RESEARCH SERIES



Impacts and Consequences of Climate Change



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Summary



In this ABB report titled "Impacts and Consequences of Climate Change" a comprehensive analysis is conducted on the primary reason of climate change and its effects at both global and country levels. The report examines climate risks, changes in climate patterns, air pollution, the economic and financial impacts of climate change, transition in the energy sector.

One of the key highlights is the increased drought risk and the reduction in fresh water resources within Azerbaijan, directly linked to climate change. Since 1990, a notable decline in air pollution emissions has been observed. By 2023, over 60% of pollutants from stationary sources were treated before being released into the atmosphere.

The presentation also covers the economic impacts of climate change on the global economy, including economic losses, climate finance flows to developing countries, the development of the GSSS bond market and transition in the energy sector. It examines the role of the oil and gas sector in Azerbaijan's economy, the transition to green energy and state budget allocations for environmental protection. Special emphasis is placed on increasing the share of the non-oil and gas sector in country's GDP and raising non-oil and gas revenues in the state budget as part of the country's transition to a sustainable economy. Key steps and targets related to the energy sector transition further support this strategy.

The report also provides information on the impacts of climate change on the banking sector, as well as ABB's activities in sustainability and ESG (Environmental, Social and Governance) fields.

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Definition of Key Terms

- Climate change encompasses global warming caused by human-caused greenhouse gas emissions and large-scale changes in weather patterns as a result
 of warming.
- Greenhouse Gas Emissions (GHG) gases such as carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) that are released into the atmosphere. These gases contribute to climate change by increasing the Earth's temperature.
- A hydrological year a time frame used in hydrology to assess and analyze the water cycle.
- **Pollutants** substances released into the atmosphere that have harmful effects on human health and the environment.
- Stationary sources facilities that emit pollutants or greenhouse gases into the atmosphere.
- Business as usual (BAU) A scenario in which current economic policies and practices will continue and new climate measures or policies will not be adopted.
- 1.5°C Scenario A scenario in which new climate measures or policies are expected to be adopted with the aim of limiting global warming to 1.5°C as set forth in the Paris Climate Agreement.
- **Mitigation** measures taken to reduce the adverse impacts of climate change. For instance: transition to renewable energy sources, using environmentally friendly transportation and so on.
- Adaptation measures taken to respond to and cope with the adverse impacts of climate change. For instance: strengthening infrastructure, implementing smart agriculture concepts and so on.

GSSS bonds:

- Green bonds financial instrument designed to raise funds for the projects that have positive environmental impacts.
- Social bonds financial instrument designed to raise funds specifically for the projects that aim to deliver positive social outcomes.
- Sustainability bonds financial instrument designed to finance both environmental and social projects that contribute to sustainable development.
- Sustainability-linked bonds financial instrument designed to finance projects while tying the bond's financial characteristics to the issuer's sustainability performance.





Primary cause, environmental impacts and consequences of climate change -Global Outlook

Climate change is the most significant challenge facing humanity.





According to data from the World Meteorological Organization (WMO), **2023** has been recorded as the **warmest year**, with **the global average temperature** reaching **1.45** °C above pre-industrial average. Since the **19th century**, the **1.1** °C increase in average temperature has been regarded as a critical warning signal of accelerating global warming.



According to data from the World Meteorological Organization (WMO), **the global reference glaciers** recorded an annual mass balance of – **1.2 meters** of water equivalent during the **2022-2023 hydrological year**. *This marks the largest ice loss on record since* **1950**, *driven by severe negative mass balance in both* **western North** *America and Europe*.

As reported by the National Oceanic and Atmospheric Administration (NOAA), global mean sea level in 2023 was 10.1 centimeters above 1993 levels. This represents the highest annual average recorded since satellite measurements commenced in 1993.

According to the Assessment Report 2023 of the Intergovernmental Panel on Climate Change (IPCC), there is a high likelihood that **global warming will exceed 1.5°C** by **2030** and it is virtually certain that limiting warming to below 2°C beyond that point will be unattainable.

As one of the major global issues arising from climate change, drought causes serious harm to the economy and well-being by negatively impacting water resources, agriculture, energy production and industry.



According to the World Population Review, countries with the highest drought risk index are **African** countries that are more vulnerable to the **socio-economic effects of drought** and **agricultural losses**.



