with support from the European Union, a National Climate Change Strategy, which has yet to be adopted. The National Sustainable Development Strategy of the Republic of Serbia and its Action plan for 2009–2017 has a specific section dedicated to climate change, including adaptation measures for the agricultural sector, such as the promotion of new crop varieties and livestock breeding that are better adapted to climate change, as well as relevant measures to enhance forecasting and early warning systems for extreme weather events, and the establishment of a climate database with regional and local projection data. Its Strategy of Agriculture and Rural Development 2014–2024 links climate change to the sustainable use and protection of natural resources. It includes risk reduction and adaptation activities, such as the promotion of insurance, integrated plant protection, agroforestry, integrated natural-resources management, and sustainable water management. Serbia's National Disaster Risk Management Programme 2016–2020 (and action plan) also prioritizes the agricultural sector and includes risk-reduction measures such as risk assessments for the agricultural, livestock, forestry, and water sectors that are consistent with international standards and directives of the European Union. It also includes flood and forest-fire risk maps, early warning systems for forest fires, and the strengthening of institutional preparedness and response capacities at all levels to help prevent, control, and manage forest fires in Serbia. The country is currently developing a new NAP through the GCF, which will include agricultural mitigation measures such as sustainable soil and forest-management practices, which also provide adaptation co-benefits by helping to reduce risks to flooding and forest fires (UNDP, 2020a).

## TURKEY

Among SEE countries, Turkey is relatively advanced in terms of establishing a range of national and sectoral climate change adaptation-related strategies and plans. Its National Climate Change Strategy 2010–2023 is its cross-sectoral mitigation and adaptation policy framework, with specific outcomes, objectives and actions outlined in its National Climate Change Action Plan 2011–2023 for various sectors including agriculture, forestry, food security, ecosystem services, biodiversity, and water. In addition, Turkey has a National Climate Change Adaptation Strategy and Action Plan, which also outlines various planned adaptation actions to be undertaken for the agricultural sector (Ministry of Environment and Urbanization, 2010; Ministry of Environment and Urbanization, 2011). In 2015, the country adopted the National Strategy and Action Plan to Combat Desertification 2015–2023, which includes various activities that support Turkey's forest areas – conducting research to monitor the climate-change impacts on forests and forest biodiversity, developing and implementing sustainable forest-management practices, as well as enhancing monitoring and early warning systems for forest fires. In 2018, Turkey adopted the Strategy of Fighting Agricultural Drought and Action Plan 2018–2022, which aims to strengthen institutional capacities to





Rose Valley, Cappadocia, Turkey



**TABLE 16. Summary of adaptation analysis in NDCs of SEE countries (Part 1)**

Country	Adaptation indicated as a priority in NDC	Adaptation pledge/aim	Agriculture included as vulnerable sector to impacts of climate change	Relevant agricultural adaptation measures included	Key policies	Summary analysis
Albania	X	X	X	X	<ul style="list-style-type: none"> <li>• Inter-sectoral strategy for agriculture and rural development in Albania 2015–2020 (2015)</li> <li>• National strategy on climate change and two action plans (under development)</li> <li>• National adaptation plan (under development)</li> </ul>	Albania is among the most vulnerable in the SEE sub-region to the impact of climate change. While the country does not have a climate-change strategy yet, it has mainstreamed climate change into its national agricultural strategy and is currently formulating a national adaptation plan and including adaptation targets for agriculture-related sub-sectors in the updated NDC.
Bosnia and Herzegovina (updated NDC)	Yes	The country included a section on climate change adaptation and indicated the importance to assess the impacts of climate change and identify priority adaptation measures (short, medium and long term)	Yes	X	<ul style="list-style-type: none"> <li>• Climate change adaptation and low emissions development strategy (2013)</li> <li>• Strategy for agriculture and rural development of Bosnia and Herzegovina 2018–2021 (2018)</li> <li>• Strategy of agriculture for Federation of Bosnia and Herzegovina for 2015–2020 (2015)</li> <li>• National adaptation plan (under development)</li> <li>• Climate change adaptation and low emissions development strategy for 2020–2030 period (being finalised)</li> </ul>	Bosnia and Herzegovina is moving forward in terms of its national adaptation planning and the establishment of its relevant policy instruments, including a national strategy that incorporates both adaptation and mitigation as well as the mainstreaming of adaptation and risk reduction in its sectoral strategies. Its NAP is being formulated.
Montenegro (updated NDC)	Yes	The country mentioned that adaptation actions will be included in the next NDC revision cycle; the national adaptation strategy and plans are being established	X	X	<ul style="list-style-type: none"> <li>• Strategy with the development of forests and forestry for 2014–2023 – National forestry strategy (2014)</li> <li>• National strategy for climate change until 2030 (2015)</li> <li>• Water management strategy for 2016–2035 (2016)</li> <li>• National adaptation plan (under development)</li> </ul>	Montenegro has prioritized agriculture as one of the sectors impacted by climate change and has integrated adaptation in its national strategy for climate change as well as the mainstreaming of adaptation and risk-reduction measures into its sectoral strategies and plans. Its national adaptation plan is still being prepared.
North Macedonia (updated NDC)	Yes	The country indicated that it is including adaptation component in the subsequent submissions, once the relevant national strategic and planning documents are prepared and adopted	X	X	<ul style="list-style-type: none"> <li>• Climate change communication strategy and action plan (2013)</li> <li>• National strategy for agriculture and rural development 2014–2020 (2014)</li> <li>• Climate change strategy (under development)</li> <li>• National adaptation plan (under development)</li> <li>• Long-term strategy on climate action (under development)</li> </ul>	North Macedonia has initiated the establishment of national and sectoral climate change related strategies and plans, adaptation, risk reduction and agriculture are mainstreamed. Its main climate change strategy, national adaptation plan and a long-term strategy on climate action are still under development.

Source: Albania's First NDC; Bosnia and Herzegovina's First and updated NDC; Montenegro's First and updated NDC; North Macedonia's First and updated NDC; Serbia's First NDC; Turkey's First NDC

**TABLE 16. Summary of adaptation analysis in NDCs of SEE countries** (Part 2)

Country	Adaptation indicated as a priority in NDC	Adaptation pledge/aim	Agriculture included as vulnerable sector to impacts of climate change	Relevant agricultural adaptation measures included	Key policies	Summary analysis
Serbia	X	X	Yes	X	<ul style="list-style-type: none"> <li>National climate change strategy (not yet adopted)</li> <li>National sustainable development strategy (2008) and action plan for the implementation of the national sustainable development strategy for period 2009–2017 (2009)</li> <li>Strategy of agriculture and rural development 2014–2024 (2014)</li> <li>National disaster risk management programme (2014) and action plan for the implementation of national disaster risk management programme 2016–2020 (2016)</li> <li>National adaptation plan (under development)</li> </ul>	Serbia has mainstreamed climate change adaptation into its sustainable development, agriculture strategies. It is currently implementing its DRR programme and action plan, which outline relevant activities for the agricultural sector. At present, it is formulating its national adaptation plan.
Turkey	X	X	X	Yes	<ul style="list-style-type: none"> <li>National climate change Strategy 2010–2023 (2010)</li> <li>National climate change action plan 2011–2023 (2011)</li> <li>National climate change adaptation strategy and action plan (2011)</li> <li>National strategy and action plan to combat desertification 2015–2023 (2015)</li> <li>Strategy of fighting agricultural drought and action plan 2018–2022 (2018)</li> </ul>	Turkey is substantially progressed in the establishment of national climate change and specific adaptation strategies and action plans. It also has incorporated adaptation and risk reduction measures for the agricultural sector in its relevant sectoral strategies and action plans, in particular to mitigate drought and soil erosion risks.

Source: Albania's First NDC; Bosnia and Herzegovina's First and updated NDC; Montenegro's First and updated NDC; North Macedonia's First and updated NDC; Serbia's First NDC; Turkey's First NDC

reduce the adverse impacts of drought in agriculture. The action plan outlines adaptation measures, such as studies on drought risk estimation, crisis management, provision of sustainable water supply and effective management of the agriculture water demand, and increasing awareness of all relevant partners (Ministry of Environment and Urbanization, 2018).

## AGRICULTURE-RELEVANT ADAPTATION MEASURES IN SEE COUNTRIES

In Turkey's NDC, several agriculture-relevant mitigation measures were included that also contribute to adaptation, such as the rehabilitation of grazing lands, the support to minimum tillage methods, and the prevention of land degradation, which all help to make agricultural lands more resilient to the adverse impacts of natural and climate-related hazards such as flooding, drought, and storms. It also included the implementation of an action plan on forestry rehabilitation, and a national afforestation campaign. Only Montenegro's updated NDC has agriculture-relevant mitigation measures that have co-benefits for adaptation, such as the enhancement of carbon sinks through increasing the use of resilient tree varieties in forest fire-prone areas, establishment of micro-reservoirs, harvest storage, and reduction of land degradation via green-belt barriers. The updated NDC of North Macedonia states that CCA will be integrated into its national DRR strategy, which is currently being developed in line with the Sendai Framework. This is highly important, given the strong linkages between CCA and DRR in the agricultural sector. Agriculture-specific adaptation measures are further described in the following paragraphs.



Countries in SEE outlined in their National Communications seven types of adaptation interventions, as shown in Figure 23. For instance, in the crop sub-sector, Albania, North Macedonia and Serbia mention the promotion of water-efficient, drought-tolerant crop varieties and adjustment (delaying or advancing) in sowing dates and depth. In addition, the application of water-harvesting techniques and practices such as inter-cropping, mulching, minimum tillage, crop rotation, and agroforestry are prioritized by Albania, North Macedonia, and Turkey. Some measures for the livestock sub-sector are included by Albania and North Macedonia, for example, the selection of heat-tolerant breeds, matching of stocking densities to forage production, rotational grazing, grassland rehabilitation and management, supplementary feeding, and vaccination of livestock. Albania and North Macedonia also included livestock-related facilities and infrastructure, with Albania stating that it will increase its livestock shelters, including through windbreak planting, and expand its water points for animals, and North Macedonia planning to ensure better housing conditions by adopting proper ventilation, in-house conditioning, and installation of cooling systems.

**FIGURE 23. Relevant adaptation-related measures for the agricultural sector in SEE sub-region**

	TURKEY	SERBIA	NORTH MACEDONIA	MONTENEGRO	BOSNIA AND HERZEGOVINA	ALBANIA
AGRO-CLIMATIC AND DISASTER RISK INFORMATION SYSTEMS	X	X	X	X	X	
EARLY WARNING SYSTEMS	X	X		X	X	
CLIMATE AND DISASTER RISK GOVERNANCE	X	X	X	X	X	
DRR/CCA AGRICULTURE GOOD PRACTICES AND TECHNOLOGIES AT FARM LEVEL	X	X	X	X	X	X
EMERGENCY PREPAREDNESS, EARLY ACTION AND RESPONSE	X			X		
CLIMATE RISK PROOFING OF GREY INFRASTRUCTURE	X	X	X	X	X	X
NATURE BASED SOLUTIONS AT TERRITORIAL/ECOSYSTEMS LEVEL	X	X	X		X	X

Sources: Ministry of Environment, 2016; Ministry of Foreign Trade and Economic Relations of B&H, RS Ministry of Spatial Planning, Civil Engineering and Ecology, Federal Ministry of Environment and Tourism and Development for Spatial Planning and Property Affairs of Brcko District, 2016; Ministry of Sustainable Development and Tourism, 2020; Ministry of Environment and Physical Planning, 2018; Ministry of Environment and Urbanization, 2018.

Every country, except for North Macedonia, prioritized forestry-relevant adaptation measures, such as the introduction of new technologies to control and manage pests, selection of tree species that have a high tolerance to altered climate conditions, and rehabilitation of degraded lands through afforestation and reforestation. These five countries also included forest fire management related measures, such as the construction and rehabilitation of fire protection roads, as well as adopting an integrated fire management approach. Every country in the sub-region, except Serbia, prioritized the development or improvement of water-saving irrigation and drainage systems. North Macedonia also specifically included drip and micro-spray irrigation technologies and the use of low-energy, precision application irrigation systems. Montenegro mentioned micro-reservoir development, wells, and larger reservoirs.

Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia, and Turkey aim to enhance their agroclimatic and disaster-risk information systems through strengthening their research on climate change and agriculture, particularly undertaking monitoring and conducting studies on drought, flooding, desertification, soil erosion, and sediment control. This will also include the strengthening of the network of hydrometeorological stations, as indicated by Montenegro. In terms of climate and disaster-risk governance, Bosnia and Herzegovina and Serbia mentioned that they will focus on providing training and capacity building for farmers on production technologies and farm-management options, and enhance capacities for agricultural research and advisory services. Serbia has indicated that it will establish early warning systems for agriculture, while Turkey will focus on a forest-fire early warning system. Bosnia and Herzegovina, and Montenegro, aim to strengthen and update their early warning systems for hydrometeorological hazards and extreme weather events such as drought, flooding, and hail. With regard to disaster preparedness and response, Montenegro signalled its intention to enhance its fire-risk preparedness, and Turkey its drought crisis management.

## 2.3. Linkages of Nationally Determined Contribution measures with Sustainable Development Goals and disaster risk reduction efforts

### 2.3.1. Nationally Determined Contribution–Sustainable Development Goal linkages

Climate change and sustainable development agendas constitute a natural framework for designing policies that can create and reinforce synergism. Climate-mitigation and adaptation actions in the agricultural sector can contribute to SDG targets, meaning that they may contribute to a transition from a less to more sustainable scenario in terms of economic, social, environmental, and governance dimensions.<sup>16</sup>

In order to assess the level of alignment between each climate action and SDG targets, a NDC–SDG matrix has been developed in the agricultural sector for each sub-region. The degree of alignment refers to the frequency of SDG target links per unique climate action, and does not reflect how much NDCs contribute in absolute terms to achieving a particular SDG or SDG target. The methodology has been developed by the FAO Office of Climate Change, Biodiversity and Environment.<sup>17</sup>

Figures below indicate the degree of convergence between climate actions in the agricultural sectors and SDGs in the Caucasus, Central Asia, CIS, and SEE. Besides the SDGs, some SDG targets are given more emphasis, which are also described below.

SDG linkages in the NDCs are closely related to the countries' indicated priorities within the context of climate change. Therefore, the linkages between SDGs and NDCs depend on their socioeconomic development and the national priorities of each country. Countries situated in the same geographical area may have similarities in terms of the strength of SDG linkages with NDCs, focusing on SDG1, SDG2, SDG8, SDG13, and SDG15. However, the sustainable development targets that are emphasised may vary from country to country.

### CAUCASUS

In Caucasus countries, the NDCs have the strongest linkages to climate action (SDG13) as the cross-cutting area, like in other ECA sub-regions. In particular, Target 13.2 on integrating climate change measures into national policies, strategies and planning, and Target 13.3 on education, awareness-raising and human and institutional capacity on climate change, have been more aligned with the NDC targets in every country in the sub-region.

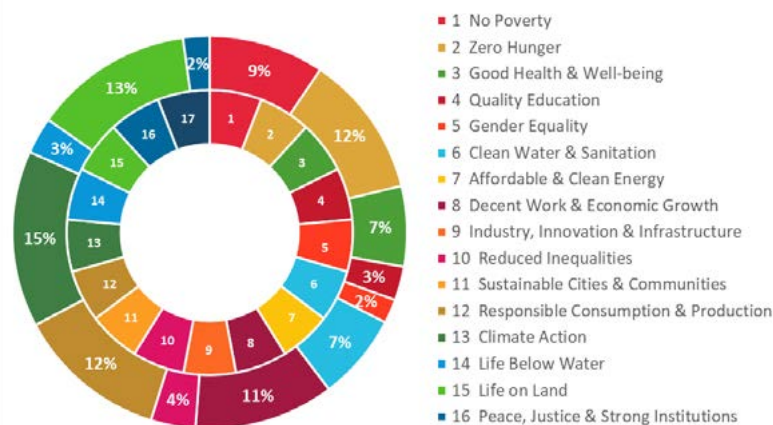
All of the countries' NDCs show a similar level of alignment with the targets under the same SDGs. Climate Action (SDG13) is closely followed by Life on Land (SDG15), mainly focusing on Target 15.3 regarding restoring degraded land and combating diversification, and Target 15.1 regarding conserving and restoring inland ecosystems in all countries of the region. The other SDGs that are linked with the Caucasus sub-region's NDCs are as follows:

- Zero Hunger (SDG2) focusing on Target 2.3 regarding agricultural productivity for small-scale food producers; and on Target 2.4 regarding ensuring sustainable food production systems and implementing resilient agricultural practices that increase productivity and production in all countries of the sub-region.
- Decent Work and Economic Growth (SDG8) focusing on Target 8.1 regarding sustaining economic growth; Target 8.2 regarding economic productivity through diversification, technological upgrading and innovation; and Target 8.4 regarding resource efficiency in consumption and production, and to decouple economic growth from environmental degradation in all countries of the sub-region.
- Responsible Consumption and Production (SDG12) focusing on Target 12.2 on efficient use of natural resources and on Target 12.8 on awareness for sustainable development and lifestyles in all countries of the sub-region.

16. It should be noted that the definition of agriculture under FAO terminology and the 2030 Agenda differs. Within the 2030 Agenda, "productive and sustainable agriculture" (target 2.4) refers to crops and livestock (FAO, 2017), while sustainable fisheries and aquaculture (target 14.7) and sustainable forestry (target 15.2) are associated with different SDGs. The definition of sustainable agriculture in the context of SDGs encompasses only a portion of FAO's vision for sustainable food and agriculture based on five principles applicable across five sectors: crops, livestock, forestry, aquaculture and fisheries.

17. The methodology was developed in parallel to a series of regional analyses of the role of the agricultural sectors in NDCs, led by the Climate and Environment Division of FAO. Under the leadership of Martial Bernoux and Julia Wolf, the methodological framework was prepared by Krystal Crumpler (CBC), Mario Bloise (CBC), Mirella Salvatore (CBC) and contributing author Alexandre Meybeck (CIFOR/FTA).

**FIGURE 24. Degree of convergence between climate actions in the agricultural sector and SDGs in the Caucasus**

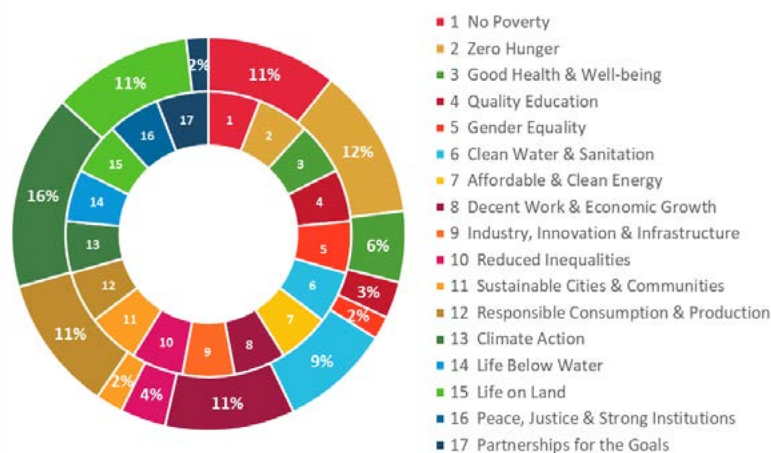


Source: FAO, 2018c

## CENTRAL ASIA

In the Central Asia sub-region, NDCs linkages with SDGs are dominated by Climate Action (SDG 13), where all targets are aligned with NDCs almost at the same level, and with significantly increased level of alignment in Kyrgyzstan, Uzbekistan, and Tajikistan. SDG 13 is followed by Zero Hunger (SDG 2), where countries have mainly given emphasis to Target 2.3 regarding agricultural productivity for small-scale food producers; and to Target 2.4 regarding ensuring sustainable agriculture systems for climate change.

**FIGURE 25. Degree of convergence between climate actions in the agricultural sector and SDGs in Central Asia**



Source: FAO, 2018c

The other SDGs that are linked with the NDCs are as follows, with Kyrgyzstan, Uzbekistan and Tajikistan's NDCs significantly more aligned in the following targets compared to other countries in the sub-region:

- No Poverty (SDG1) focusing on Target 1.4 regarding poor and vulnerable people to have equal rights to economic resources; and on Target 1.5 regarding building resilience of poor and vulnerable communities to climate-related extreme events and other economic, social and environmental shocks and disasters.
- Zero Hunger (SDG2) focusing on Target 2.3 regarding agricultural productivity for small-scale food producers; and on Target 2.4 regarding ensuring sustainable food production systems and implementing resilient agricultural practices that increase productivity and production.

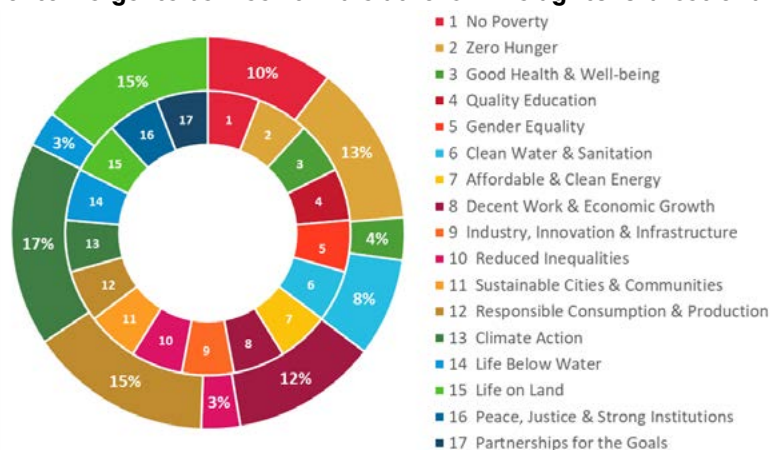


- Decent Work and Economic Growth (SDG8) focusing on Target 8.1 regarding sustaining economic growth; Target 8.2 regarding economic productivity through diversification, technological upgrading and innovation; and Target 8.4 regarding resource efficiency in consumption and production, and to decouple economic growth from environmental degradation.
- Responsible Consumption and Production (SDG12) focusing on Target 12.2 on efficient use of natural resources and on Target 12.8 on awareness for sustainable development and lifestyles. Central Asia

## CIS

In the CIS sub-region, the level of alignment of NDCs with the SDGs are relatively weaker compared to other sub-regions. The NDCs have the highest level of linkages to Climate Action (SDG13) as the cross-cutting area, like in other ECA sub-regions. In particular, Target 13.2 on integrating climate change measures into national policies, strategies and planning, and Target 13.3 on education, awareness-raising and human and institutional capacity on climate change, have been more aligned with the NDC targets in Republic of Moldova. The SDG13 is closely followed by Life on Land (SDG15), Responsible Consumption and Production (SDG12), and Zero Hunger (SDG2).

**FIGURE 26. Degree of convergence between climate actions in the agricultural sector and SDGs in CIS sub-region**



Source: FAO, 2018c

The other SDGs that are linked with the NDCs are as follows. In all targets, Republic of Moldova has a significantly higher level of alignment compared to other countries of the sub-region:

- In Zero Hunger (SDG2) all countries of the sub-region have relatively stronger linkages to Target 2.3 regarding agricultural productivity for small-scale food producers; and to Target 2.4 regarding ensuring sustainable food production systems and implementing resilient agricultural practices that increase productivity and production.
- In Responsible Consumption and Production (SDG12) all countries have stronger linkages to Target 12.2 on efficient use of natural resources and Target 12.8 on awareness for sustainable development and lifestyles.
- In Life on Land (SDG15) mainly focusing on Target 15.3 regarding restoring degraded land and combat diversification, Target 15.1 regarding conserving and restoring inland ecosystems in all countries of the sub-region, and Target 15.5 regarding stopping the loss of biodiversity in all countries of the sub-region.

