THE FIRST BIENNIAL REPORT OF THE REPUBLIC OF TAJIKISTAN ON INVENTORY OF GREENHOUSE GASES UNDER THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE

Dushanbe 2018

Government of the Republic of Tajikistan
Agency for Hydrometeorology under the Committee on Environmental Protection under the Government of the Republic of Tajikistan

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- Minsitry of Agriculture of the Republic of Tajikistan;
- Minsitry of Transport of the Republic of Tajikistan;
- Committee for Environmental Protection under the Government of the Republic of Tajikistan;
- Agency for Hydrometeorology of the Committee for Environmental Protection under the Government of the Republic of Tajikistan;
- Statistics Agency under the President of the Republic of Tajikistan;
- Forestry Agency under the Government of the Republic of Tajikistan;
- Agency for Reclamation and Irrigation under the Government of the Republic of Tajikistan;
- Academy of Science of the Republic of Tajikistan;
- SUE "Hojagii Manziliyu Kommunali"

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AAS RT	Academy of Agricultural science of the Republic of Tajikistan
ADB	Asian Development Bank
AF	Adaptation Fund
ARI	Agency for Reclamation and Irrigation under the Government of the Republic of Tajikistan
AS RT	Academy of Science of the Republic of Tajikistan
DRS	Districts of Republican Subordinations
CC	Climate Change
CDM	Clean Development Mechanism
CEP	Committee for Environmental Protection under the Government of the Republic of Tajikistan
CESCD	Committee for Emergency Situations and Civil defense under the Government of Tajikistan
CIF	Climate Investment Fund
CIS	Commonwealth of Independent States
CP	Conference of the Parties
EBRD	European Bank for Reconstruction and Development
EUTF	EU Trust Fund
FA	Forestry Agency under the Government of the Republic of Tajikistan
FNC/ BRGHGI	Fourth National Communication/Biennial Report on Greenhouse Gas Inventories
GBAO	Gorno-Badakhshan Autonomous Oblast
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GHG	Green House Gases
GHGI 2014	Greenhouse Gas Inventory presented as part of the Third National Communication of the Republic of Tajikistan submitted in 2014
GHGI 2018	Greenhouse Gas Inventory presented as part of the First Biennial Report of the Republic of Tajikistan submitted in 2018
GIZ	Gesellschaft für Internationale Zusammenarbeit
HPP	Hydropower plant
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
LULUCF	Land use, land-use changes and forestry
MA RT	Ministry of Agriculture of the Republic of Tajikistan
MEDT RT	Ministry of Economic Development and Trade of the Republic of Tajikistan
MEWR RT	Ministry of Energy and Water Resources of the Republic of Tajikistan
MF RT	Ministry of Finance of the Republic of Tajikistan
MT RT	Ministry of Transport of the Republic of Tajikistan
M&E	Monitoring and Evaluation
M&R	Monitoring and Reporting
MR&V	Monitoring, Reporting and Verification
NAMA	National Actions on Climate Change Mitigation and Adaptation
NAP	National Action Plan for Mitigations of Climate Change Impact
NGO	Nongovernmental organizations
OJSHC Barki Tojik	Open Joint Stock Holding Company “Barki Tojik”
PIG	Project Implementation Group

PIU	Project Implementation Unit
POL	Petroleum, oils and lubricants
PPCR	Pilot Program For Climate Resilience
PSC	Project Steering Committee
RES	Renewable Energy Sources
RT	Republic of Tajikistan
SAP RT	Statistics Agency under the President of the Republic of Tajikistan
SCISPM	State Committee on Investments and State Property Management of the Republic of Tajikistan
SCLNG	State Committee for Land Management and Geodesy of the Republic of Tajikistan
SFCC	Strategic Fund for Climate Change
SUE	State Unitary Enterprise
SUE HMK	State Unitary Enterprise "Hojagii Manzili Kommunali"
UNDP	United Nations Development Program
UN FCCC	United Nations Framework Convention of Climate Change
V&A	Vulnerability and Adaptation
WB	World Bank
WFP	World Food Program
WHO	World Health Organization
CO_2	Carbon Dioxide
CH_4	Methane
CFCs	Chlorofluorocarbons
PFCs	Perfluorocarbons
SF_6	Sulfur Hexafluoride
N_2O	Nitrous Oxide

INTRODUCTION

Tajikistan is the most vulnerable country in Central Asia, strongly impacted by the effects of climate change. The melting of glaciers, fluctuation in the flow of major rivers and its impact on the production of hydropower and agricultural products are just some examples of the numerous effects of climate change in Tajikistan.

The Republic of Tajikistan ratified the UN Framework Convention on Climate Change (UNFCCC) in 1998, becoming a party not included in Annex I. In October 2015, the Government of the Republic of Tajikistan submitted its Intended Nationally Determined Contribution (INDC) in accordance with the decision of the 19th session of the Conference of Parties.

Acknowledging the significant steps to institutionalize and to integrate climate change into the country's development program, considering the existing financing challenges and new climate change adaptation initiatives in the context of the Paris Agreement on Human Anthropogenic Effects on Climate the regular updates of the information to the UNFCCC secretariat is of crucial importance. In this regard, the preparation of the First Biennial Report on the inventory of greenhouse gases according to the UNFCCC is the country's obligation to provide information to the international community on actions taken to address climate change.

The national inventory of greenhouse gases was prepared in accordance with the Guidelines of the Intergovernmental Panel on Climate Change 1996 and 2006, software V2.54, developed in June 2017 in South Korea for calculating greenhouse gas emissions, analyzing results and conclusions. Good Practice and Uncertainty Management Guidelines, as well as other important documents, were also used.

In the First Biennial Report of the Republic of Tajikistan, the inventory of greenhouse gas emissions for the period 2004-2014 and the updating of emission factors for key sources are divided into the following categories: energy, industrial processes, agriculture, forestry and other land uses, and waste, which constitute the main results of this document. All these analyzes can consolidate the existing aspirations of the Republic of Tajikistan to move towards low carbon development, to assess the possibilities for developing national greenhouse gas emission reduction policies and thereby determine the country's contribution to reducing the impact of climate change.

Chairman of the Committee on Environmental Protection under the Government of the Republic of Tajikistan  Gulmahmadzoda D.K.

SUMMARY

Climate of our planet is changing. The trends of these changes show dangerours signs like increased number and extent of hydrometeorological disasters. Many sectors of economy are getting more vulnerable to unfavourable weather conditions and long terms sustainable trends of climate change. Large amount of greenhouse gases entering the atmosphere due to unregulated economic activity of people is one of the reasons of climate change at present time. The UN has called on all countries to address the climate change issue by limiting greenhouse gas emissions to the atmosphere, having prepared the Framework Convention on Climate Change (FCCC) in 1992.

On December 13, 1997 Majlisi Oli of the Republic of Tajikistan has adopted the Resolution #533 "On Accession of the Republic of Tajikistan to the United Nations Framework Convention on Climate Change". On January 7, 1998, Tajikistan has signed the Convention as a "non-Annex I Party". In 2008, the country signed and ratified the Kyoto Protocol.

The Government of the Republic of Tajikistan has developed and submitted its First National Communication in 2002, the Second National Communication in 2008, and the Third National Communication in 2014.

In October 2015, Tajikistan has submitted its estimated nationally determined contribution to implement the relevant decisions made by the UNFCCC's 19th Conference of the Parties and UNFCCC's 20th Conference of the Parties, including "Lima Call for Climate Action" (Lima, Peru, December 2014).

Estimated nationally determined contribution of the Republic of Tajikistan in the part of reducing the greenhouse gas emissions and impact on climate system reads as follows:

- if new significant volumes of international funding are not attracted: "The long-term goal for reduction of anthropogenic emissions of greenhouse gases was defined as a flexible indicator, not exceeding 80-90% of the 1990 level by 2030, which is 1.7-2.2 tons in CO_2 equivalent per capita. And this is the country's contribution to reduction of the greenhouse gases. Planned restoration of forests in accordance with the adopted state programs is a significant contribution of the country to reduction of the negative impact on climate system"
- if substantial international funding and technology transfer are provided: "Capacity for reducing greenhouse gas emissions in the Republic of Tajikistan makes it possible to ensure 65–75% of the 1990 level by 2030, which amounts to 1.2–1.7 tons in CO_2 equivalent per capita. This will become possible with implementation of investment projects and national programs in energy, transport, agriculture and forestry, water management, disaster risk reduction, increasing and diversifying of renewable energy sources and reducing energy losses; modernization, introduction of new technologies and development of economy sectors."

Tajikistan has developed its First Biennial Report in accordance with the Guidelines for submission of biennial reports containing updated information by non-Annex I Parties to the Convention", which are contained in the Annex III to the decision 2/CP17.