Top 10 Countries with the Highest Drought Risk Index



Greenhouse gas emissions (GHGs) are the primary driver of climate change. According to the European Commission's most recent update to the Emissions Database for Global Atmospheric Research, China, the United States and India collectively accounted for 49% of global GHG emissions in 2023.





Distribution of global GHG emissions in 2023





Primary cause, environmental impacts and consequences of climate change – Country Analysis: Azerbaijan

Impacts of climate change cause extreme weather events in Azerbaijan.



According to the International Monetary Fund's (IMF) 2023 Article IV Consultation Report for Azerbaijan, extreme climate events resulting from rising temperatures have been identified as one of the significant risks in the country's risk matrix, with a moderate probability of occurrence.

Over the past 100 years, the average annual temperatures in the country have increased by 0.4 to 1.3 °C.

According to the Fourth National Communication Report of Azerbaijan to United Nations Framework Convention on Climate Change, it is forecasted that during 2020-2040, country will experience an **average annual temperature rise** of **0.5-2.5°C**, while **precipitation** is expected to **decrease** by **10 to 20%**.







Average annual precipitation

30% -3% 2022 2021 2020 2019

Source: Statistical Committee

According to research by the World Resources Institute, Azerbaijan is ranked 18th among countries at high risk of severe drought by 2040.



Based on the drought risk assessment, 10% of the country's territory is classified as being at very high risk of drought.



Source: Azercosmos

The increase in temperature and intense rainfall has contributed to a significant rise in the frequency of flooding in the country's rivers.



Source: National Hydrometeorology Service

Percentage distribution of desertification risk across the country's territory 6% 13% 27%

Low

The desertification risk level is high in 6% of the country's territory.

A high risk index of desertification are primarily observed in the **Absheron Peninsula, the Kura-Aras** Lowland and the Nakhchivan **Autonomous Republic.**

Over the past 10 years, 2021 recorded the highest incidence of strong winds, with a total of 79 occurrences.

No risk



Source: Ministry of Emergency Situations

High

Medium

In the last 23 years, renewable fresh water resources has decreased by 24%.



Despite the ongoing variability in precipitation, the annual increase in temperature causes over 80% of rainfall to evaporate, which subsequently reduces fresh water resources.



Source: Statistical Committee





Approximately 70-75% of water resources in Azerbaijan are provided by sources formed outside the country's borders. In 2023, there was a 42% decrease in the volume of transboundary surface water relative to 2000.



In the last five years, the level of the Caspian Sea has decreased by 1.5 meters.

The level of the Caspian Sea has **decreased** by **2 meters** between **1994 and 2024**. The main factors affecting the change in the level of the Caspian Sea include climate change, a decrease in precipitation, warming, the reduction of water inflow into the sea due to evaporation and use of water from the Caspian Sea for economic and domestic purposes.

Based on the UN report "EU for Climate, Azerbaijan" water resources in Azerbaijan, including transboundary waters are projected to **decline** by **5-10%** by **2040** and by **10-15%** by **2070 under an optimistic scenario**. **Under a pessimistic scenario**, water resources may **decline up to 10-15% by 2040** and **15-25%** by **2070**.

In 2023, fresh water abstraction from natural resources decreased by 8.2% compared to the previous year.



In recent years (excluding 2023), an increase has been observed in the share of total water consumption, while the share of water losses during transportation has shown a declining trend.



Source: Statistical Committee

Based on the Second National Communication to UNFCCC, surface water resources in Azerbaijan are predicted to decline by 23% by 2050 as a result of climate change.

Azerbaijan accounts for 0.1% of the global GHG emissions.



A significant portion of the country's GHG emissions is released by the energy sector.



As part of its contribution to global climate change initiatives outlined in the Paris Agreement adopted at the 21st Conference of the Parties (COP 21) in 2015, Azerbaijan has committed to reducing GHG emissions by 35% by 2030 compared to the base year of 1990.

At the COP 26 Conference held in Glasgow in 2021, Azerbaijan committed to a new obligation to reduce GHG by 40% by 2050 and to establish a 'net zero emissions' zone in the liberated areas.

In 2023, 67% of pollutants released from stationary sources were treated before being emitted into the atmosphere.