## SEE

The NDCs of SEE countries have a similar focus in terms of the SDGs that are linked to NDC targets. In this sub-region, the emphasis is on Climate Action (SDG13), which particularly emphasises Target 13.2 on integrating climate change measures into national policies, strategies and planning, and on Target 13.3 on education, awareness-raising and human and institutional capacity on climate change, in countries like Albania, North Macedonia, and Turkey. Linkages to SDG13 are closely followed by:

- Zero Hunger (SDG2) focusing on Target 2.3 on agricultural productivity for small-scale food producers in Bosnia and Herzegovina, Serbia, and Turkey.
- Life on Land (SDG15) focusing on Target 15.3 on combating desertification, restore degraded land and soil in almost all SEE countries.
- Responsible Consumption and Production (SDG12) focusing on Target 12.2 on efficient use of natural resources and on Target 12.8 on awareness for sustainable development and lifestyles.
- Decent Work and Economic Growth (SDG8) focusing on Target 8.1 on sustaining economic growth, and on Target 8.2 regarding economic productivity through diversification, technological upgrading and innovation, especially in Bosnia and Herzegovina, Serbia, and Turkey, while in North Macedonia stronger linkages exist with Target 8.4 regarding promoting resource efficiency.

**FIGURE 27. Degree of convergence between climate actions in the agricultural sector and SDGs in SEE**



Source: FAO, 2018c

### 2.3.2. Nationally Determined Contribution–Disaster Risk Reduction linkages

Agriculture is highly climate-sensitive and the sector depends heavily on favourable weather and climate conditions. For generations, farmers, herders, foresters, and fishers, have adapted on the basis of climate variability and from their perspective, the occurrence of extreme weather events and climate change go hand-in-hand. Disaster Risk Reduction (DRR) and climate change adaptation (CCA) both aim to reduce risk and the underlying vulnerabilities to shocks and stresses. The overlaying nature of disaster and climate-change impacts on agriculture requires an integrated approach to increase the resilience of farmers and their communities. In this regard, the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030 provides an opportunity to enhance and strengthen coherence across climate and sustainable-development agendas.

The SFDRR aims to achieve, over the next 15 years, a significant reduction in disaster risk and losses in lives, livelihoods and economic, physical, social, cultural, and environmental assets of people, businesses, communities, and countries. It consists of the following four priorities for action:

- SFDRR priority for action I: understanding disaster risk;
- SFDRR priority for action II: strengthening disaster risk governance to manage disaster risk;
- SFDRR priority for action III: investing in disaster risk reduction for resilience;
- SFDRR priority for action IV: enhancing disaster preparedness for effective response and to 'build back better' in recovery, rehabilitation, and reconstruction.

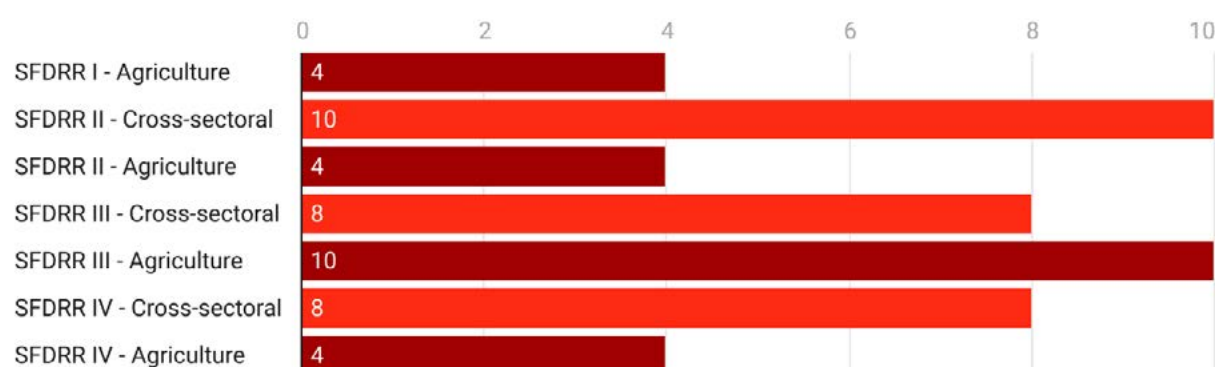
The SFDRR recognises climate change as a risk driver, as many disasters are exacerbated by climate change, which are expected to increase in frequency and intensity and substantially inhibit the progress of countries towards sustainable development. Convergence between DRR and CCA could therefore bring significant benefits to both the climate change and disaster agendas, as well as to the SDGs. This is particularly the case for the agricultural sector, in which the two streams are strongly inter-related

and complement one another, providing incentives to modify behaviours and practices over the medium to long term. As climate-related disasters become more frequent and intense, a major shift towards converging actions, including sector-specific DRR and CCA technologies and practices, would contribute to more productive and more resilient agriculture, and thus to more resilient livelihoods.

This section analyses the extent of alignment of adaptation priorities included in the NDCs that also contribute to the four priorities of action of the Sendai Framework. Thus, it helps to find entry points to ensure coherent DRR–CCA planning and implementation of relevant policies, plans, strategies, interventions, good practices, inter-institutional and cross-sectoral mechanisms, and pooled financial resources in the agricultural sector.

Overall in the ECA region, there are limited cross-sectoral adaptation measures included in the NDCs. An estimated 10 percent of the identified priorities mentioned in the NDCs in the ECA region are contributing to the implementation of the SFDRR priority for action II, followed by 8 percent that support the implementation of the SFDRR priorities for action III and IV. The integration of agriculture-related adaptation measures that contribute to the implementation of SFDRR III is the highest (10 percent), followed by those that equally support the SFDRR priorities for action I, II and IV. This data is based on 51 NDCs in the ECA region (including European Union countries), of which the European Union and EFTA countries did not include any adaptation priorities in their NDCs. Figure 28 provides an overview of the share of countries with cross-sectoral or agriculture-related adaptation priorities in the NDCs that contribute to the four Sendai Framework priorities for action.

**FIGURE 28. Share of ECA countries with cross-sectoral or agriculture-related adaptation priorities in NDCs contributing to the Sendai Framework, per SFDRR priority for action (%)**



Source: Analyses of NDCs.

### 2.3.2.1. SFDRR priority for action I: understanding disaster risk

When countries have a better understanding of their disaster risks in the agricultural sector, including risk drivers and underlying risk factors, it will help them to better design, plan, develop, implement, and monitor DRR and CCA interventions, as well as to ensure risk-informed agricultural development planning. SFDRR priority for action I emphasises the importance of addressing existing challenges to help to prepare for future ones, such as climate change, by focusing on monitoring, assessing, and understanding disaster risk and sharing and raising awareness about such information. Three of the 51 NDCs (6 percent) refer to cross-sectoral measures, and 4 percent (or two NDCs) of the countries included specific agriculture measures that contribute to the implementation of the SFDRR priority for action I.

In this regard, Tajikistan, Uzbekistan, and Republic of Moldova aim to enhance their climate change monitoring related systems, including the development of methodologies for the assessment of climate-change impacts, vulnerabilities, and risks. Tajikistan will specifically monitor its glaciers and water resources, including documenting runoff information within the context of global warming, as well as modernize its hydrometeorological services and disseminate knowledge and experience on climate change at various levels.



Moreover, Republic of Moldova also outlined its aim to further strengthen its national electronic databases and build its capacity to collect, monitor, and report hydrometeorological and climatological information and other data needed to assess climate risks and impacts, which will help to implement its national climate change adaptation policy. The country will also include CCA issues in its education curricula at all levels in order to raise awareness of people, in particular children and youth, and provide them with access to information on disaster and climate risks as well as appropriate emergency response and long-term adaptation options. For the agricultural sector in particular, it intends to improve the availability and applicability of modelling and technologies such as Geographic Information Systems (GIS), to help risk-informed development planning, and the implementation of adaptation options to be used by farmers. In Georgia's updated NDC, it has indicated that it will assess the impact of climate change on the available ground and surface-water resources for sustainable use in irrigation, and conduct research on the most vulnerable forest areas.

#### 2.3.2.2. SFDRR priority for action II: strengthening disaster risk governance to manage disaster risk

Governance to manage disaster risk and to adapt to climate change in agriculture requires a clear vision, plans, competence, guidance, and coordination within the sector as well as across other related sectors, such as water and energy, and the participation and collaboration of all relevant partners at all levels. About 10 percent (or five of the 51 NDCs) of the countries refer to measures that would strengthen governance mechanisms for CCA and 4 percent (or two NDCs) of the countries mention specific governance-related measures for the agricultural sector.

For instance, Georgia mentioned that in order to implement its adaptation options for the period 2021–2030, it will require the continuous development and strengthening of the country's capacities, in particular the capacity of its communities to reduce their vulnerabilities to the adverse impacts of future climate-related hazards. Uzbekistan, similarly, will also continue its efforts to enhance its adaptation capacity development to reduce risk of climate change and the adverse impacts on various sectors of the economy. Hence, these CCA-related activities can also help to strengthen national disaster risk management mechanisms.

Similarly, North Macedonia mentioned in its updated NDC that a CCA component will be included within its National DRR Strategy, which is currently being prepared and will be in line with the SFDRR. Tajikistan has developed and adopted various legal and regulatory instruments as well as national strategies and programmes in line with international frameworks, such as the National Strategy for Disaster Risk Management of the Republic of Tajikistan for 2009–2015, National Plan for Emergency Preparedness and Response of the Republic of Tajikistan, as well as other sectoral programmes, and has established relevant institutional structures. In its NDC, it mentioned its intention to ensure that climate resilience and adaptation measures are comprehensively integrated into the planning and development of infrastructure for the agricultural and water sectors, such as for irrigation systems. Armenia emphasised in its updated NDC the ecosystem-based adaptation approach as a basis for the development of its National Adaptation Plan 2021–2030, and the general aim of its NAP process to promote the reduction and management of climate risks. Its Agriculture Strategy 2020–2030 and its National Forestry Programme 2021 are mentioned with the aim to enhance carbon sinks through mitigation measures that also have co-benefits for adaptation.

Republic of Moldova also acknowledged in its NDC the importance of mainstreaming CCA in its sectoral policies and to ensure that information related to climate-related risks, vulnerabilities, risk reduction and adaptation options are integrated into its planning and decision-making in key sectors. It will develop and implement local adaptation action plans at community level. Moreover, it will strengthen its understanding of climate risks, assess its existing knowledge on CCA, evaluate policy and institutional implication of key hazards posed by climate change and variability and on this basis, adjust existing or develop new sectoral climate-resilient strategies and action plans, as well as further develop and establish institutional cooperation within the agricultural sector and across related sectors.

#### 2.3.2.3. SFDRR priority for action III: investing in DRR for resilience

Public and private investment in disaster risk reduction and climate-change adaptation through the implementation of structural and non-structural measures are essential to enhance the resilience of people, communities, and countries to the effects of climate change and variability. Farmers have for generations adapted on the basis of climate variability and some of the risk reduction measures available to help agricultural producers reduce risks of climate-related hazards can also be used for adapting to climate change and as such are the same. These DRR and CCA measures can be drivers of innovation, growth and job creation, which is especially important for those vulnerable people who are dependent on the agricultural sector for their food, income, and livelihoods. In this way, the implementation of CCA measures at farm level directly feed into the SFDRR and vice versa. Eight percent (or four of the 51 NDCs) of the countries included cross-sectoral measures, and 10 percent (or five NDCs) mentioned specific agricultural interventions.



High mountains of Adjara, Georgia

In its NDC, Georgia outlined various CCA and DRR measures related to the crop and forestry sub-sectors, such as the introduction of innovative irrigation and water-management techniques, and the establishment of information centres to help guide farmers with the application of adaptive practices. It also emphasises the importance of technology transfer regarding coastal protection, sustainable water, crop and forestry management. In the country's updated NDC, additional adaptation actions focused on the assessment and development of adaptive capacities for agricultural production of grapes, hazelnut, tangerine, Georgian honey, non-timber products, support measures to reduce loss and damage caused by extreme weather events, and the promotion of the conservation of endemic, protected and indigenous species.