The First Biennial Report of the Republic of Tajikistan includes:

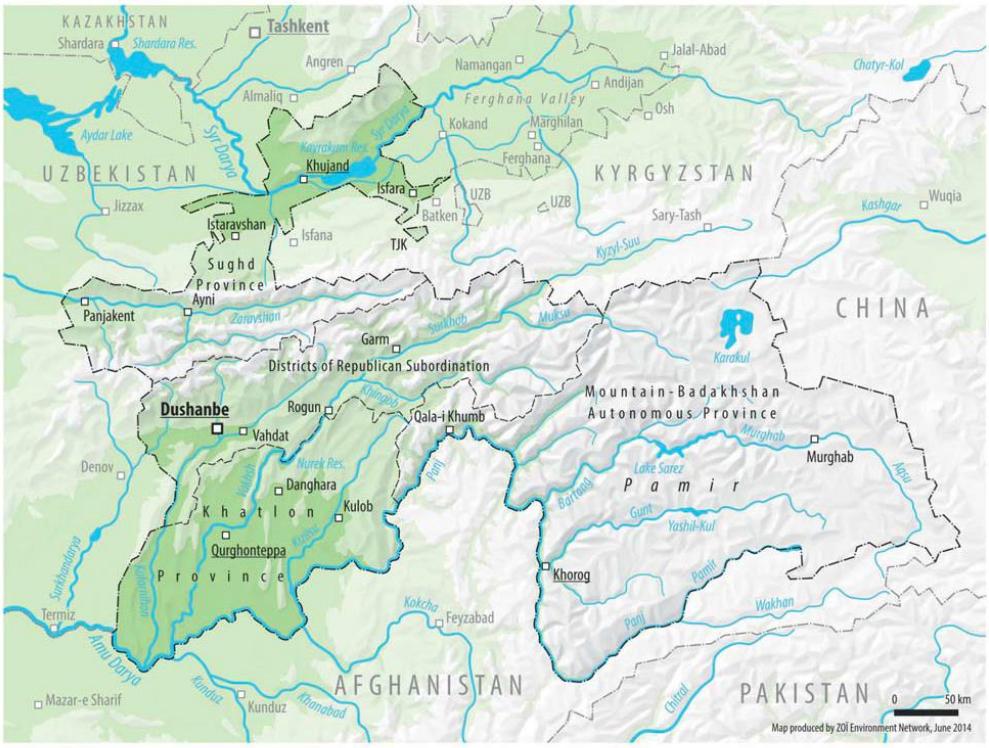
- information about the national conditions and country's mechanisms related to preparation of the national communication on a regular basis;

- national inventory of anthropogenic emissions from sources and sinks of all greenhouse gases (GHG) not controlled by the Montreal Protocol, including a national inventory report;
- information on the climate change prevention activities and its impact, including related methodologies and assumptions;
- difficulties and gaps, as well as related financial and technical capacity needs, including a description of the support that was needed and that was received;
- information on the level of support that has been received to create opportunities for the preparation and submission of the biennial reports containing updated information;
- information on monitoring, reporting and verification (MRV) at the internal level.

1 NATIONAL CONDITIONS OF THE REPUBLIC OF TAJIKISTAN ON GREEN HOUSE GAS EMISSIONS AND REMOVALS

1.1 Geographical Location

Tajikistan is a landlocked mountainous country located in the south-eastern part of Central Asia between 36°40' and 41°05' N. and 67°31'and 75°14' E, extending from west to east for 700 km and from north to south for 350 km. The total area of the country is 142.6 thousand km^2. Tajikistan has a common border with Uzbekistan in the west and north (about 900 km), with Afghanistan in the south (more than 1000 km), with Kyrgyzstan in the north (630 km), with China in the east (about 400 km). Mountains occupy 93% of the territory. Country elevations range from 300 meters to 7,495 meters. Almost half of the territory is located at an absolute altitude of more than 3,000 m above sea level, which is unsuitable for agriculture due to the harsh climatic and physiographic conditions, predominance of rocks, glaciers and high mountains.



Source: Third National Communication of the Republic of Tajikistan, 2014

Figure 1. Relief map of Tajikistan.

Relatively plane territories exist only in the valleys of large rivers and intermontane depressions. Slightly less than half of the republic is the highest highlands - the Pamirs. The huge mountain ranges of Central Asia meet in the Pamirs: Karakorum Range, Kunlun Shan and Hindu Kush. The Southern Tien Shan, which unites the Hissar–Alai Mountainous System, occupies the central part of the territory of Tajikistan. In the republic, the Tien Shan system of latitudinal ridges consist of: Turkestan, Zeravshan, Hissar and Karategin ridges. The total length of the Hissaro-Alai is about 900 km. The average height of the ridges is 3,000

m, and some peaks rise to 5,000 m. Some peaks and the highest parts of the watersheds are covered with glaciers and perennial snow. Most of the country is in a zone of high seismic risk. Mountainous areas, semi-desert and desert zones are especially vulnerable to hydrometeorological hazards.

The territory of Tajikistan is administratively divided into Sughd Region (north), Khatlon Region (southwest), Gorno-Badakhshan Autonomous Oblast (east), Districts of Republican Subordinations (DRS) located in the center and in the west, with the capital in Dushanbe. In Tajikistan, there are 17 cities, 62 districts, 57 villages and 369 village councils.

1.2 Climatic Conditions and Features

The main features of Tajikistan climate - the strong continentality and aridity - are determined by the geographical position within the huge Eurasian continent, far from the main sources of ocean moisture. Arid climate is reflected in little of precipitation in the valleys and foothill areas during long summer period. In mountainous areas, the summer drought is slightly alleviated, although the overall aridity of the climate is also present here. The climate of Tajikistan is formed by the influence of a number of factors, the main of which is solar radiation, atmospheric circulation and orography. The critical role in shaping the climate of the republic belongs to solar radiation. The high solar altitude due to the republic's location in the southern latitudes, the long sunshine duration, the lack of cloudage in the valleys during summer period contribute to a huge amount of solar radiation, which, due to the greater soil dryness, is spent on heating its surface and surface air. As a result, very high summer temperatures are observed in the valleys.

Another equally important factor for the climate shaping is atmospheric circulation. For Tajikistan, located in the northernmost part of the subtropical zone, seasonal change of air masses is typical. The middle latitude air masses are prevailing. they are bordered by cold arctic air in the north and warm tropical air in the south. These air masses are separated by arctic and polar fronts, whose position does not remain constant. As a result, the territory of Tajikistan is periodically influenced by the arctic and the hot tropical fronts. Continental tropical air dominates here in summer, which causes the predominance of hot, dry weather. In winter, Tajikistan is covered by the continental air of middle latitudes. Entering the territory of Central Asia, cyclones cause dramatic changes in weather conditions of Tajikistan: increasing wind, a short increase and then a strong decrease in air temperature, precipitation. Precipitation in the valleys falls mainly in the form of rain, but rain turns into snow when the cold arctic air invades the territory. A special reactivation of cyclonic activity takes place in the spring. Precipitation in the spring, unlike winter, is in form of storm rain. In autumn, cyclonic activity on the polar front weakens due to a decrease in temperature contrasts in middle latutude and tropical air. As a result, warm and dry weather favorable for agriculture prevails in Tajikistan. Most of the precipitation falls in mountainous areas which are open to wet western air masses. The eastern regions separated from these air masses by high mountains receive little moisture. 75% of the annual precipitation falls during the cold season. The average annual precipitation varies from 100 mm to 1,800 mm.

Orography also has a great multidimensional impact on climate. The relief impact on the climate depends on the mountain systems height, the variety of mountain relief forms, the steepness of the slopes, and their slope exposure. In some cases, mountain ranges serve as a barrier to the movement of air masses. The mountains safely protect from cold air masses, affect circulation processes, temperature and humidity, determining a clear vertical zonal climate from the very hot climate in lowlands which allows to grow many subtropical cultures to the cold zone of highlands covered with snow and ice. The air temperature throughout the

republic varies over a wide range. The greatest differences in the temperature characterize wide valleys and intermontane depressions, foothills and mountains, and high mountains. The average annual temperature varies from 17 degrees in the south-west to minus 7 degrees in the Pamirs. Also, the harsh climate prevails in the Eastern Pamirs, where the minimum temperature reaches -63ºC. The absolute maximum temperature reaches + 47ºC in the south of the country.

1.3 Forest and Pastures, Wildlife

The forestry of Tajikistan is important for environment and conservation and is the genebank of many rare and valuable fruit trees and shubs, as well as the habitat of wild animals. Almost all forests of Tajikistan are state property and are classified as the first group forests, where forestry activities are aimed at preserving and improving their condition.