In 2023, the amount of pollutants released into the atmosphere increased by 3.8% compared to the previous year.



The industrial sector contributes 92% of the pollutants emitted into the atmosphere from stationary sources across all economic sectors.



Between 1990 and 2023, the average annual reduction in the amount of pollutants emitted per vehicle was 4.1%.



In 2023, road transport accounted for 85% of the pollutants released into the atmosphere, primarily due to the increase in the number of vehicles.





Change in the number of vehicles

The decrease in the amount of pollutants emitted per vehicle in recent years is due to the increased number of hybrid and electric vehicles.







Impacts of Climate Change on the Economy and Financial System

Increasing climate investments to 266 trillion USD by 2050 could reduce social and economic losses by 1 266 trillion USD by 2100.

The total economic losses during 2010-2019 were 48% higher than in the previous decade.



According to the latest data from the World Meteorological Organization, climate-related events resulted in 11 778 disasters, over 2 million deaths and economic losses of 4.3 trillion USD between 1970 and 2021.



Economic losses in BAU and 1.5°C scenario



The Climate Policy Initiative's report "Global Landscape of Climate Finance 2023" suggests that if climate investments reach **266 trillion USD by 2050**, climate-related losses could be reduced to **1 062 trillion USD** by **2100**, which would be **1 266 trillion USD lower** than the projected losses under a business-as-usual scenario.

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Released on May 2024: The OECD's seventh progress assessment toward the UNFCCC goal reveals that, in 2022, developed countries provided and mobilized a total of 115.9 billion USD in climate finance for developing countries, surpassing for the first time the Paris Agreement's annual target of 100 billion USD.



Climate finance flows to developing countries have primarily been provided by multilateral organizations.





Between 2016 and 2022, financial flows for **mitigation** purposes were primarily directed to the **energy** and **transport sectors**, receiving **43%** and **19%** of the funding, respectively. In the same period, **adaptation** funding was allocated to **water supply** and **sanitation**, as well as to **agriculture**, **forestry** and **fisheries**.

In 2022, 60% of total climate finance flows were directed toward mitigation measures.





According to Standard & Poor's latest report, the GSSS (green, social, sustainability, sustainability-related) bond market is projected to *grow by 1% in 2024* compared to 2023, reaching *14% of the global bond market*.



In 2023, the GSSS bond market experienced a 6% growth compared to the previous year.



In 2023, Europe led the GSSS bond market as the largest issuer, commanding 45% of the global market share, whereas the Middle East and Africa region represented the smallest share, contributing only 2%.



Despite a **6% depreciation** of the US dollar against the euro and a decline in the issuance of social and sustainability bonds, **Europe** has maintained its dominant position in the global GSSS bond market, even as overall bond issuance volumes decreased in the second half of 2023.

The decline in the GSSS bond market in North America is related to several factors, including high interest rates, political changes in the United States and uncertainties regarding the use of sustainability bonds for carbon-intensive sectors.

Compared to 2022, the size of the GSSS bond market in the Middle East doubled in 2023, reaching **23 billion USD**. **UAE** and **Saudi Arabia** are the dominant issuers in the region.



Since the post-COVID recovery period, the GSSS bond market has experienced a 16% decline in the share of supranational organizations, despite a rising share held by high-income and upper-middle-income countries.



■ Supranational ■ Lower-middle income ■ Upper-middle income ■ High income

Fossil fuels account for over 75% of global greenhouse gas (GHG) emissions and approximately 90% of total carbon dioxide emissions, making them the primary driver of global climate change. In 2023, for every 1 USD invested in fossil fuels, 1.7 USD was allocated to clean energy investments — a significant improvement compared to five years ago when the ratio was 1:1.



675.9 Source: Bloomberg (billion US dollars) 73.9 32.0 31.4 USA **Great Britain** China France Brasil Spain Japan India Italy Germany Since 2016, global investments in clean energy have consistently outpaced the investments in fossil fuels. Renewable energy technologies are projected to In 2024, global energy investments are projected to exceed 3 trillion USD for the first time, with 2 trillion USD allocated to contribute 46% of global electricity generation clean energy technologies. bv 2030.