Uzbekistan will aim to diversify its crop production pattern, focus on the conservation of germplasm and indigenous plant species, as well as the application and development of new crop varieties that are resistant to drought, pests and diseases. Moreover, it will improve its water management and saving practices and modernize its irrigation and drainage systems. In this way it will enhance its irrigated lands, which are adversely impacted by desertification, soil degradation, and drought, and increase the fertility of these irrigated and rain-fed areas. The updated NDC of Montenegro also included actions to prevent soil degradation through green-belt barriers, the development of micro-reservoirs, and the enhancement of carbon sinks through increasing the use of resilient tree varieties in forest fire-prone areas. In its updated NDC, Armenia includes adaptation measures such as increasing its forest cover, improved nitrogen fertilizer management, development of organic farming, sustainable intensification of animal breeding using improved species, and enhanced irrigation systems.

The updated NDCs of Republic of Moldova and North Macedonia include a range of adaptation and risk reduction measures for the agricultural, forestry, water, energy, and health sectors. Similarly, Uzbekistan aims to support agricultural research to develop crop varieties and animal breeds that are better adapted to changes in the growing season and are overall more resilient to new climate conditions. It will invest in irrigation, water recycling and storage-related technologies, establish integrated programmes that combine irrigation, fisheries and excess inland water management, as well as develop guidelines that promote good practices, in particular for non-irrigated agriculture. Moreover, it will promote agriculture insurance, especially for the crop sub-sector.

#### 2.3.2.4. SFDRR priority for action IV: enhancing disaster preparedness for effective response and to 'build back better' in recovery, rehabilitation and reconstruction

Climate change is expected to increase the frequency and severity of extreme weather events and thus increase the risks of disasters, including the increase of people's and assets' exposure. As a result, there is a need to further strengthen disaster preparedness for response, enhance early warning systems, undertake anticipatory action and integrate DRR ('build back better') in relief, recovery, and rehabilitation activities to ensure that capacities are in place for effective response, recovery, and rehabilitation at all levels in the agricultural sector. Around 8 percent (or four of the 51 NDCs) of the countries include cross-sectoral preparedness and response measures, while 4 percent (or two NDCs) mention agriculture-specific interventions.

For instance, Belarus mentioned in its NDC that it would establish mechanisms to enhance rapid response in emergency situations, taking into account current and future risks to climate change. Uzbekistan and Georgia aim to develop early warning systems for climate-related hazards within the context of climate risk management. Both Republic of Moldova and Georgia focus specifically on the agricultural sector, with Republic of Moldova striving to develop infrastructure and technologies to reduce the adverse impacts of extreme weather events on crops and the livelihoods of local communities. Georgia is planning to implement various measures including developing agricultural emergency response plans to reduce the risks of drought, flooding, and so on, and implement various site-specific anti-erosion measures.

As this section has outlined, several of the NDCs in the ECA region have cross-sectoral and agriculture-related adaptation measures prioritized. Some of these CCA measures can also contribute to the implementation of the SFDRR's four priorities for action. While DRR aims to enhance existing capacities to anticipate, resist, cope with and recover from the impact of climate-related hazards, CCA focuses on future risks and trying to address uncertainties and new risks. Addressing climate change, as one of the drivers of disaster risk, thus provides an opportunity to reduce disaster risks through the implementation of DRR and CCA measures. This is highly important in the agricultural sector, where farmers have for generations adapted on the basis of climate variability and where the implementation of DRR and CCA measures at farm level contribute to the implementation of the NDCs and the SFDRR.





A flock of sheep in Galichnik, North Macedonia





## PART 3

# CLIMATE FINANCE FLOWS

### KEY MESSAGES

- Middle-income countries of the Europe and Central Asia region, like in many other parts of the world, need international climate-finance support to reach their NDC goals. The Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report estimates the climate adaptation costs for developing countries to be around USD 70 billion to USD 100 billion per year between 2010 and 2050. UNEP's 2020 Adaptation Gap report suggests the need may be in the range of USD 140 billion to USD 300 billion by 2030, rising to USD 280 billion to USD 500 billion by 2050 (Puig *et al.*, 2016).
- Provision of financial resources from developed to middle-income countries is secured through both UNFCCC's Article 4 and the Paris Agreement's Article 9, where provision of climate finance to developing parties has been set as a requirement for developed parties.
- Countries in the ECA region can benefit from several international climate-finance mechanisms, such as the Adaptation Fund, Green Climate Fund, Global Environment Facility, Special Climate Change Fund, and Least Developed Countries Fund, which constitute the majority of the financial resources that channel global climate finance to countries that are most vulnerable to the impacts of climate change.

# 1. Climate finance flows

In the context of increased climate action, middle-income countries require financial support and other resources to fulfil their targets as defined in their NDCs, reducing their vulnerabilities to the impacts of climate change, while sustaining low-carbon economic growth.

## 3.1. Global framework of climate finance

The UNFCCC constitutes the foundational climate agreement that has provided the platform for subsequent international climate agreements, among them the Kyoto Protocol and the Paris Agreement. These include several mechanisms to finance the climate-change mitigation and adaptation efforts of developing countries. In accordance with the principle of “common but differentiated responsibility and respective capabilities” set out in the Convention, developed countries have agreed to provide financial resources to assist developing countries in implementing the objectives of the UNFCCC. The multilateral financing arrangements established under the UNFCCC are very important for leveraging larger amounts of capital needed to achieve the target of staying below 1.5 °C.

The provision of financial resources from developed to developing countries is secured through UNFCCC’s Article 4, which states that: “The developed country parties and other developed parties included in Annex II shall provide new and additional financial resources to meet the agreed full costs incurred by developing country parties in complying with their obligations.” Similarly, Article 9 of the Paris Agreement stipulates that developed country parties shall provide financial resources to assist developing country parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention. Other countries providing support are also encouraged to provide this information. Such projected information on future financial support is important to middle-income countries as it enables better planning and implementation of climate action.

In addition, Article 9 also states that the provision of scaled-up financial resources should aim to achieve a balance between adaptation and mitigation, taking into account country-driven strategies, and the priorities and needs of developing country parties.

In the context of global climate action and implementation of NDCs, the availability of financial resources to support urgent mitigation and adaptation measures is of great relevance to ensure the achievement of the overall objective of the UNFCCC. Indeed, according to the IPCC, estimates of the investment required to achieve the low-carbon transition – a range from USD 1.6 trillion to USD 3.8 trillion annually – will be needed between 2016 and 2050, for supply-side energy system investments alone (IPCC, 2018). However, the Global Commission on Adaptation (GCA, 2019) estimates adaptation costs of USD 180 billion annually from 2020 to 2030. Similarly, the IPCC’s Fifth Assessment Report includes estimated adaptation costs for developing countries of around USD 70 billion to USD 100 billion per year between 2010 and 2050; while the 2020 UNEP Adaptation Finance Gap report suggests that annual adaptation needs may be in the range of USD 140 billion to USD 300 billion by 2030, rising to between USD 280 billion and USD 500 billion by 2050 (Puig *et al.*, 2016).

As part of the commitments agreed at the Seventeenth Conference of the Parties (COP17) of the UNFCCC, a work programme on long-term finance was established to inform developed countries in their efforts to identify pathways for mobilising USD 100 billion per year by 2020, to enhance developing countries’ enabling environments and policy frameworks to facilitate the mobilization and effective deployment of climate finance in developing countries.

In this context, according to the ‘Global Landscape of Climate Finance 2019’ report developed by the Climate Policy Initiative, total climate finance at the global level has reached an annual average of USD 579 billion in 2017/18. This indicates a significant increase from an annual average of USD 365 billion for 2013/14; however, the report highlights that “while climate finance has reached record levels, action still falls far short of what is needed under a 1.5 °C scenario” (Climate Policy Initiative, 2019).

More concretely, in 2017/18 the average annual public climate finance totalled USD 253 billion, representing 44 percent of total commitments. On the other hand, private finance reached USD 326 billion, representing 56 percent of global climate finance on average annually. This is a clear indication that the resources flowing through private-sector channels outweigh public-sector resources in terms of the scale of finance provided. Nonetheless, public finance and public policy play an important role in leveraging and shaping private investments. Despite the significant increase in global climate-finance commitments over recent years as mentioned above, there is still a significant gap.

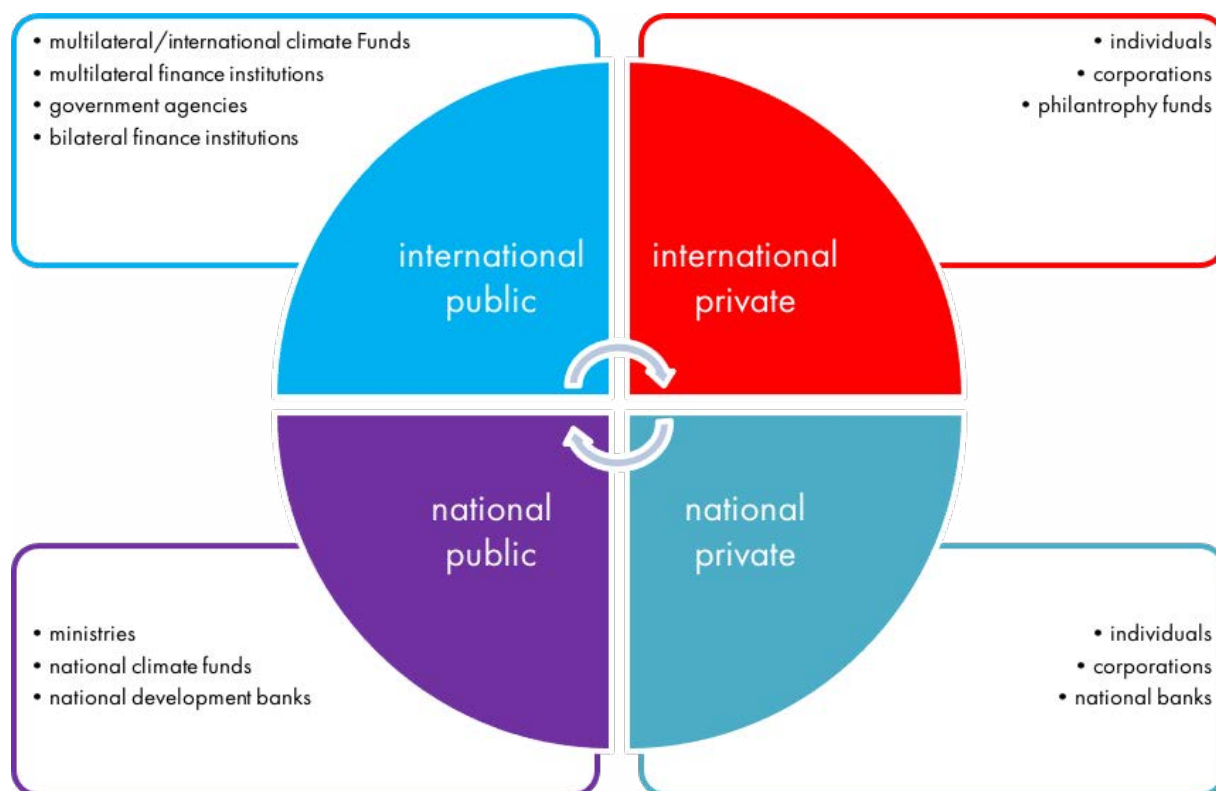


There are several definitions for climate investment and climate finance, but with no uniformly agreed version. In its broadest interpretation, climate finance refers to the flow of funds towards activities that reduce GHG emissions or help society adapt to climate-change impacts. The term “climate finance” is applied both to the financial resources devoted to addressing climate change globally, and to financial flows to developing countries to assist them in addressing climate change. Therefore, both international and national support for mitigation and adaptation activities are considered climate finance.