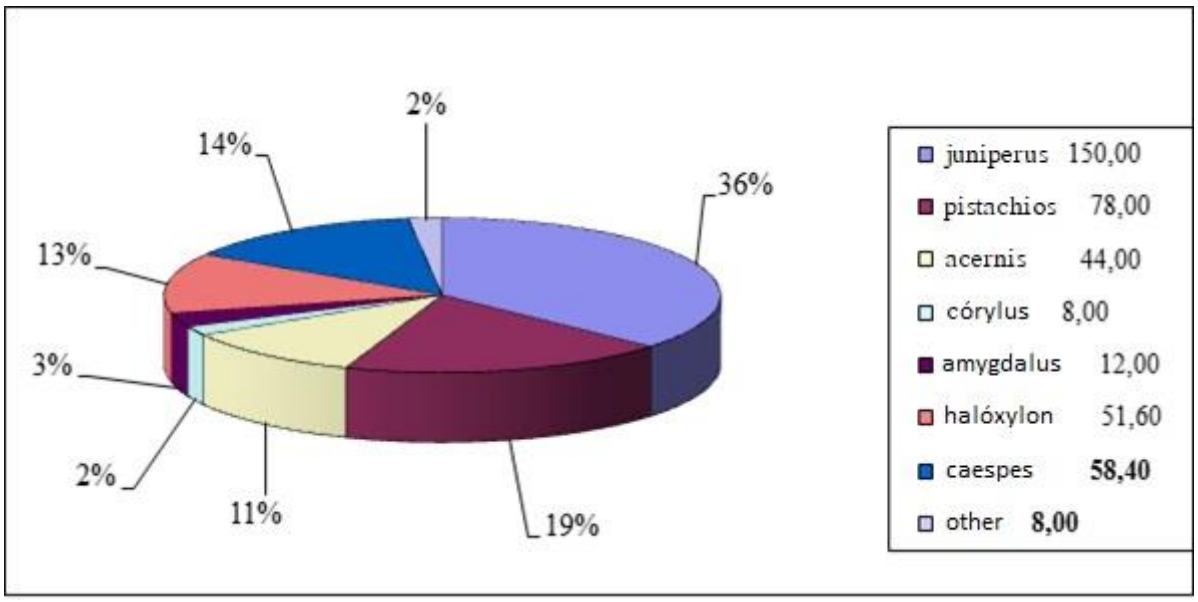
There are more than 5 thousand species of plants in the mountains and valleys. A distinctive feature of the flora - the predominance of grasses, semishrubs, bushes, steppe, desertsand highland shrubs. Forests in Tajikistan occupy a relatively small area of 422 thousand hectares - only 3% of the territory. Tree vegetation does not form large arrays in the mountains of Tajikistan and is rarely grow along the slopes of ridges, in gorges, and only in some places it turns into proper forests. Their composition in different areas of the republic is distinct. Juniper forests occupy the largest area of the country - up to 150 thousand hectares and spread at altitudes from 1,500 to 3,500 m above sea level. Large forests are in the northern part of the country and are mainly located on the northern expositions of the slopes of the Turkestan, Zeravshan and Hissar ranges.

The central part of Tajikistan is also rich in forests. This region and its midlands with altitude of 1,000 to 2,200 m above sea level are represented by broadleaf plants. Due to the relatively humus-rich gray soils, water sources and sufficient rainfall (800-1200 mm per year), this part of the country is rich in hazel, apricot, apple, cherry plum, hawthorn, almond, seabuckthorn, maple, and various shrubs. The mountain belt from 3,000 to 3,200 m above sea level is rich in juniper forests.

The southern regions of Tajikistan with annual precipitation 400-600 mm, is mainly represented by Bukhara almond and pistachio which mainly grows at altitudes from 600 to 1,300 m above sea level. Saxaul plants grow in the zone of arid deserts, in the southernmost area.

In the Western Pamirs, where the annual precipitation is 200-700 mm, vegetation is growing along the gorges rivers at altitudes from 1,500 to 3,200 m above sea level. Walnut, apricot, apple, poplar, willow grows in the areas untill 2,200 meters above sea level.

Tajikistan's pasture grounds with the total area of 80% of the agriculturally used land are exposed to erosion. The largest pasture grounds are in the Khatlon Region and the DRS and represent 31% and 28%, respectively. At the same time, 89% of summer pastures and 97% of winter pastures are exposed to moderate and high erosion. A catastrophic situation has developed in the eastern Pamirs around teresken pastures. A catastrophic situation has developed in the eastern Pamirs around teresken pastures. The local population began widespread uprooting of the important fodder plant teresken due to a shortage of energy resources, which resulted in the desertification of high-mountain pastures. In other parts of the country, local pastures are also strongly degraded. Most of the country's natural pastures are high-mountain, located at altitudes from 1,700-2,000 to 3,500 m above sea level.



Source: Statistics Agency under the President of the Republic of Tajikistan.

Figure 2. Distribution of forest covered area by major species (thousand ha).

The flora of Tajikistan is rich, diversified and has 5 thousand species of higher plants, over 3 thousand species of lower plants, among which there are many endemics and rare species. Wildlife is also diverse and includes 84 species of mammals, 385 species of birds, 47 species of reptiles, 52 species of fish, 2 species of amphibians, 10 thousand invertebrates. The country ecosystems are very diverse and contrasted. The fauna includes rare and endangered species, such as the markhoor, argali, Bukhara deer, snow leopard. The territory of Tajikistan and adjacent areas is considered one of the world centers of speciation and genetic resources. However, poaching, excessive and illegal collection and harvesting of wildlife, pollution and fragmentation of ecosystems and the increasing climate change impact have led to the situation deterioration.

1.4 Glaciers and Water Resources

The water resources of Tajikistan play the main role in ensuring sustainable socio-economic development of the country. Despite its small area, Tajikistan is rich in mountain rivers and lakes with systematic glacial feeding. The share of water resources of Tajikistan in the Central Asian Region is more than 60%. In the CIS, Tajikistan ranks second in water resources, after Russia. The country has 947 rivers with length from 10 to 100 kilometers, the total length of rivers exceeds 28,500 kilometers. In the central mountainous regions of the country, the specific power of the average annual surface flow at 1 km^2 reaches 30-45 liters/s and less than 1 liters/s in the desert lowland and highland areas. According to updated estimates, the total average annual river flow throughout the country is about 64 km^3. Most flows are formed in the basins of the major rivers Pyanj and Vakhsh. The confluence of these rivers forms the largest water artery of Central Asia, called the Amu Darya. From the beginning of the warm period, from April to August, which concurs with heavy precipitation and intense snowmelt, rivers are filled up and carry large amounts of suspended particles. Their content in some rivers reaches 5 kg/m^3. These phenomena are mainly observed in the Amu Darya and Kizilsu. During the flood period, abundance of water increases the water level in rivers by 2-4 m, which leads to flooding of populated areas, agricultural lands, roads and bridges. Considering the importance of water resources and their rational use for Tajikistan, the country began a transition from the administrative water management to a hydrographic (catchment-based)

approach in 2014. There are several large basins in the country: Syr-Darya (Northern Tajikistan), Zeravshan (Central Tajikistan), Kafirnigan, Vakhsh and Pyanj (Southwestern Tajikistan and the Pamirs), drainless lakes in the east of the Pamirs.

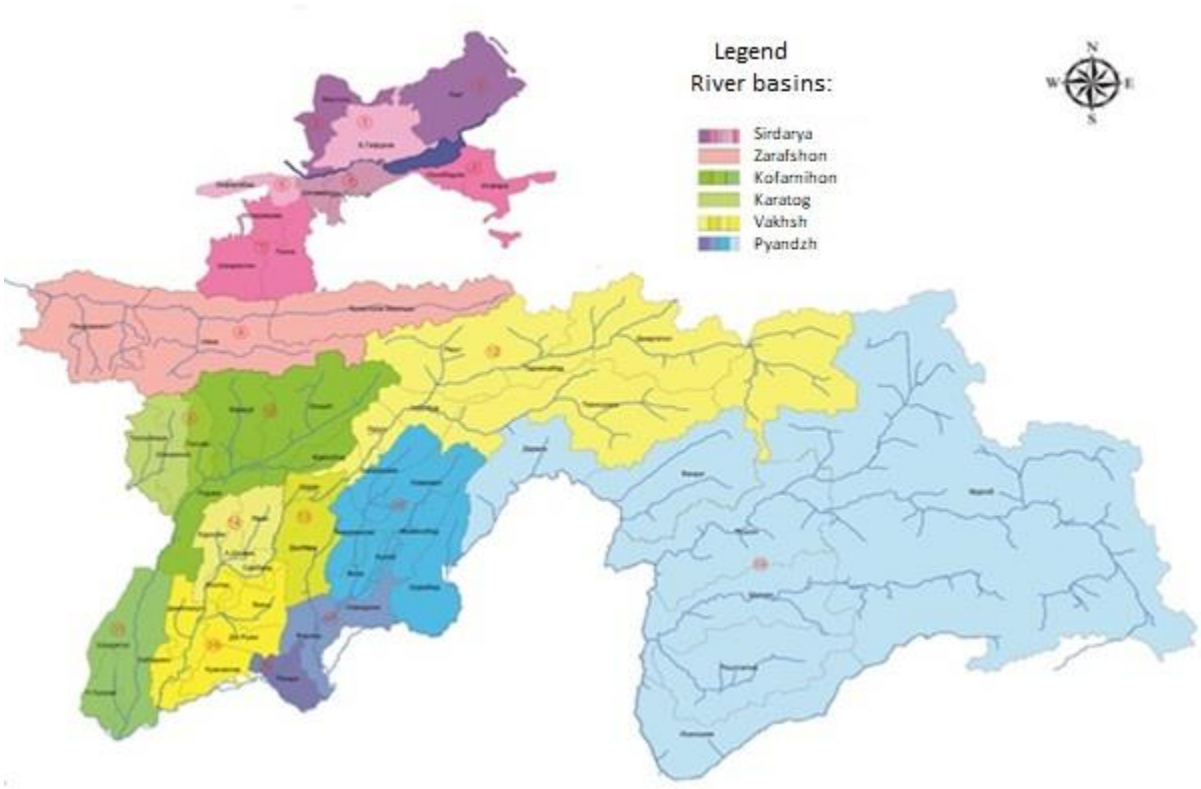


Figure 3. Main river basins of Tajikistan.