Top 10 Countries Leading in Clean Energy Investments in 2023





Impacts of Climate Change on Azerbaijan's economy

In 2023, 2.4% of the state budget was allocated to climate change mitigation and adaptation measures.



In 2023, a total of 361.7 million manat was allocated to environmental protection, including 3.1 million manat of state capital investments, marking a 24.7% increase compared to 2022.

The functional classification of the state budget allocation for environmental protection, excluding state capital investments



In 2024, the state budget allocation for environmental protection is 5.1% higher compared to 2023.



In 2023, the state budget allocation for adaptation and mitigation measures was 869.9 million manats.



Source: Ministry of Finance

According to the World Bank's Country Climate and Development Report, the projected costs for Azerbaijan by 2060 are 44.1 billion USD in total, with 24.7 billion USD allocated for decarbonization and 19.4 billion USD for resilience, respectively. These costs represent approximately 3.2% of the country's GDP.



The Ministry of Economy of Azerbaijan projects that the oil and gas sector's contribution to GDP will continue to decline, reaching 22.3% by 2028.



By the end of 2024, non-oil/gas revenues of the state budget are expected to increase by 2.7%



Despite the predominance of traditional energy sources, the share of renewable energy within the country's energy mix is on an upward trajectory.







Since 2020, renewable energy and natural gas have constituted a growing share of total energy production, while the contribution of crude oil has diminished.



In 2023, the share of fossil fuels in the energy supply increased by 1.2% compared to the previous year, while renewable energy saw a more substantial rise of 6.3%.



Green Energy Transition



157 GW

Offshore

In alignment with its commitments under international climate agreements, Azerbaijan has set a strategic goal of achieving a 30% share of renewable energy in the country's overall energy balance by 2030.



Bio energy

380 MW

The capacity of electricity generation from renewable energy sources accounts for 20.30% of the total capacity of the country's power plants.



1.9%

Biomass and waste

Other renewable energy

sources

-5.6%



The majority of energy generated from renewable sources in the country comes from hydropower stations.



Energy from waste

2023 compared to 2022

Hydropower accounts for 15.6% of the total capacity of electricity generation stations.



Source: Statistical Committee

Solar Power Stations (SPS)



"State Program on the Use of Alternative and Renewable Energy Sources"

"The State Program on Socio-Economic Development of the Republic of Azerbaijan for 2022–2026"

Azerbaijan 2030: National Priorities for Socio-Economic Development – Priority 5. "Clean Environment and Green Growth"

National Strategy on "Efficient Use of Water Resources", approved on October 10, 2024

According to Order No. 2620, dated 3 May 2021, by the President of the Republic of Azerbaijan, the establishment of a "green energy" zone in the liberated territories of Azerbaijan

"The State Program on the Great Return to the Liberated Territories of the Republic of Azerbaijan" – enhancing the ecological environment and the implementation of environmentally friendly technologies in the liberated territories

"The State Program on Socio-Economic Development of the Nakhchivan Autonomous Republic for 2023–2027" – National Priority of "Strengthening Environmental Protection"

The establishment of a "green energy" zone in the Nakhchivan Autonomous Republic

Since 2019, tax and customs exemptions have been implemented for electric vehicles to encourage the use of environmentally friendly transportation options.

By the decree of President Ilham Aliyev, 2024 has been declared the "Green World Solidarity Year" in Azerbaijan.

Azerbaijan will host COP29 under the United Nations Framework Convention on Climate Change (UNFCCC) this year, focusing on advancing global efforts to combat climate change and implement effective actions for a sustainable future.

Climate Change and Banking Sector



In 2022, **55.4%** of total loans in Azerbaijan were exposed to climate risks. The largest share of exposures was in the **real estate sector**, representing **23% of the total loan** portfolio, followed by **energy-intensive sectors at 13%** and **the agricultural sector at 7%**.

In the context of combating climate change, the Central Bank has developed the following documents to ensure the sustainable development of the banking sector:



Documents developed by the International Bank of Azerbaijan in the field of Sustainable Development:



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Current ESG and sustainability related activities by ABB





Under the leadership of the International Bank of Azerbaijan within the ESG expert group of the Azerbaijan Banks Association (ABA), the bank has contributed to the implementation of a series of educational initiatives on Sustainable Finance and ESG.





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