However, the term is most frequently used in the context of international climate-change negotiations, where climate finance (or international climate finance) is used to describe financial flows from developed to developing countries for climate-change mitigation and adaptation activities.

Climate-finance resources can originate from a wide variety of national, bilateral, and multilateral sources, both public and private, which represent a wide range of key partners and actors, as shown in Figure 29.

**FIGURE 29. Main climate-finance actors**



Source: adapted from Global Landscape of Climate Finance (CPI, 2019)

In order to clearly understand the different roles of the actors presented in the climate-finance system, a more detailed characterisation is provided in the following paragraphs.

**International public-sector climate finance** originates from either public sources or public intermediaries. Ministries and government agencies are examples of public sources. Public intermediaries make up the bulk of public-sector sources of climate finance, including climate funds and national development banks, multilateral development banks, and bilateral financial institutions – which collectively are called development financial institutions (DFIs).

Public finance can play a critical role in helping to ensure that the global costs of climate-change mitigation and adaptation are met.

However, public-sector funds alone are not sufficient to transform economies towards a low-carbon pathway. It is therefore important to use national budgetary resources to mobilise private-sector finance. Because of the high up-front costs or high risks, even for highly profitable mitigation and adaptation projects, supportive public financial incentives, together with stable regulatory frameworks, may be needed. A stable regulatory framework that can minimise investor risks for potential projects is often a prerequisite for the financial incentives to function effectively in the beneficiary countries.

Most international public climate finance provided to middle-income countries flows through bilateral and multilateral institutions, usually as concessional loans and grants. Over recent years, climate finance funds flow increasingly through bilateral channels, as well as through regional initiatives and channels.

Bilateral development agencies which are an important part of international climate finance operate under governments of individual countries and are often dedicated to advancing foreign policy goals while contributing to the economic and social development of recipient developing countries.

Bilateral development banks are created and directed by national governments for the purpose of providing aid or investing in targeted development projects and programmes in middle-income countries. These differ in mandate and purpose from development cooperation agencies, to the extent that they exist as banks, with a profit as well as a development objective.

Multilateral/International climate funds include financial flows reported by the dedicated climate funds administered by the operating entities of the Financial Mechanism of the Convention and the Kyoto Protocol, other multilateral climate funds, and multilateral development banks. In general terms, the existing international climate funds are managed or nested in multilateral financial institutions.

However, in addition to managing specific resources committed by provider countries, and receiving core capital contributions, multilateral climate funds are instrumental in catalysing investments from various multilateral and bilateral institutions, as well as from the private sector. The mandates and level of private-sector engagement of such funds vary considerably. For instance, the Clean Technology Fund, the Global Environment Facility (GEF), and Global Energy Efficiency and Renewable Energy Fund, have explicit mandates to mobilise private investment; the Green Climate Fund (GCF) has a separate private-sector facility; whereas other funds envisage private engagement only as part of a broader objective.

The climate finance of multilateral development banks refers to the amounts committed by them to finance climate-change mitigation and adaptation activities in developing economies and emerging economies in transition. This includes commitments from the banks' own accounts, and from external resources channelled through and managed by the banks. Projects are also sometimes co-financed by external resources alongside multilateral development banks. These may include entities from both the private (commercial) and public (non-commercial) sectors.

**National public climate finance** includes the increasing amount of finance for mitigation and adaptation projects allocated through national budgets, even when in some cases those expenditures are not labelled as such. State institutes, national finance institutions, private investors or individuals, can be the source of climate finance at the national level.

A growing number of recipient countries are also setting up national climate change funds that receive funding from multiple contributor countries in an effort to coordinate and align contributor interests with national priorities. National climate funds are financial mechanisms that allow countries to collect, blend, and manage all incoming revenue streams – both international and national – related to climate change into one, centralised fund. These funds contribute to building national capacity for the development and implementation of climate projects, and can benefit from sustainable, predictable and accessible financial and technical support. Challenges remain in meeting the criteria and requirements of resource providers in mobilising financial resources to replenish national climate funds.

The source of international and national private finance originates in savings of individuals and corporations (natural and legal entities), often managed, pooled and invested through intermediaries such as banks, portfolio management firms, or pension funds.

In this sense, private and public investors channel investments to low-carbon and climate-resilient projects via a wide variety of financial instruments available; the range of options also varies depending on the source of climate finance (private, public, specific climate fund) and the scope and objective of climate investment or initiative to be developed.

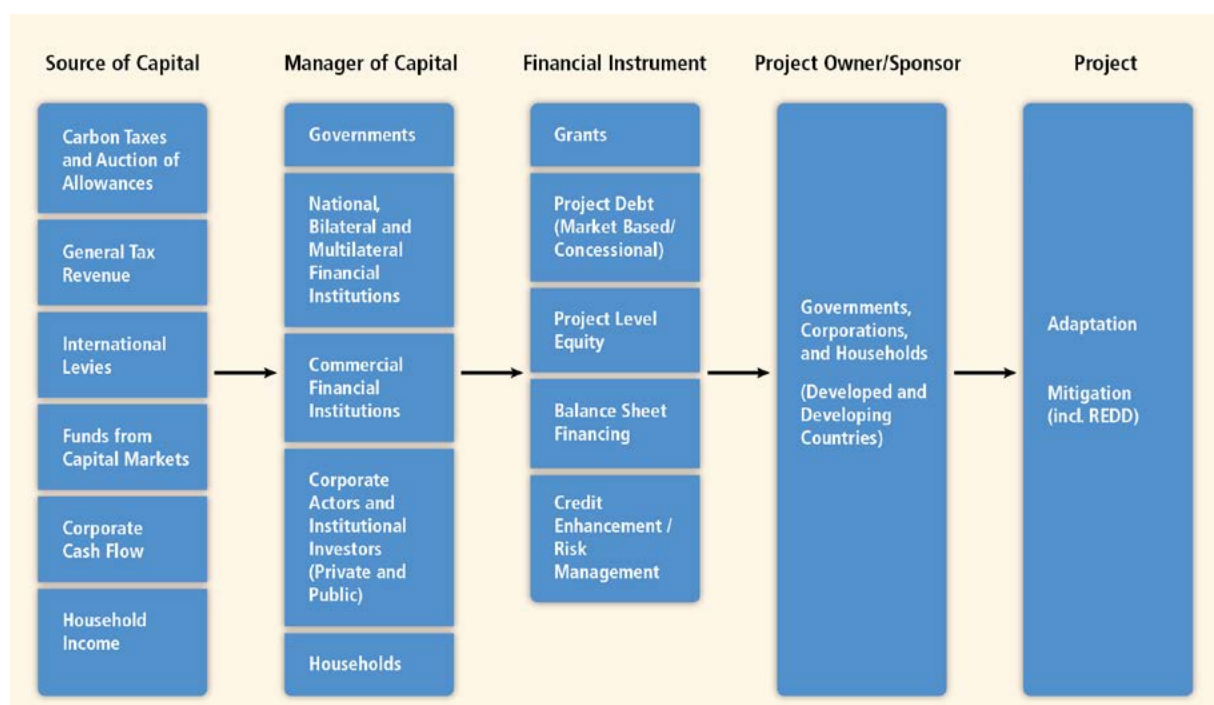
Instruments not only help to channel investments to low-carbon and climate-resilient projects, but serve as an important catalytic function for public climate-finance actors in mobilising climate finance and achieving climate investments at scale. There are various examples of instruments that can address investor-specific needs, align public and private interests, and enable scaled-up low-carbon and climate-resilient investments. National and international public actors can utilize these options to help increase the amount and impact of climate finance.

There are five major categories of instruments utilized in climate finance, including policy incentives, risk management, grants, low-cost debt, and capital instruments. Policy incentives include income-enhancing mechanisms, such as feed-in tariffs, tradeable certificates, tax incentives and clean-energy subsidies. Risk-management instruments include guarantees, insurance policies, and contract-based instruments.

A combination of one or more of financial instruments can be utilized to structure a climate investment initiative, through blending instruments. Blending allows the combination of different de-risking instruments (often including grants, guarantees, and insurance) to achieve a blended capital structure.

The provision of resources by DFIs can take the form of technical assistance, interest-rate subsidies, or direct investment grants to bring down the costs of projects that would not otherwise happen. Blending grants and loans at concessional terms from climate funds with DFI commercial financing has become a common practice in international climate finance. Figure 30 provides an overview of how climate finance resources flow globally from the capital flow and finance instruments point of view.

**FIGURE 30. Overview of climate finance flows**<sup>18</sup>



Source: IPCC, 2014b

18. Note: Capital should be understood to include all relevant financial flows. The size of the boxes is not related to the magnitude of the financial flow.



## 3.2. Climate finance needs and progress in the Europe and Central Asia region

As of today, six of the NDC submissions of countries in the ECA region have indicated their concrete quantified financial needs for climate-change mitigation and adaptation targets. Table 17 provides an overview of the financial needs of these countries for both mitigation and adaptation measures.

Table 17 indicates that the financial resources necessary for these five countries alone to reach their NDC targets range from USD 18.9 billion to USD 19.9 billion for mitigation and adaptation targets respectively. In this sense, it is noted that the numbers covering only the needs of those five countries already exceed the current climate finance available for the whole ECA region, evidencing the major gap in resource allocation. Resources need to be leveraged and scaled up, from domestic and international sources, to allow countries to fully comply with GHG emissions reductions and adaptation commitments. However, a comparison between this figure and the reported average climate-related development finance received by ECA countries in 2013 and 2014, which amounted USD 283 million, and the resources approved by multilateral climate funds in the same period totalling USD 1.8 billion, shows a significant gap in climate financing in the region. This gap needs to be reduced by leveraging and scaling up domestic and international resources, to allow ECA countries to fully comply with GHG emissions reduction and adaptation commitments.

In particular, the need for available resources to undertake urgent adaptation and mitigation measures has been a growing concern for developing countries, considering that the global trend shows availability of considerably more resources for mitigation than for adaptation. The ECA region follows the global trend with regard to the availability of resources for mitigation versus adaptation, with climate-related finance committed for mitigation projects prevailing the level of climate-related finance for adaptation while adaptation finance in the region in those same years accounted for only 11 percent of the committed.

This represents an important challenge for countries in the region as the impacts of climate change can cause a significant threat to the most vulnerable livelihoods. Moreover, adaptation projects can also address crucial economic development issues as co-benefits from projects focused on addressing climate change impacts. In this regard, it is important to highlight that some countries in the ECA region already have CCA targets included in their INDC/NDCs, which also signals the importance granted to these matters and the need for scaled-up climate financing.

The financial commitments of bilateral and multilateral development cooperation partners have been increasing for climate-related finance over the past decade in Central Asia, CIS, the Caucasus, and SEE, as well as in many other parts of the world. However, the available resources are still not considered sufficient, given the increased level of financial resources needed in order to reach NDC targets on mitigation and adaptation. In this context, total climate finance provided to the ECA region has been USD 10 billion and USD 18 billion for 2017 and 2018, respectively. This number constitutes a minor share when compared with total global climate finance of USD 579 billion that was committed in 2018 (Climate Policy Initiative, 2019).

Compared to other regions such as Africa and Asia-Pacific, ECA faces a systematic lack of financial resources. This is due to some extent to the fact that ECA countries are mostly categorised as middle-income countries, with very few exceptions, which limits their capacity to access climate finance, as the providers of resources focus their efforts on other regions.

According to the information reported in their respective NDCs, the following paragraphs provide information on the references to either financial needs or the use of market-based mechanisms to support the implementation of the mitigation and adaptation targets as indicated by countries.

**Albania** intends to sell carbon credits during the period until 2030 to contribute to cost effective implementation of the low emissions development pathway and its sustainable development. Albania foresees that the utilization of the international market mechanism is conditional on having effective accounting rules developed under the UNFCCC to ensure the environmental integrity of the mechanisms.