There are more than thousand lakes in Tajikistan. Many lakes are situated mainly in mountainous areas in the north-west, in the Fann Mountains, in the central and eastern part of the republic, in the Pamir Region. The total water surface of all lakes is 1,005 km², which is about 1% of the country's territory. The total water volume is 46 km^3, half of it consist of salt water in the lakes of the Pamir high-mountain deserts. The largest highland lakes are: Karakul – 3,914 m above sea level; Zorkul – 4,126 m above sea level; and Sarez – 3,260 m above sea level. Their area is more than 680 km^2, while the total area of all lakes is 700 km^2. The deepest lake, Sarez (over 400 m depth), is rockdammed and rather "young" – just over 100 years. More than 95% of all lakes in the country have an area of less than 1 km^2 with a small amount of water, and many of them are vulnerable to anthropogenic and climatic influence. The country also has more than 200 lakes located in the highlands before the tongue of the glaciers. Sometimes, due to the strong melting of glaciers, these lakes are filled up and break a natural dam (end moraine), causing significant damage.

About half of the Central Asian glacier zone is located in Tajikistan. At present, the glaciers in the republic with a total area of 8,476 km^2. The total volume of all glaciers is 567 km^3. Therefore, although the Republic of Tajikistan occupies about a tenth of the area of Central Asia, almost two thirds of the entire region water flow is formed on its territory. The share of glacial river feeding is more than a quarter of the total river flow of Tajikistan.

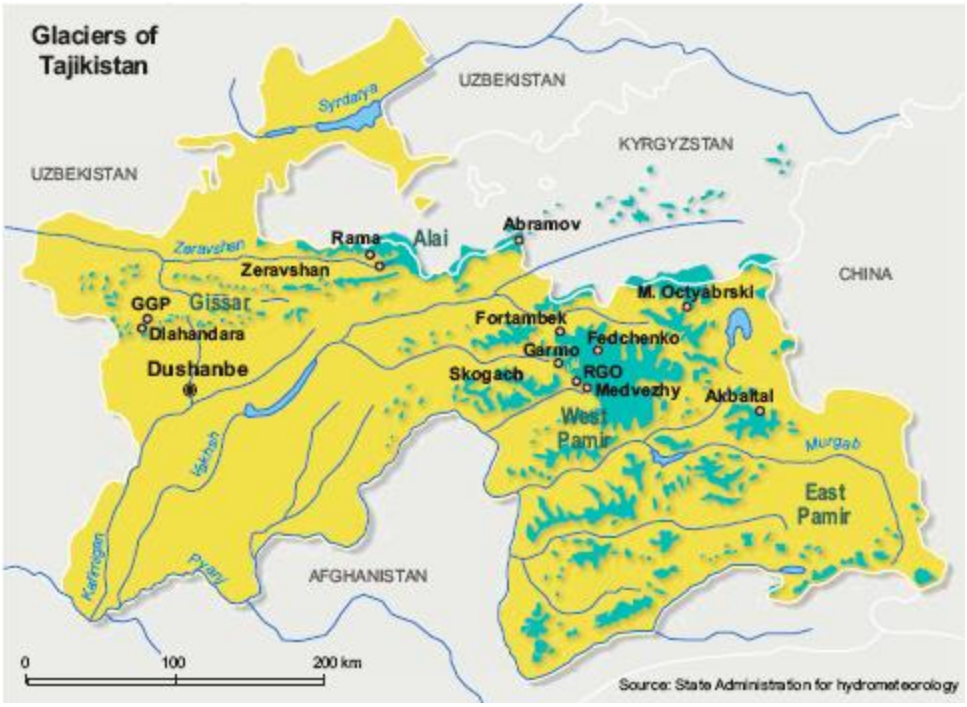


Figure 4. Glaciers of Tajikistan.

Tajikistan's largest glacier area is located in the north-west of the Pamirs, where the Akademiya Nauk, Darvaz, Peter I, Vanch and Yazgulem Ranges meet, and where two of the three seventhousanders are located – Ismoil Somoni Peak (7,495 m) and Korzhenevskaya Peak (7,105 m). Here is the largest of the continental mountain glaciers of Central Asia – Fedchenko Glacier. It has a length of 72 km, ice thickness reaches 1,000 m in the middle part, the ice volume of the main trunk is 125 km^3, and with outlets the ice volume is 165 km^3. The glacier starts at an altitude of 6,300 m, the glacier's tongue is located at an altitude of 2,910 m. Grumm-Grzhimailo Glacier with an area of 142.9 km^2, the Garmo Glacier with an area of 114.6 km^2, as well as hundreds of smaller glaciers are located in the same area.

The second large glacier area is located at the junction of the Zaalaisky and Zulumart Ridges near the Ibn Sina Peak (7,134 m). Three large glaciers located here belong to different basins. The Oktyabrsky Glacier (88.2 km^2) gives its flow to Karakul Lake, the Big Saukdara Glacier (53.0 km^2) belongs to the Muksu River Basin, and the Uysu Glacier (49.9 km^2) belongs to the Markansu River Basin.

The upstream of the Zeravshan River can be considered the third glacier area, although it significantly smaler than the first two. At the junction of the Turkestan and Zeravshan Ranges, there is a large valley Zeravshansky Glacier. Its length is 27.8 km, the area is 132.6 km^2, and the volume is 15.85 km^3. Its outlets glaciers are also of considerable size. For example, the length of the Rama Glacier is 8.9 km, the area is 22.8 km^2, the volume is 1.58 km^3.

Millions of Central Asian people depend on the snow reserves, glaciers and precipitation in the mountains of Tajikistan.

1.5 Political Set up

Tajikistan has proclaimed its independence on September 9, 1991 and since that it is a sovereign, democratic, jural, secular and unitary state. Political system is defined by the Constitution that was adopted on November 6, 1994. The President of the country is a Head

of the executive power and the head of the state. He is a guarantee of the Constitution, rights and freedom, unity and territorial integrity, national independence and laws. The Government of the Republic consists of the Prime minister, First Deputy Prime Minister and other deputy prime-ministers, ministers and chairs of the state committees. Government ensures the effective operation of the economy, social sphere and intellectual life of the society, enforcement of the laws and decisions of the RT Parliament. The Parliament of Tajikistan is a legislative power (Majlisi Oli, Supreme Assembly) consists of the Upper House - Majlisi Milli (National Assembly, 33 members) and the Lower House - Majlisi Namoyandagon (House of Representatives, 63 deputies). The term of the office of both chambers is 5 years. Local government consists of representative (Councils of people's deputies) and executive bodies (Jamoats).

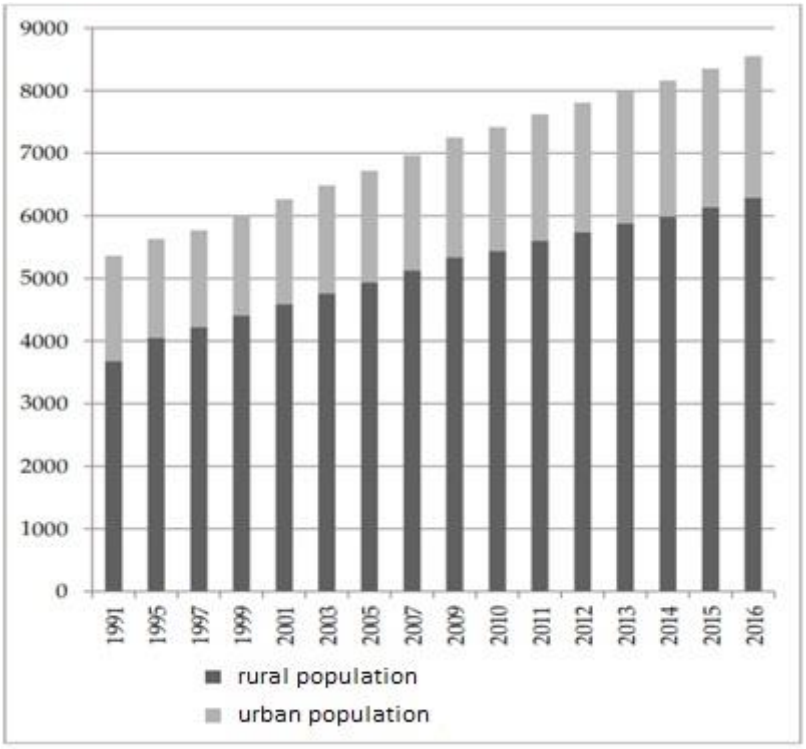
Since early 1990s, the legal system of Tajikistan is constantly improving similar to other former Soviet countries. In accordance with the Constitution from 1994, the Tajik Parliament has adopted all the constitutional laws prescribed by it, as well as new codes like: Water Code (1993), Economic Procedural Code (1995), Customs Code (1995), Land Code (1996), Labor Code (1997), Family Code (1998), Criminal Code (1998) and the first part of the Civil Code (1999).