**Armenia** included information on the need to develop an appropriate legislative and institutional framework for adequate financial assistance. For this purpose, a targeted financial mechanism consisting of two components should be created to finance climate-change mitigation and adaptation projects: first, an internal (domestic) climate revolving civil fund, to be replenished on permanent base by allocations from environmental fees, ecosystem service fees, including "carbon taxing"; second, an external (international) financial mechanisms with resource provision following the principle of additionality, such as the GCF, the Adaptation Fund, the GEF, bilateral and multilateral funds, and other sources. The emerging financial mechanism will create realistic and operational grounds for the establishment and development of a reliable public-private

TABLE 17. Climate finance requirements as indicated in NDC

Country	Financial Needs for Mitigation USD Billion	Financial Needs for Adaptation USD Billion	Total USD Billion	Notes
Georgia	N/A	2.0	2.0	According to experts, estimated economic losses without adaptation measures during 2021–2030 will be about USD 10–12 billion, while adaptation measures will cost from USD 1.5–2 billion.
Kyrgyzstan	9.4	3.2	12.5	Resources required to reduce calculated losses: USD 1.9 billion. Reduced economic losses through domestic activities and international support: USD 1.2 billion. Expected GHG emissions reduction and resources required for mitigation to 2100: USD 2.1 billion Resources (required) cumulative: USD 1.9 billion; GHG reduction (annual): 7 403 Gg CO <sub>2</sub> eq (scenario 1)
North Macedonia	4.5	N/A	4.5	In the period 2015–2030, the additional investments (relative to BAU scenario) needed for realisation of the mitigation scenario are estimated at EUR 4.2 billion, while for the higher ambition mitigation scenario they are estimated at EUR 4.5 billion. It is further estimated that the investments that are required for the decarbonisation scenario are 7.7 percent of the country's total average annual GDP
Republic of Moldova	5 (until 2030)	4.2	9.2	Appropriate international financial support approximately equal to USD 4.9–5.1 billion, i.e. about USD 327 to USD 340 million per year until 2030, is needed
Turkmenistan	N/A	10.5	10.5	According to preliminary estimates, the cost for implementing planned adaptation measures will amount to USD 10.5 billion
Ukraine	N/A	N/A	EUR 102	It is estimated that the amount of capital investments until 2030 required for the implementation of the NDC is EUR 102 billion.

Source: NDCs of Georgia, Kyrgyzstan, North Macedonia, Republic of Moldova, Turkmenistan, and Ukraine, from UNFCCC NDC Registry.

partnership; and ensure the right of future generations to use climate resources. In its updated NDC, it is mentioned that the financing needs assessment is part of the National Implementation Plan for 2021–2030 that is currently under development.

**Belarus** provided information on the support the country provides for developing countries, mainly in the area of awareness-raising, education, capacity development, and in the area of research and development relating to climate-change issues.

**Bosnia and Herzegovina** also introduced a reference in its NDC on enhanced GHG emissions reduction efforts provided that the country has the opportunity to access international support or development financial mechanisms. It also highlighted that a number of activities and projects resulting in mitigation effects have been initiated, or there are clear intentions to implement them. These project activities assume that the intended emissions reduction contribution depends on potential access to international development and financial mechanisms (GEF, GCF, European Union pre-accession funds, favourable loans from financial institutions). In its updated NDC, it reiterates the need for international support for the establishment of financial mechanisms to promote decarbonisation, preparation of required research and project documentation and project financing itself, and also assistance for capacity development, training, and technology transfer.

According to the National Communications of **Georgia** to the UNFCCC, the cost of the coastline adaptation programme is estimated at USD 600 million. In the absence of adaptation measures, the estimated losses only in the tourism sector will reach about USD 2 billion by 2030. Due to the very high social costs involved, priority will be given to the integrated coastal planning and management instruments, rather than investments in coastal erosion abatement only. Without international support, Georgia

is unable to cope with the adverse effects of climate change. According to an expert judgment, estimated economic losses without adaptation measures during 2021–2030 will be about USD 10 billion to USD 12 billion, while adaptation measures will cost from USD 1.5 billion to USD 2 billion.

**Kazakhstan** refers to the need for additional international investments, access to a low-carbon technologies transfer mechanism, the GCF, and a flexible mechanism for the country which has an economy in transition.

**Kyrgyzstan**, in its NDC, refers to sector losses related to climate change amounting to a total of Million USD 1 230.8 million for the water resources, agricultural, energy, emergencies, healthcare, forestry, and biodiversity sectors (Kyrgyz Republic, 2020).

**Montenegro** intends to sell carbon credits during the period to contribute towards achieving its emissions reduction objectives, as assistance to cost-effective implementation of the low emissions development pathway. Montenegro foresees that the utilization of international market mechanisms is conditional on having effective accounting rules developed under the UNFCCC to ensure the environmental integrity of the mechanisms. In its updated NDC, the country mentioned that in 2021 its government initiated a project 'Enhancing Montenegro's capacity to integrate climate change risks into planning'. This project is being undertaken in cooperation with UNDP and the GCF, with the aim to enhance the evidence base for effective decision-making through assessing climate risks and identifying appropriate measures – investments, projects and programmes, including establishing a resource mobilisation strategy.

**North Macedonia** highlighted in its NDC financial resources needed for the mitigation scenario are estimated at EUR 4.2 billion for 2015–2030; while the higher ambition mitigation scenario is likely to cost EUR 4.5 billion. The implementation of national mitigation policies and measures will depend on national investments, and also on the involvement of the private sector (national and international), as well as on the access to new sources of finance and enhanced international support to be mobilised through new climate-finance mechanisms such as the GCF. In the country's updated NDC, it is mentioned that regarding mitigation actions, the private sector participates with 85 percent in total investments needed for the realisation of the policies and measures in the manufacturing sector. At present, 110 private companies have invested, mainly in solar and small water power. Moreover, it is estimated that the investments that are required for the decarbonisation scenario are 7.7 percent of the country's total average annual GDP. Besides domestic investments, international support from international funds, donors, and banks is needed to support the country's transition towards a low-carbon economy (Republic of Macedonia – Ministry of Environment and Physical Planning, 2021).

According to **Republic of Moldova's** updated NDC, in order to reach the conditional target of up to 88 percent reduction of its GHG emissions by 2030, international financial support equal to about USD 5 billion (cumulative), or about USD 500 million per year until 2030 will be needed. The support needed includes finance, in addition to domestic allocations, to cover required abatement costs, as well as assistance in the form of technology transfer and capacity development.

Domestic financing can be secured both from the state budget and from other financial mechanisms (special funds like the National Ecological Fund, National Fund for Regional Development, and so on). They will be important tools for directing the domestic monetary flows in environmental investments, and a means of strengthening the external and domestic financing. Foreign assistance and investments is envisaged to play the most important role in promoting climate-change actions in all economic sectors and in catalysing the specific investments that will be needed to ensure CCA in Republic of Moldova. In this sense, the Moldovan NDC clearly states that the reduction commitment could increase to a 78 percent reduction below 1990 levels conditional on a global agreement addressing important topics, including access to low-cost financial resources, technology transfer, and technical cooperation commensurate to the challenge of global climate change. However, in order to reach the conditional target of up to a 78 percent reduction of its GHG emissions by 2030, appropriate international financial support of approximately USD 4.9 billion to USD 5.1 billion (about USD 327 million to USD 340 million per year until 2030) is needed. The support needed will be in addition to domestic allocations to cover the required abatement costs. Republic of Moldova's access to the financial mechanisms of the UNFCCC, specifically the GCF, Special Climate Change Fund, Adaptation Fund and others, will be crucial for the implementation of mitigation and adaptation measures.

**The Russian Federation** reports in its first NDC that it supports developing countries in their climate efforts. It highlights that it carries out joint projects, including scientific and technical cooperation in the field of climate, environmental protection, resource and energy conservation, with various developing countries, including the most vulnerable to the effects of climate change. Such joint projects are most actively developed within the framework of cooperation with CIS countries, BRICS (Brazil, Russia, India, China, South Africa), and ASEAN countries. The Russian Federation intends to continue its voluntary participation in the provision of international assistance to eliminate the consequences of natural hazard-induced disasters, including natural and climatic ones, as well as in financing the activities of the Trust Fund 'Russian Federation – United Nations Development Programme' (within the framework of the thematic area 'climate window'), the GCF, and other institutions for



sustainable development. It contributes to the global reduction of GHG emissions by increasing the peaceful use of nuclear energy in developing countries, which helps to reduce fossil-fuel consumption, and reduce GHG emissions.

**Serbia** introduced in its NDC a reference to the total damage caused by extreme climate and weather conditions since 2000, which exceeds EUR 5 billion, and more than 70 percent of the losses are associated with drought and high temperatures. In this sense, according to the NDC, the total estimated investment in implementation of projects for adaptation measures in the period 2000–2015 is approximately USD 68 million. There are no estimates for long-term investments in the area of adaptation to climate change in Serbia.

International support for the intentions of **Tajikistan** with respect to the reduction of GHG emissions, and a full-scale implementation of climate-adaptation and resilience measures, will enable the country to be on track towards a green economy and climate-resilient development.

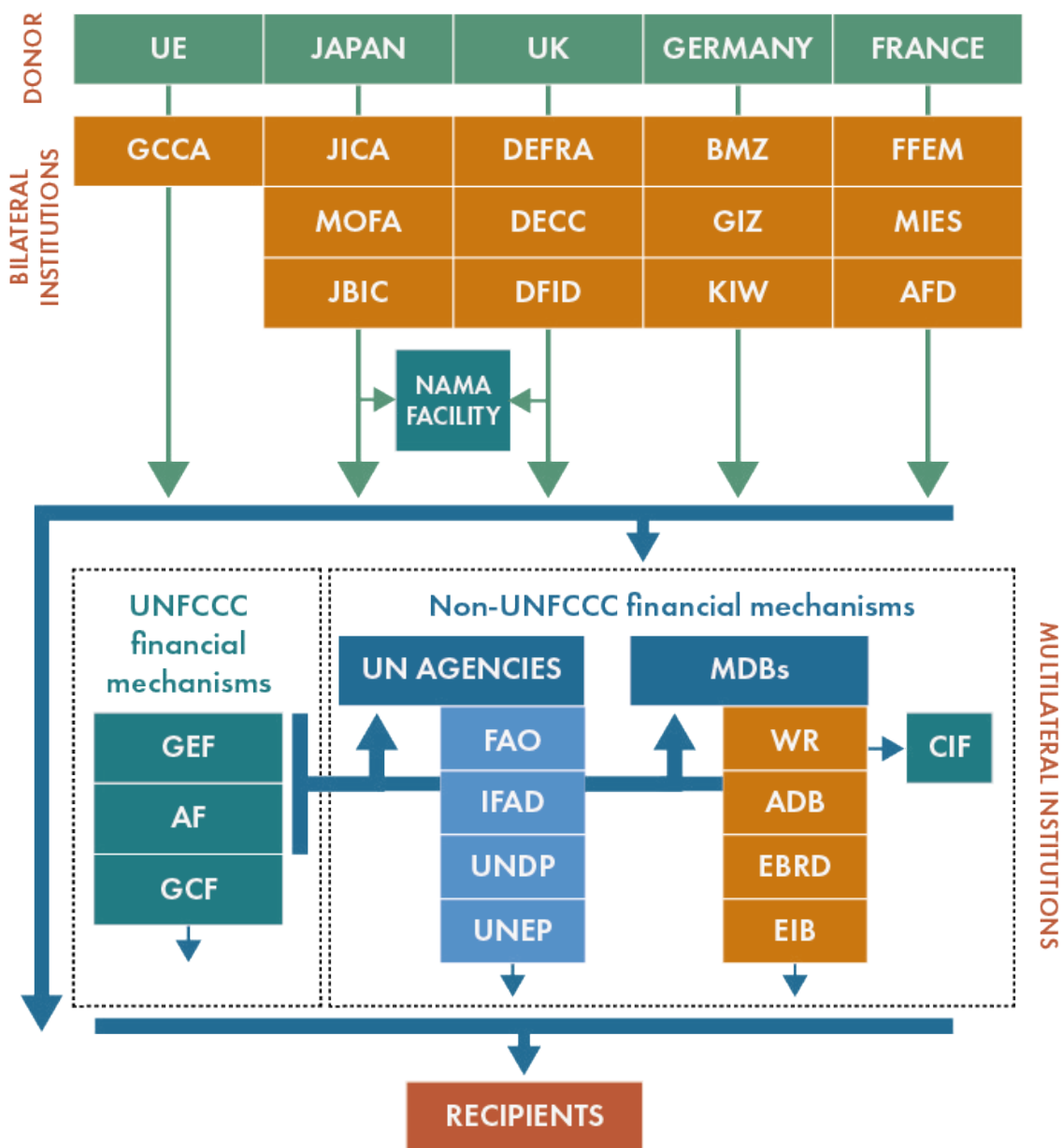
In its NDC, **Turkmenistan** included a clear reference to the means of implementation, primarily coming from the state budget. Furthermore, it stated that the country's economy has the potential to further reduce GHG emissions, but in this case the country will need additional financial resources and technological support. With sufficient international support, Turkmenistan could see zero growth in emissions, and even a reduction, by 2030.