Legislative and other regulatory legal acts are the main source of the law in Tajikistan. Constitution stands on the top of the legal hierarchy with it provisions, which have direct effect. It is followed by the constitutional and commony laws. Government adopts resolutions and decrees in accordance with the Constitution and national laws.

In November 2013, the incumbent head of state, the Founder of Unity and the Leader of the Nation, Emomali Rahmon won the RT President elections in Novemebr 2013. Following this, in November and December 2013, the structural and staff changes were carried out in the executive government bodies. In the context of climate change, some of the most important decisions include: formation of the Ministry of Energy and Water Resources (formerly two different agencies), enhancement and expansion of the status and functions of the State Land Management Committee and the Ministry of Health and Social Protection of Populations, as well as establishment of the Committee on Local Development. Integration of the efforts on the climate change policy making and implementation of these policies and measures by these and other authorities is the most urgent task of the future. There is an increasing understanding and the level of implementation of the concept for development of the E-Government, which is very much in line with the reforms in the field of environment and and reporting.

1.6 Tajikistan Population

As of January 1, 2016, the resident population of the Republic of Tajikistan was 8.5 million people, including 2,260 thousand of urban population, 6,290 thousand of rural population. Proportions of men and women in the republic: the number of men is 4 million 124.2 thousand, and women 4 million 36.9 thousand. The average population density is 60 people/km^2.



Sourse: Statistic Agensy under the President of the Republic of Tajikistan, 2016.

Figure 5. Population dynamics as at January 1, 1991-2016 (thousand people).

The indigenous people of Tajikistan, Tajiks, constitute about 85% of the total population. The state language is Tajik, which belongs to the Persian language group. The main religion is Sunni Islam. Russian is the language of interethnic communication and cooperation of the residents of the republic. People in the north and west of the country speak Uzbek language (14%), and people in the east of the country use Pamir dialects and Kyrgyz language. The northern, central and southern regions of the country and the regions with developed agriculture and industry are characterized by the highest population density (90-110 people/km^2), while the Pamirs has the lowest density (3 people/km^2). The largest cities in Tajikistan are: the capital, Dushanbe, with a total population of 803 thousand people, located in the central part of the country; Khujand located in the north of the country in Sughd Region; Kurgan-Tube located in Khatlon Region, the south-west of the country; Khorog located in the Gorno-Badakhshan Autonomous Oblast in the east of the country. *Table 1* below shows the population in the administrative divisions in 2016.

Table 1. Population in administrative divisions in 2016.

№	Region	Urban populaton (thousand people)	Rural population (thousand people)	Population per 1 square. km	Total population (thousand people)
1	Districts of Republican Subordinations (DRS)	259.0	1713.3	69.0	1972.3
2	Sughd Region	622.0	1889.2	99.6	2511.0
3	Khatlon Region	547.5	2500.3	124.0	3047.0
4	Gorno-Badakhshan Autonomous Oblast	29.2	188.2	3.4	217.4

The population of Tajikistan is growing rapidly: in 1960 there were 2 million people, in 1989 - 5 million and, unlike other CIS countries, the population continued to grow in 1989-1999. The main factor for population growth is high natural increase. The population of Tajikistan is

the youngest in Central Asia – the average age is less than 25 years. The average age at first marriage for women is 20 years, and the age of a mother at the time of the first child's birth is 22 years. The average fertility rate is 3.8 births per woman.

Table 2. Number of births, deaths and natural increase of the population of Tajikistan.

Year	Population			Per 1000 people		
	Total in the republic	Including:		Total in the republic	Including:	
		Urban	Rural		Urban	Rural
	Number of births					
1991	212598	50413	162185	39,1	29,9	43,3
1995	193182	47475	145707	34,1	30,2	35,6
2000	167246	42382	124864	27,0	25,8	27,5
2005	180790	42563	138227	26,4	23,5	27,4
2010	239805	54563	185242	31,7	27,2	29,8
2011	224178	55081	169097	29,1	27,0	29,8
2012	219281	53371	165910	27,8	25,6	28,5
2013	209417	50508	158909	25,9	23,6	26,8
2014	229460	54878	174582	27,8	25,0	28,8
2015	237551	53043	184508	28,1	23,7	29,7
	Number of deaths					
1991	33067	11123	21944	6,1	6,6	5,9
1995	34274	12277	21997	6,0	7,8	5,4
2000	29387	9320	20067	4,7	5,7	4,4
2005	31520	9697	21823	4,6	5,4	4,3
2010	33343	9936	23407	4,4	5,0	4,2
2011	33855	9836	24019	4,3	4,8	4,2
2012	33972	10418	23554	4,3	5,0	4,1
2013	31706	10090	21616	3,9	4,7	3,6
2014	32879	9830	23049	4,0	4,5	3,8
2015	33563	9959	23604	4,0	4,5	3,8
	Natural increase of the population					
1991	179531	39290	140241	33,0	23,3	37,4
1995	158908	35198	123710	28,0	22,4	30,2
2000	137859	33062	104797	22,3	20,1	23,1
2005	149270	32866	116404	21,8	18,2	23,1
2010	206482	44627	161835	27,3	22,3	29,0
2011	190323	45245	145078	24,7	22,2	25,6
2012	185309	42953	142356	23,5	20,6	24,5
2013	177711	40418	137293	22,0	18,9	23,1
2014	196581	45048	151533	23,8	20,5	25,0
2015	203988	43084	160904	24,1	19,3	25,9

Source: Statistic Agensy under the President of the Republic of Tajikistan, 2016.

Age distribution of the population as the following: 34% - people under 15 years old, 63% - people aged 15 to 65 years, 3.4% - people more than 64 years old. In absolute figures, the age groups of the population are:

- 2,975 thousand people under 15 years old, including: male – 1,514 thousand; female – 1,461 thousand;

- 5,499 thousand people older than 15 and under 65 years, including: male – 2,723 thousand; female – 2,775 thousand;
- 295,610 people above 65 years, including: men – 125,224; women – 170,474 people.

Table 3. Population dynamics in Tajikistan.

Year	The population at the beginning of the year, thousand people	Including:		Share of the urban population, %	Population growth rate, %		
		Urban	Rural		Total population	Urban	Rural
1991	5361,0	1676,6	3684,4	31,3	2,7	1,3	3,3
1995	5633,9	1582,4	4051,4	28,1	1,2	-1,1	2,1
2000	6127,5	1626,0	4501,5	26,5	2,0	2,1	2,0
2001	6250,0	1659,9	4590,1	26,5	2,0	1,8	2,1
2002	6375,5	1690,5	4685,0	26,5	2,0	1,7	2,2
2003	6506,5	1719,9	4786,6	26,4	2,0	2,2	2,0
2004	6640,0	1757,8	4882,2	26,5	2,1	1,9	2,2
2005	6780,4	1791,9	4988,5	26,4	2,1	1,8	2,1
2006	6920,3	1824,8	5095,5	26,4	2,1	1,8	2,2
2007	7063,8	1857,7	5206,1	26,3	2,1	2,1	2,2
2008	7215,7	1896,7	5319,0	26,3	2,2	2,4	2,1
2009	7417,4	1973,5	5443,9	26,3	2,1	2,4	2,0
2010	7529,6	1987,5	5542,1	26,4	2,0	2,0	2,0
2011	7621,2	2020,5	5600,7	26,5	1,2	1,5	1,0
2012	7807,2	2064,8	5742,4	26,4	2,4	2,2	2,5
2013	7987,4	2106,5	5880,9	26,4	2,3	2,0	2,4
2014	8161,1	2170,9	5990,2	26,6	2,2	3,1	1,9
2015	8352,0	2215,5	6136,5	26,5	2,3	2,1	2,4
2016	8551,2	2260,3	6290,9	26,4	2,4	2,0	2,5

Source: Statistic Agensy under the President of the Republic of Tajikistan, 2016.

In Tajikistan, the overall literacy rate among young people is 99.88% (the concept of youth in this case covers the population aged 15 untill 24), 99.86% and 99.89% for men and women respectively. The literacy rate among adult people is 99.77% of the total adult population. The adult population is people above 24 years old. The adult male literacy rate is 99.83% and the adult female literacy rate is 99.72%.

Education and training are the priority areas of state policy, for which up to 17% of budget is allocated (over 3 billion somoni). The number of school children in 2016 exceeded 1.8 million children and there are 600 thousand of students in universities, lyceums and technical schools. Over 90-98% of children attend elementary school (grades 1-4), and about 85% attend secondary school (grades 5-11). There is almost no difference in numbers of boys and girls attending elementary school.

Table 4. Number of students by age.