In its updated NDC, **Ukraine** mentioned that according to estimates, it requires EUR 102 billion in capital investments to implement its NDC. Moreover, its access to investments will primarily rely on the macroeconomic stability of the country, and although it has managed to restore it, the country still relies on support from the International Monetary Fund (Government of Ukraine, 2021).

### 3.3. Further options for climate finance in the Europe and Central Asia region

The ECA region hosts several middle-income countries that can benefit from a number of international climate-finance resources. Figure 31 shows a simplified version of the global architecture of public international climate finance, presenting institutions offering climate finance for the ECA region. The financial mechanisms and channels which do not contribute to the ECA region have been excluded from the figure.

**FIGURE 31. International public climate finance flows (narrowed down for ECA region)**



Source: Heinrich Böll Stiftung, 2020

The figure indicates that public international finance is provided and channelled through different multilateral and bilateral mechanisms within the UNFCCC and beyond. Additionally, there are sources of private finance as will be seen below, which complement the work conducted through public channels.

Mechanisms established under the UNFCCC constitute important elements of the global climate finance architecture. The Convention, the Kyoto Protocol, and the Paris Agreement call for financial assistance from parties with more financial resources than those that are less endowed and more vulnerable. Both the Kyoto Protocol and Paris Agreement underline the requirement of developed countries to provide financial resources to assist developing countries in implementing the objectives of the UNFCCC. Within this framework, several funds have been established under the UNFCCC financial mechanism to provide financial resources to developing countries.

The Global Environment Facility (GEF) has served as an operating entity of the financial mechanism since the Convention's entry into force in 1994. In addition, parties have established special funds, namely the Special Climate Change Fund and the Least Developed Countries Fund. The GEF is responsible for the administration of these trust funds together with the GEF Trust Fund.

The Adaptation Fund was established to finance concrete adaptation projects and programmes in developing countries that are particularly vulnerable to the adverse effects of climate change. It was established under the Kyoto Protocol in 2001, but only became operational in 2009. Over the past three years, the fund has dedicated more than USD 190 million to increase climate resilience in 28 countries around the world. It receives funding from a 2 percent levy on the Clean Development Mechanism. The GEF also provides secretariat services to the Adaptation Fund on an interim basis.

In order to scale up the provision of long-term financing for developing countries, governments at COP16 in 2010 in Cancun decided to establish a GCF as an operating entity of the financial mechanism of the Convention. The 17th COP in 2011, in Durban, launched the work of the GCF, and decisions were made around the governing instrument for the GCF. The finance architecture further evolved at the 19th COP in 2013, in Warsaw, where parties welcomed the establishment of the independent GCF Secretariat and the selection of a GCF Executive Director. The 21st COP in Paris in 2015 was a landmark date for reaching agreement on new ways forward in scaling up climate finance and overall efforts in tackling climate change.

There are also bilateral climate financing options for the ECA region. Bilateral funding sources come from dedicated funds established by one country to support developing countries in implementing the global climate-change regime. Several countries provide funds for climate-related development projects through their international development agencies, while others contribute directly to multilateral funds.

Bilateral development agencies have significant contribution in the ECA Region. So far, Germany and institutions of the European Union have committed by far the most climate finance for ECA countries. Besides this, countries such as France and Japan also provide bilateral funds through their development agencies. The NAMA Facility is also considered a bilateral finance mechanism, with ECA region countries eligible to benefit.

Another bilateral finance option for the ECA Region is the Bilateral finance institutions such as the Agence Française de Développement (AFD), the German Development Bank (KfW), and the Japan International Cooperation Agency (JICA).

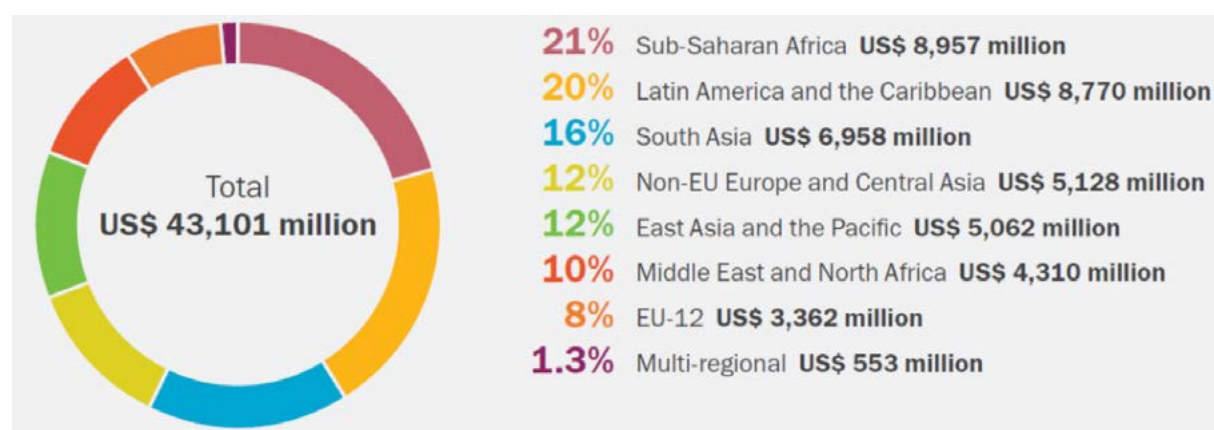
Multilateral development banks are also considered sources of public finance for climate-change mitigation and adaptation in developing countries. These have also pledged to scale up the climate finance they provide in future. In 2015, multilateral development banks signed a joint statement at the Paris COP21 on "delivering climate change action at scale: our commitment to implementation".

Multilateral development banks are significant actors in financing climate action in developing countries. When the total climate development finance that they have provided is measured, the increasing trend of the importance placed on climate-change mitigation and adaptation projects becomes visible. According to the Joint Report on Multilateral Development Banks' Climate Finance, the African Development Bank (AfDB), Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), European Investment Bank (EIB), Islamic Development Bank Group (IDBG), and World Bank Group (WBG) committed almost USD 237 billion in climate finance between 2011 and 2018 in developing and emerging economies. This climate finance commitment has continuously increased since the Paris Agreement, reaching USD 43.1 billion in climate finance in developing and emerging economies in 2018 – USD 30.165 billion, or 70 percent of this total, has been for climate-change mitigation finance, and USD 12.936 billion, or 30 percent, for climate-change adaptation finance (AFDB; ADB; EBRD; EIB; IDBG; WBG, 2019).



Figure 32 shows that the ECA region received a total of 20 percent of the global climate finance from multilateral development banks, where non-European Union ECA and EU12 countries received 12 percent and 8 percent respectively in 2018.<sup>19</sup>

**FIGURE 32. Multilateral development banks' climate finance by region, 2018**



Source: AFDB; ADB; EBRD; EIB; IADB; IDB; WBG, 2019

Besides multilateral development banks, a substantial volume of climate finance has been channelled through institutions that are not directly under the guidance of the UNFCCC. These multilateral climate funds are public funds that are established or chartered by more than one country to provide financial support and professional advice for economic and social development activities in developing countries.

Multilateral climate funds play a key role in using international public finance to promote the investments by other public and private finance institutions for tackling climate change. During the past two decades, the number of international funds providing climate finance has grown, each new fund responding to needs that emerged at different times. This pattern of growth reflects a general trend consistent with development finance. However, there are only a few non-UNFCCC multilateral funds for which ECA countries are eligible.

Table 18 provides an overview of the different opportunities and eligibility of all the sources of finance for the ECA region.

19. EU-12 are the new EU member states which benefit from multilateral development banks (Bulgaria, Estonia, Latvia, Romania, Croatia, Greece, Lithuania, Slovakia Republic, Cyprus, Hungary, Poland, Slovenia).

**TABLE 18. Eligibility of ECA countries for accessing climate finance (developed from countries on ODA list)** <sup>20</sup>

	Countries	Global Climate Funds Under UN					Bilateral Finance Institutions and Development Cooperation Agencies					Multilateral Finance Institutions and Funds							
		GCF	GEF	SCCF	AF	EU	IKI	AFD	JICA	KfW	NAMA	ADB	EBRD	EIB	IFC	IFAD	WB	CIF	GCPF
Non-Annex I	Lower-middle income countries																		
	Armenia	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Georgia	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x
	Kyrgyzstan	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
	Kosovo (UNSCR 1244/99)	x	x	x	x	x	x	x	x	x	x		x	x	x		x		x
	Moldova	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x		x
	Tajikistan	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
	Uzbekistan	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x		x
	Kazakhstan	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x
	Azerbaijan	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x
	Upper-middle income countries																		
	Albania	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x		x
	Turkmenistan	x	x	x	x		x	x	x	x	x	x	x		x		x		x
	Montenegro	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x		x
	Serbia	x	x	x	x	x	x	x	x	x	x		x	x	x		x		x
	North Macedonia	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x		x
Annex I	Lower-middle income countries																		
	Bosnia Herz	x	x	x	x	x	x	x	x	x	x		x	x		x	x		x
	Belarus		x			x	x	x	x	x			x	x	x		x		x
	Upper-middle income countries																		
	Turkey		x			x	x	x	x	x			x	x	x	x	x	x	x
	Ukraine		x			x	x	x	x	x			x	x	x		x	x	x

Source: NDCs of Georgia, Kyrgyzstan, North Macedonia, Republic of Moldova, Turkmenistan, and Ukraine, from UNFCCC NDC Registry.

20. Official Development Assistance (ODA): ODA is government aid designed to promote the economic development and welfare of developing countries. The OECD maintains the list of developing countries and territories; only aid to these countries counts as ODA. The list is periodically updated and currently contains over 150 countries or territories (more information available at: <https://data.oecd.org/oda/net-oda.htm>).

# CONCLUSIONS



Šar Mountain, Brezovica, Serbia



# CONCLUSIONS

Extreme weather events including flooding, storms, and drought, have caused substantial agricultural damage and losses in the Europe and Central Asia region. Climate change is expected to increase the frequency and intensity of climate-related hazards, change rainfall patterns, and increase outbreaks of pests and diseases. Due to the region's diversity in physical geography, climate characteristics, and economic development, countries will be affected differently. In particular, smallholders and their communities are among the most vulnerable to the effects of climate variability and change, due to the climate-sensitive nature of the agricultural sector and their reliance on it for their livelihoods.

The year 2021 represents the sixth anniversary of the signature of the Paris Agreement and a key milestone to fulfil elements of the Paris Agreement and the promise to act jointly and decisively to tackle climate change with the required urgency. The world would like to see if the Paris Agreement has been succeeding, with expectations of raised ambitions in updated NDCs.