Age, year	2012/13	2013/14	2014/15	2015/16	2016/17
Total	***1712867***	***1715939***	***1741628***	***1784367***	***1837762***
Including:					
6 years	5159	5695	7915	13049	10654
7 years	162829	168133	180053	198841	214695
8 years	167724	165262	171121	183086	201854
9 years	161738	167347	164771	170596	182418
10 years	168607	160955	166777	164243	170009
11 years	161683	167460	160266	166125	163329
12 years	171627	160968	165894	159962	165123
13 years	171511	169800	159708	164952	159017
14 years	164950	169009	168167	158859	164081
15 years	156497	162344	166506	164784	156504
16 years	110607	117797	122164	127713	129938
17 years	108642	99976	107413	111265	119535
18 years and above	1293	1193	873	892	605
Girls	***810366***	***816006***	***830385***	***851183***	***877952***
Including:					
6 years	2397	2677	3756	6243	5152
7 years	78072	81151	86630	95781	103379
8 years	81173	79786	82875	88390	97339
9 years	78232	81093	79570	82701	88176
10 years	81117	78073	80768	79164	82482
11 years	77054	80157	77170	79992	78434
12 years	82035	76892	79377	76992	79552
13 years	81700	80903	76329	78931	76544
14 years	78045	80437	79715	75857	78525
15 years	73257	76457	79123	78142	74539
16 years	50009	54397	56521	58704	60147
17 years	46823	43628	48190	50036	53502
18 years and above	452	355	361	250	181

Source: Statistic Agensy under the President of the Republic of Tajikistan, 2017.

There are more than 3.7 thousand general education schools, over 100 special and higher educational institutions teaching 150 specialties. The highest percentage of people with higher education is in Dushanbe and GBAO, especially among women (20%). About 5 thousand students from Tajikistan study at universities in the USA, Europe, Russia, China, Turkey and other countries. Institutions of secondary technical education train specialists in pedagogy, medicine, culture, economics and agriculture. More than 400 thousand people are employed in the field of education. The level and quality of teaching and education, the level of knowledge deepening, teachers' skills, school children and students require continuous improvement. Knowledge and understanding of the climate change issues remains limited.

It is noteworthy that the number of poor people, mainly in rural areas, decreased from 80-83% in 1999-2000 to 40-45% in 2009-2011. The development of entrepreneurship, attraction of investments, the issuance of microcredits and international assistance have collectively contributed to the reduction of poverty and employment growth. Among the main causes of persistent poverty in Tajikistan, UNDP notes the following: high unemployment, especially among young people; low quality of education; limited access to electricity, drinking water and sanitation; degradation of natural resources. According to the Human Development Index

(0.622 in 2014), Tajikistan ranks 125th out of 190 countries of the world, next to Kyrgyzstan. Welfare is unevenly distributed across regions.

A significant part of the population capable of working, mostly male, in the country is forced to become labour migrants due to low wages (the average wage was 700 somoni in 2013, including the smallest in agriculture — less than 300 somoni, the largest in the financial, industrial and construction sector — over 1,500 somoni) and high unemployment. The minimum wage and pension is 200 somoni. Unemployment statistics do not reflect the true picture, since about 55 thousand people (2.5%) out of a total of 2.2 million of the economically active population have official unemployment status. Every year, according to reports, over 200 thousand jobs are created in the country, but most of them are temporary or seasonal jobs.

Labor migration to neighboring countries, especially to Russia and Kazakhstan, played a key role in increasing the income and purchasing power of the population. Every year, about 1-1.5 million labor migrants transfer an amount equivalent to $3-4 billion dollars to the country, which reaches the half (45-47%) of GDP and is a source of support for many families and small businesses. According to the World Bank (2011), about 40% of household incomes in rural areas are migrants' remittances. Due to the gap between growing labor resources and the pace of job creation over the past ten years, a high level of labor migration persists. During the assessment of the adaptation capacity performed by UNDP in 2012, resident often considered migration as a factor that weakens adaptation opportunities, especially to natural disasters. The need to improve medical services and accessibility to it, as well as maintaining the level of education and motivations for young people and specialists, were also among the most important factors. The public health system has 456 state hospitals, 1.7 thousand medical houses, a total of 3.7 thousand various medical institutions. 16.6 thousand doctors and 41.3 thousand mid-level medical personnel (20 doctors and 48 mid-level health workers per 10 thousand people) provide public medical services to the population. About 6% of the state budget is allocated to support the health care system. The number of private clinics and doctors is growing every year, but even in the public sector, part of the treatment cost is paid by the population. Medical insurance is poor. The incidence of dangerous infections associated with the influence of climatic factors, such as malaria and typhoid, significantly decreased from the peak values in 1996-1998. The success of antimalarial interventions has been achieved due in no small part to the support of the World Health Organization (WHO), UNDP and bilateral assistance. Despite the progress in protecting and improving maternal and child health, many reproductive health problems have not been resolved. The prevalence of goiter, anemia and vitamin deficiency among children and women remains high. Child mortality (age group of children under 5 years old) decreased from more than 120 per 1 thousand live births in 1993, to 76 in 1998-2002 and to 43 in 2008-2012. Khatlon Region has the highest child mortality rate, and Dushanbe has the lowest child mortality rate. The infant mortality rate (up to 1 year old) is 34 per 1,000 live births, and the child mortality rate (1-5 years old) is 9 per 1,000. In Tajikistan, the HIV prevalence rate remains low, amounting to 0.3% among population aged 15-49 years in 2011.

Access to electronic information and communications is increasing and improving. Cell phone ownership increased from 10% in 2005 to more than 90% in 2016. Almost all households (95%) in Tajikistan have a TV, while radio is less common (25%). About 30% of the population use newspapers and magazines. Permanent access to the Internet is provided for 5-10% of the population, but a significant part of the population has irregular access, including via mobile phone.

1.7 Economic Development

From the day of its independence (1991), the country has not just undergone serious economic upheavals, but also survived the civil war of the 1990s. After the civil war (1992-1997), Tajikistan has experienced the phase of transition from a post-conflict state to an economically viable country that promotes the principles of sustainable development through building a democratic society and a market economy. At the same time, Tajikistan continues to be the poorest country in the Commonwealth of Independent States (CIS) with a population of 8.5 mln.people (2016). More than 70% population lives in rural area and the level of GDP per capita is slightly more than $ 800 (2016). Poverty level is very high in the country with more than half of the population lives on less than $ 2.15 a day. Nevertheless, the country's economy is developing quite dynamically, and in the last few years there is an economic growth of more than 7% per year, which gives hope for resolution of the difficult economic situation.

According to 2016 official statistics of the Statistics Agency under the President of the Republic of Tajikistan, gross domestic product was amounted to 6951,7 mln.USD, which is 15,9% as less as in 2015 (in national currency – growth was for 6,9%). GDP per capita for the same period was 800,3 USD, which was 13.9% less than that of 2015.

In 2016, agriculture was a priority sector for the country’s economy with 20,7% share of GDP, followed by the industry, including energy sector - 15,1%, trade - 14,0%, transport, communication - 11,5%, taxes - 11,3% and construction - 11,2%.

In 2016 the major commodity markets of Tajikistan were: food, non-precious metals, POL, chemical products, transport vehicles.

Currently, Tajikistan is ranked No.129 (2016) in terms of human development index and belongs to the middle-income countries. According to the Global Competitiveness Report for 2015–2016, Tajikistan was ranked No.80, and according to the Doing Business rating, the country is ranked No.132 (in 2016).

In Tajiksitan the start of economic reforms coincided with the complication of political situation in the country. Real GDP in Tajikistan has dropped sharply from 1991 to 1996 by almost 68%. In the sectoral composition of GDP, indicators for industry for 1992-1994 decreased by 14,3%, transport sector by -2,1%. Industrial production in 1994 was 41,9%, compare to 1990.

It was possible to achieve some stabilization of economy in 1997-2007 due to favorable external conditions, such as doubled exports and increased world prices mainly for aluminum and cotton, which led to an increase in production capacity and an increase in total factor productivity. At the same time, domestic demand for goods and services, especially for agricultural products has increased.Foreign trade turnover of the country in 2000-2013 has increased by more than 3.8 times, and the country's economy grew annually by 7–8% in these periods. From 1990 to 2013, the average annual GDP growth per capita amounted to $21.7 US dollars, or 4.1%. During this period, GDP growth was 49%, from $536 USD in 1990 to $1,051 USD in 2013

Hydroenergy resources play an important role for the economy of Tajikistan. Development of this sector has started in the mid-twentieth century (in the 60s) and actively continued until the mid-80s. Energy production in the country has remained stable over the last twenty years. Presently, total annual demand for electricity in Tajikistan is about 22-24 billion kWh/hour, while the country produces annually about 19-20 billion kWh. Shortage of the energysupply amounts to 4 billion kWh. Deficit of electricity in the country falls on the cold time of the year - autumn and winter, while in the warm period, in late spring and summer, energy produced in the country exceeds the domestic demand by 2 billion kWh.hour.

The development of hydropower sector in Tajikistan is a strong argument for the strengthening and increasing of the installed capacities of the industrial sector. In the Soviet times, commissioning of the cascade of the Vakhsh hydropower plants effectively impacted not only the economy of Tajikistan, but those of the neighboring countries. Just with the capacity of Nurek HPP (3000 MW) and its water resources Uzbekistan could develop 1 million 400 thousand hectares of land and increase the incomes of water users. In the future, with the commissioning of the Roghun HPP, the downstream countries – Uzbekistan and Turkmenistan will be able to irrigate around 3million hectares of land.