Varying levels of GHG emissions can be observed in ECA countries since 1990. Former USSR countries have seen a contraction of their economies, as they move towards a decentralized system. These economic changes are reflected in GHG emissions, with a sharp decrease between 1990 and 1995. Since that initial post-USSR decline, countries whose economies are dominated by fossil fuels, such as Azerbaijan, the Russian Federation, and Kazakhstan, have seen increased emissions, while the emissions of smaller economies in Central Asia and the Western Balkans have increased slightly. The European Union has experienced a decreasing GHG emissions trend since the 1990s, due to robust climate-change mitigation policies and measures taken since then.

Drivers including population growth, increasing incomes, changing consumption patterns, and urbanization, are expected to increase GHG emissions all over the world. However, the Paris Agreement serves as a strong driving force for both Annex I and non-Annex I countries to make solid commitments to GHG emission reductions in the upcoming decades. As a reflection of increasing commitment, several countries in the ECA region have completed their first or updated NDC submissions, including the European Union, Kyrgyzstan, Republic of Moldova, the Russian Federation, Switzerland, and the United Kingdom (by 2020), and Armenia, Bosnia and Herzegovina, Georgia, Iceland, Montenegro, North Macedonia, Turkey and Ukraine (in 2021).

In the Caucasus sub-region, the minimum target has been 35 percent compared with 1990, while in Central Asia the targets remained below 20 percent. The EU27, and United Kingdom, lead in emissions targets, of 55 percent and 68 percent respectively, by 2030. The CIS sub-region has also enhanced targets, with Republic of Moldova committing to a 64 percent to 67 percent reduction by 2030. Countries in the SEE sub-region have a variety of emissions reduction targets, with Montenegro and North Macedonia having the highest – of 35 percent and 51 percent, respectively.

As in many countries, the energy sector remains to be the biggest source of GHG emissions in the ECA region, due to fossil-fuel combustion for power generation and heating systems. In some of those countries, the portion of emissions from the agricultural sector follows the energy sector, while in others it constitutes only a small share. Nevertheless, there is an emissions reduction potential in the agricultural and LULUCF sectors that can be explored in many countries. Many sustainable agricultural practices that have the potential to reduce GHG emissions can increase resilience to impacts of climate change, and improve livelihoods, at the same time.

The LULUCF sector has constituted a net sink in almost all ECA countries, apart from Iceland (due to that country's emissions from farmland and grasslands on drained organic soil). Many countries intend to focus on the LULUCF sector, especially in forestry, in order to further reduce their overall emissions, such as countries in CIS.

Both Annex I and non-Annex I countries in the ECA region have made significant progress in their GHG mitigation policies and measures over recent years. The European Union's commitment to the global fight against climate change has been a significant driver for other countries such as Montenegro, North Macedonia, Azerbaijan, Belarus, Georgia, and Republic of Moldova, all of which have demonstrated increased commitment to GHG mitigation. Countries in EFTA have also aligned their NDC targets with those of the European Union, due to the historical close cooperation between them. Moreover, a substantial number of countries in the region have established adaptation strategies. For instance, the European Union adopted its Adaptation Strategy in 2013, and its new Strategy on Adaptation to Climate Change in early 2021 – that is as well as the 2020 "Farm to Fork" Strategy, and 2020 Biodiversity Strategy for 2030, as part of the European Green Deal.

In 2019, 24 European Union countries, the United Kingdom, and three EFTA countries, established national adaptation strategies, while Bulgaria, Croatia, Latvia, and Iceland are currently developing their strategies. Finland, Hungary, Portugal, and Romania

have already updated their strategies. Moreover, 14 European Union countries, the United Kingdom, and three EFTA countries, also have national or sectoral adaptation plans in place, while countries in the Caucasus, Central Asia, CIS, and SEE, are currently developing their national adaptation plans. Of those, Georgia is the only country so far to have established a sectoral adaptation plan – in 2017, it adopted a climate-change NAP for the agricultural sector.

Although the agricultural sector is not to be a major source of emissions in ECA countries, it is nevertheless one of the economic sectors with a high vulnerability to the impacts of climate change. Therefore, the agricultural sector makes up an important part of climate-change adaptation efforts, which have also been reflected in country NDCs. The sector is highlighted as being vulnerable to the impacts of climate change by almost all Caucasus countries (except Azerbaijan), Central Asia countries (except Kazakhstan), CIS countries (except Ukraine), as well as two of the six SEE countries, namely Bosnia and Herzegovina, and Serbia.

Specific agriculture-relevant adaptation measures were included by ten ECA countries – Azerbaijan, Belarus, Georgia, Montenegro, North Macedonia, Republic of Moldova, Tajikistan, Turkey, Turkmenistan, and Uzbekistan. These countries mentioned the assessment and monitoring of climate impacts (Belarus, Georgia, Tajikistan, Turkmenistan), the development of early warning systems (Republic of Moldova and Uzbekistan), the development of national DRR strategies and agricultural emergency response plans (North Macedonia and Belarus), and climate risk proofing of irrigation and draining systems (Georgia, Republic of Moldova, Tajikistan, Turkmenistan). The implementation of crop, livestock, and forestry-related DRR and CCA good practices at both farm and landscape level was mentioned by all these countries. Although Armenia and the European Union did not include specific agriculture adaptation measures in their NDCs, their focus on ecosystem-based adaptation and nature-based solutions was emphasized.

The main measures presented by countries in National Communication reports to the UNFCCC include the following: agroclimatic and disaster risk information systems; early warning systems; climate and disaster risk governance; DRR/CCA agriculture good practices at farm level; nature-based solutions at territorial and ecosystem level; risk transfer mechanisms (social protection and insurance); emergency preparedness, early action and response; and climate risk proofing of grey infrastructure. Through the joint implementation of risk-reduction and adaptation measures that are part of these types of interventions, countries will be able to build the resilience of the agricultural sector to climate variability and change.

Sustainable Development Goal linkages in the NDCs are closely related to the countries' priorities that they have indicated within the context of climate change, which reflect their socioeconomic development and national priorities. The NDCs of the ECA region mainly have linkages with SDG1 (no poverty), SDG2 (zero hunger), SDG8 (decent work and economic growth), SDG13 (climate action), and SDG15 (life on land). However, sustainable-development targets have varied from country to country, with similarities in countries of the same sub-region. The FAO Strategic Framework seeks to support the 2030 Agenda for Sustainable Development and its 17 Sustainable Development GoalSDGs through the transformation to more efficient, inclusive, resilient and sustainable, agrifood systems for 'better production, better nutrition, a better environment, and a better life, leaving no one behind'.

There are specific linkages between adaptation measures mentioned in NDCs and DRR measures, as DRR aims to enhance existing capacities to anticipate, resist, cope with, and recover from the impact of climate-related disasters, while CCA focuses on future risks and uncertainties. In the ECA region, the cross-sectoral adaptation measures included in NDCs contribute the most to the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030 priority for action II (strengthening disaster risk governance to manage disaster risk), while the integration of agriculture-related adaptation measures contribute the most to the implementation of SFDRR priority for action III (investing in disaster risk reduction for resilience).

The financial commitments of bilateral and multilateral development cooperation partners have for climate-related finance have been increasing over the past decade in Central Asia, CIS, the Caucasus, and SEE, as well as in many other parts of the world. However, the available resources are still insufficient when considering the level of financial resources needed in order to reach NDC mitigation and adaptation targets. In this context, total climate finance provided to the ECA region was USD 10 billion and USD 18 billion for 2017 and 2018, respectively. However, in the light of the current global context and with some additional support, the ECA region has a unique chance to seize the opportunities that the post-COVID global wave of "green recovery" may offer. In this context, despite the uncertainty that the COVID-19 crisis has sparked, economic stimulus and recovery packages are needed to ensure a swift response to the pandemic without unleashing a surge in GHG emissions over the upcoming years.

The agricultural and LULUCF sectors are at the crossroads of climate change mitigation and adaptation, being both a source of GHG emissions, and subject to climate-change impacts, in countries of the ECA region. A detailed reflection of mitigation and adaptation


needs, goals, and related costs in the NDCs, could secure increased access to climate finance for ECA countries, particularly from climate-finance mechanisms under the UNFCCC and Paris Agreement. Adaptation to the impacts of climate change is increasingly reflected in NDCs, although this is still quite limited considering the adverse impacts that countries are already experiencing.

For many countries in the ECA region, reflecting sectoral targets and needs in NDCs, implementing and reaching the NDC targets, and monitoring and reporting the progress for the upcoming stocktaking exercise and Enhanced Transparency Framework (ETF), remains challenging. Complicated tasks, such as mainstreaming a climate-change vision in all policies instruments across sectors, including in agriculture-relevant sectors, and implementing measures to reach the targets, will require cooperation not only among different states, but also among various partners within countries, due to the multidisciplinary nature of the issue.

The international scientific community is urging countries to increase ambitions now, and not wait until 2025 and the next NDC enhancement cycle. The road to COP26 is an opportunity increasing to create further momentum on climate action, as countries work towards enhanced commitments. It is in this context that this publication contributes to taking stock of progress achieved, and gives a snapshot of the anticipated efforts beyond 2021

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Mountains in Arkhyz, Russia

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## POLICY ANALYSIS OF NATIONALLY DETERMINED CONTRIBUTIONS IN THE EUROPE AND CENTRAL ASIA REGION

Corrigendum  
Updated on [28.01.2022.]

The following corrections were made to the PDF after it went to print.

Page	Location	Text in printed PDF	Text in corrected PDF
i	authors	Gamze Celikyilmaz and Tamara van 't Wout	Tamara van 't Wout, Gamze Celikyilmaz and Carmen María Argüello López
iv	Boxes/Figures		Number of pages are updated
2		There is an additional space before the first word on the page 'In', additional space between the comma (,) and EU27+UK footnote nr 3, should be right after UK and not after the comma and before the European Free Trade Association	Space removed Space deleted Footnote changed
5	1/ First key message 2/ last sentence of first key message	in the first key message, "which threaten to reduce yields and productivity in crops, livestock, forestry, fisheries" "which resulted in more than USD 56.5 billion worth of economic damage"	"which threaten to reduce yields and productivity in crops, livestock, forestry, fisheries and aquaculture" at the end added "Climate change is expected to increase the frequency and intensity of extreme weather events, which will negatively affect agricultural production systems and the most vulnerable, such as the smallholder farmers, who are dependent on the sector and its activities for their food, income and livelihoods" which resulted in economic damages of over USD 56.5 billion
6	Chapter 1	The sentence is moved from the top of the page to the first chapter The ECA region comprises 53 countries in different geographical sub-regions, including the Caucasus, Central Asia, CIS, EU27+UK, EFTA, and SEE. 4 As a result, it is highly diverse in terms of landscape, climate, water resources, extent of urbanization, and levels of socioeconomic development.	The sentence is moved from the top of the page to the first chapter
8	Table 1	There is no source below the table.	Source added: "Source: FAOSTAT, 2018 n/a: data not available"
9	Table 2	There is no source below the table.	"Source: UN, 2018"
14	Figure 4	There is no source below the figure.	"Source: UNSTATS, 2015"
31	First key message	"the minimum target has been 35 percent compared with 1990"	"the minimum target has been 35 percent compared to 1990"
33		Missing page number	Page number inserted
69- 97	Figures 18-23	Style changed	
76		The two paragraphs of "the Republic of Moldova section" is currently on the right side of Box 2 While Box 2 should be moved to page 78 after the last sentence where it says "...which are outlined in Box 2".	The para start immediately below the Belarus paragraph. Box 2 is moved to page 78 after the last sentence where it says "...which are outlined in Box 2".
100	Middle the page	2.3.2. Nationally Determined Contribution–disaster risk reduction linkages	2.3.2. Nationally Determined Contribution–Disaster Risk Reduction linkages
	Figures 24-27	Sources missing Sources is missing from reference list too	"Source: FAO, 2018c". Full reference in the references list as follows: "FAO. 2018c. Regional analysis of the nationally determined contributions of countries in Southern-Eastern Europe and Central Asia. Gaps and opportunities in the agriculture sectors (also available at <a href="https://www.fao.org/3/CA2518EN/ca2518en.pdf">https://www.fao.org/3/CA2518EN/ca2518en.pdf</a> )."

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