The country also uses the potential of small hydropower facilities with the total estimated capacity of more than 20000 MW. In accordance with the plans of the Government of Tajikistan and as provided by the national program for the development of small HPPs by 2020, the country shall built more than 100 small HPPs. Transboundary cooperation projects for construction of high voltage transmission lines are implemented in the country. In May, 2016 the President of Tajikistan has launched CASA-1000. This is the first joint project of the Central and Southern Asia that would connect electricity networks of Tajikistan, Kyrgyzstan, Afghanistan and Pakistan. Total budget of the project is estimated at $1bln.USD, length of the power transmission line shall be 750 km. The first phase provides for the construction of the 500kW power transmission lines of 477 km duration from Tajikistan to Afghanistan and further to Pakistan.

Over the past years, the economy of Tajikistan has been developing in weak foreign market conditions. In this regard, the declared development priorities of the country are fully justified. These priorities include: transition of the country to a market economy, development of various types of property, including private ownership, strengthening of trade relations with foreign countries, membership in the influential regional and international organizations, construction of the railways and highways, as well as ensuring energy independence and food security, creation of small and large agricultural and industrial enterprises. The socio-economic development of the country in the medium term will largely depend on the implementation of the declared measures.

1.8 Industry

The industry of Tajikistan consists of more than 90 branches and over 140 types of products related to mining and processing of mountain minerals, coal mining, light and chemical industries, engineering, metal processing, building materials and food industry.

Most of the enterprises in this sector have been transformed into joint-stock and private forms of ownership, joint ventures have been created with the attraction of foreign capital.

In the republic, there are sufficient stocks of raw materials for the metal, chemical, construction and other industries. The largest deposits of silver, gold, iron, lead, antimony, coal, salt, precious stones and other minerals are explored. In the near future, metallurgical, mining, chemical, machinery, textile and other enterprises with high export capacity can meet the increasing consumer demand for high-quality raw materials and products both within the country and abroad.

At present, the industrial sector is developing and modernizing, and it is under the constant attention of the Government of the Republic of Tajikistan. Dozens of partnership agreements signed between the Government of the Republic of Tajikistan and domestic and foreign companies are being successfully implemented. These agreements consider the establishment of new enterprises for: the production of cement and various types of building materials; metallurgy and metal processing; mining and mountain mineral processing; coal mining and oil and natural gas extraction; chemical production; and machinery. The positioning of new enterprises in the regions and the improvement of production capacities are specified in

strategic documents and government programs, taking into account an adequate supply of natural raw materials. These issues are priorities of the country's industrial policy.

Based on internal and external investments, hundreds of large and small enterprises were established and jobs were restored, providing more than 200 thousand people in the country with permanent job. In 2016, the number of enterprises in the country reached 2068 units, they provide permanent job for more than 86.4 thousand people in the country.

Food industry and agriculture play an important role in ensuring the country's food security. They are also greatly important for solving a number of issues, including providing jobs for rural population, increasing the share in total domestic production and increasing the country's export capacity. The number of enterprises in the industry was 300 units in the 1990s and grew to more than 700 large, medium and small enterprises in 2015, employing more than 7.5 thousand of working-age population.

Due to large reserves of non-mineral raw materials for building material production, the country occupies one of the leading positions in the world. Currently, more than 400 deposits with a stock of 30 different types of raw materials (limestone, granite, granodiorite, marble, marbled limestone, alabaster, soil, quartz sand) are being developed.

Building material production is developing in accordance with programs and concepts aimed at a twofold increase in production, the creation of new jobs, considering reducing poverty. While there were 30 building materials industry enterprises in the republic in 1990s, their total number reached 450 in 2015, with employement of 8431 people, which is three times more than in 1991.

Since 2005, enterprises for the processing of scrap metal, waste of ferrous and non-ferrous metals, the number of which currently reaches 33 units, have been established on the basis of machinery enterprises. These enterprises produce mainly building bars, metal angles, metal threads, aluminum products, etc. from metal waste and supply domestic and foreign markets.

Regarding the chemical and petrochemical industries, it should be noted that in 1991 there were only 10 enterprises in the republic. This figure reached 45 units in 2015 and the volume of production of these enterprises is 86 million somoni.

Being the most important structure of the fuel and energy complex, coal mining can have a significant role in reducing energy limitations and ensuring the country's energy independence with the support from domestic and foreign investors. Due to the increasing demand for coal in various sectors of the republic, its production amounted to more than 1.3 million tons in 2016.

Today, Tajikistan has approached a qualitatively new stage, which is beginning to bear fruit, by accumulating experience in restructuring industrial enterprises and developing private entrepreneurship. Under existing conditions, Investments in the real sector of economy of the Republic of Tajikistan become effective and profitable.

1.9 Energy

Tajikistan has significant hydropower resources, which is estimated at 527 billion kWh per year (*Table 5*). By hydropower resources, the country ranks second among the CIS countries (after Russia) and eighth in the world after China. More than 60% of the rivers in the region originate in the mountains of Tajikistan. The country actively develops hydropower. In recent years, the following major facilities have been built and put into operation in the republic:

- Sangtuda-1 Hydropower Plant with installed capacity of 670 MW;
- Sangtuda-2 Hydropower Plant with installed capacity of 220 MW;
- Dushanbe-2 Thermal Power Plant (TPS-2) with installed capacity of 400 MW;
- 500 kV South-North Power Transmission Line;

- 220 kV Kanibadam-Batken Power Transmission Line;
- 200 kV Lolazor - Khatlon Power Transmission Line;
- 220 kV Tajikistan-Afghanistan Power Transmission Line;
- more than 100 small hydropower plants;
- high-voltage substations.

Construction works of the strategically important hydropower facility, the largest in Central Asia Rogun Hydropower Plant launched in 1976 continue.

After the CASA-1000 Project implementation started in 2016 a significant increase in the electricity exports to Afghanistan and Pakistan is planned.

Since state independence, the country produced 398.7 billion kWh of electricity and 20.9 million Gcal of thermal energy, 20.5 billion kWh was exported and 23.1 billion kWh was imported.

Table 5. Potential hydropower resources of the rivers of Tajikistan

River basins	Average annual capacity, MW.	Average annual energy, TWh.	Share in total,%
Panj	14030	122,90	23,20
Gunt	2260	19,80	3,73
Bartang	2969	26,01	4,93
Vanj	1191	10,34	1,96
Yazgulyam	845	7,40	1,39
Kyzylsu	1087	9,52	1,78
Vakhsh	28670	251,15	48,00
Kofarnihon	4249	37,22	7.00
Karakul lake	103	0,90	0.17
Surxondarya	628	5,50	1,03
Zarafshan	3875	33,94	6,38
Sirdarya	260	2,28	0,43
Total	**60167**	**527,06**	**100,00**

13 Hydropower plants (*Table 6*) and 3 thermal power plants (*Table 7*) are located on the territory of the country.

Table 6. Hydrotechnical facilities on the territory of Tajikistan

№	Name	Installed capacity, MW	River
1	Nurek HPP	3000	Vakhsh
2	Sangtuda-1 HPP	670	Vakhsh
3	Baipazin HPP	600	Vakhsh
4	Head HPP of the Vakhsh Cascade	240	Vakhsh
5	Sangtuda-2 HPP	220	Vakhsh
6	Kairakkum HPP	126	Sirdarya
7	Perepadnaya HPP of the Vakhsh Cascade	29,95	Vakhsh
8	Pamir-1 HPP	28	Gunt
9	Central HPP of the Vakhsh Cascade	15,1	Vakhsh
10	Varzob-2 HPP	14,4	Varzob
11	Khorog HPP	8,7	Gunt
12	Varzob-1 HPP	7,44	Varzob
13	Varzob-3 HPP	3,52	Varzob

Table 7. Thermal power plants on the territory of Tajikistan

№	Name	Installed capacity, MW
1	Dushanbe Thermal Power Plant	198
2	Yavan Thermal Power Plant	120
3	Dushanbe-2 Thermal Power Plant	400

Despite the energy sector development, there is an electricity shortage in the country which negatively affects the development of the economy, entrepreneurship and the level of employment. The annual loss from the introduction of electricity consumption limit in autumn and winter amounts to more than $ 200 million. Ensuring the country's energy independence is the most important strategic direction of the republic's economic policy.

To solve this issue, the priority is given to the completion of the Rogun HPP (the project costs $5 billion), the upper stare of the Vakhsh Cascade. The implementation of this project is planned to allow not only fully meet the country's yearlong internal electricity needs, but also to export significant amounts of electricity to other countries. These activities will result in significant increase of the production capacity and export opportunities of the country and the expansion of the power transmission infrastructure, will create new opportunities for the economy and social sphere, improve access to electricity and the w people's well-being.

1.10 Agriculture

Agriculture is one of the most important sectors of the national economy. The achievement of one of the strategic goals – ensuring food security – depends on the development of this sector. It should be noted that today, this industry provides for 20-23.5% of gross domestic product by systematically increasing and strengthening agricultural production, increasing incomes and ensuring social employment. This accordingly contributes to the systematic provision of the population with food, as well as the protection of natural resources.

In 2016, the agricultural production increased to 22.2 billion somoni, which is 69.1% more than in 1991.

Taking into account the country's population growth and the increasing demand for agricultural products, 9.6 hectares of new lands were introduced into agricultural circulation to ensure food security since independence.

The reform implemented in the sector in 2016 allowed to increase grain production to 1,435.8 thousand tons, potatoes – 898.0 thousand tons, vegetables – 1,748.2 thousand tons, melons – 594.1 thousand tons, fruits – 364.7 thousand tons, grapes – 214.7 thousand tons, meat – 233.3 thousand tons, and milk – 917.9 thousand tons, which is 168.4 kg of grain, 105 kg of potatoes, 204 kg of vegetables, 69.4 kg melons 42.5 kg of fruit, 24 kg of grapes per capita. This gradually leads the population to the level of self-sufficiency.

It should be noted that until 2007, there were 8 poultry enterprises operating in the republic. Their number reached 118 in 2016. As at January 1, 2016, 5,143 thousand birds were raised and 357.2 million eggs were produced in all types of economic activities.

While in 1991 there were 1390.7 thousand cattle, 3355 thousand sheep and goats, 52.6 thousand horses in the republic, in 2016, the number of cattle increased to 2278 thousand, sheep and goats - 5456 thousand and horses - 79.7 thousand.

As at January 1, 2016, 210.3 thousand bee colonies were bred in all types of economic activities in the republic, honey production reached 3852.8 tons. As a result of the program, the number of bee colonies increased by 29.7 thousand and production honey - by 2652.8 tons compared to 2011.

During the years of its independence, there has also been an increase in fish farming an. It should be noted that in 2008, 8 fish farms producing 225 tons of fish operated in the republic. Within 7 years, the number of fish farms increased to 220 units and the production of fish products increased up to 2023.3 tons, which is 213 fish farms and 1518.8 tons of fish production more than in 2008. The total area of fish farms reached 5,961.01 hectares and the area of water planes - 2,720.19 hectares, which is respectively 222.6% and 173.4% more than in 2008.

1.11 Transport

Development of transport sector is a very important task for the country and breaking of the communication deadlock is undoubtfully is one of the strategic goals for the country. It should be noted that the actual development of transport sector in the period of independence started from 1997. Only 42% of national roads and 20% of local roads had asphalt covering at those years with 73% of them in a poor condition, 26% in a satisfactory conditions and only 1% in a technically good state.

In the period of independence, building transport infrastructure was one of the tasks for the industry sector to take the country out of the communication deadlock. To achieve this goal, up to presently, 45 state investment projects were implemented in the transport sector of the country, more than 2000 km of roads, 31 km of tunnels, 200 bridges and 173, 2 km of railways have been built and reconstructed. Currently, 16 investment projects are implemented throughout the country.

Government of the country provides for the yearly increase of the budget for the maintenance of the roads in good state. In the year of 2000 - 3,8mln.TJ Somoni was allocated for this purpose, while in 2015 the total volume of financing was 60,9 mln.TJ Somoni, which is 16 times as much compare to the previous years.

In 2008-2016, 38 projects for road construction and rehabilitation were implemented with support of the foreign investments. Over this period, the following projects were completed: “Murgab - Kulma”, “Shokhon - Zigar, 1, 2, 3 phases”, “Shkev - Zigar”, “Dushanbe - Kurgantyube - Dangara - Kulyab”, “Dusti - Nizhny Pyanj, 1, 2 phases”, “Dushanbe - border of Kyrgyzstan, 1, 2, 3 phases”,“ Dushanbe - Chanak - border of Uzbekistan”,“Kurganthube - Dusti, the first phase”,“Dushanbe - Tursunzoda - border of Uzbekistan”,“Aini - Penjikent - border of Uzbekistan”, as well as tunnels - “Istiklol”, “Shahriston”, “Dusti”, “Ozodi” and “Khatlon”.

During this period, bilateral road transport agreements were signed with 21 non CIS and 13 CIS countries. At the same time, 9 international conventions and agreements were signed for the development of international cooperation of the country, which contributed to the development of international transportation.

During the years of independence, 9 international cargo terminals and 5 passenger terminals were constructed and put into operation. Presently the number of transport companies has also increased up to 220 transport entities, 57 passenger terminals, 18 cargo transportation terminals, 836 passenger lines and 41 international transport companies operating in the country.

Aviation sector has also gradually developed in this period. Air service agreements with twently one near and far-abroad countries have been signed, including 7 CIS countries: Russia, Belarus, Ukraine, Azerbaijan, Turkmenistan, Kazakhstan, Kyrgyzstan, 10 asian countries: Turkey, Iran, Afghanistan, India, China, Pakistan, Thailand, Saudi Arabia, Bahrain, Korea and 4 european countries: Luxembourg, Germany, Austria and Latvia.

Currently, national carriers offer flights to 33 destinations in 9 near and far-aborad countries according to the flight schedule. Two hundred local and foreign carriers are provided with air traffic control services.

New and modern terminals have been built in the airports of Dushanbe and Khujand cities; airport of the Kulyab city was reconstructed in accordance with the international standards in this perod.

In 1999, the Kurgantube-Kulyab railway with a length of 132 km was commissioned. Recently, the construction of an interval "Vahdat-Yavan" of the Dushanbe-Khatlon railway line with a length of 40.7 km was completed and put into operation during the celebration of the 25th anniversary of the State Independence of the Republic of Tajikistan. Presently, 33 stations and 2 railway stations were built and rehabilitated.

In 1995, the first enterprise for repair of rolling stocks was put into operation in the city of Kanibadam and in 2003. The first factory for production of concrete sleepers started its operation in the city of Sarband. SUE "Rohi Ohani Tojikiston" company has increased its operational capacity in this period after purchasing of 937 new passenger cars and freight wagons and 9 diesel locomotives.

Significant progress has been reached in telecommunication sector, which contributes to development of other social and economic sectors of the country. It should be noted that communication services, including thouse provided by private telecom operators amounted to - 5,5mln.TJS in 2000, 436,3 mln.TJS in 2005, 1778,4 mln.TJS in 2010 and 2716,0 mln.TJS in 2015. Analysis of these indicators allows to conclude that the volume of the communication sector services has increased by 494 times in 2015 compare to 2000.

Channels, which are broadcasting national programs on radio, TV and communication moved to digital broadcasting. This provides for full access to modern information services for all people from all regions of the country.

Tajikistan has extended digital connection network in 2005 – 2015, expanded service coverage, increased number of users and incomes of the sector also increase.

Number of internet users in 2005 was 67134 people, in 2010 - 1,3 mln.people and reached presently - 2,9 mln.people.

1.12 Institutional Mechanisms Related to Climate Change, to Preparation of the National Communications and Biennial Reports on a Regular Basis

Tajikistan has created the regulatory and institutional framework for actions aimed at addressing climate change issues.

Government of Tajikistan adopted more than 30 laws and bylaws in the field of environment and developed over 10 government programs and action plans and ratified a number of conventions, which take into considerations the environmental safety. National centers were established to coordinate and address environmental issues of the national and global scales.

All key government agencies and program implementing agencies, including those in the field of environment shall report to the Executive Office of the President of the Republic of Tajikistan. The relevant departments of the EOP monitor and coordinate policies and measures of the different ministries and agencies, provide information support to public officials for adoption of the national programs and action-plans.

Majlisi Oli (the Parliament) play the key role in development and improvement of legislation and bringing it into compliance with the international agreements, including those related to

climate change issues. Members of the Parliamentary Committee on Environment are well aware of the problems associated with climate change and the decisions of international environmental conventions.

To address the climate change isses, **institutional framework** in Tajikistan provides for a number of ministries and agencies, where each of them is responsible for their relevant component of this complex and intersectoral task. Among others, one could mention the Committee for Environmental Protection under the Government of the Republic of Tajikistan, Agency for Hydrometeorology, Ministry of Economic Development and Trade, Ministry of Energy and Water Resources, Ministry of Agriculture, Agency for Land Reclamation and Irrigation. Involved agencies also include: Ministry of Health, Ministry of Transport, Committee for Emergency Situations and Civil Defence, Committee on Land Use and Geodesy, State Committee on Investments and State Property Management, Interagency Committee and Academy of Science.

Committee for Environmental Protection under the Government of the Republic of Tajikistan (CEP) is responsible for control of the use of natural resources, protection of land, minerals, forests, water and other resources, and also coordinates activities on environment protection among the government agencies. Its decisions on environment protection are considered to be binding for all legal entities and individuals. It is also authorized to be the policy making body in the field of climate change and oversee the work of the Agency for Hydrometeorology. In addition, it carries out professional development of the staff for the integrated implementation of the climate change concept into the national legislation on environmental protection and sub-legal regulatory acts.

Agency for Hydrometeorology (Hydromet) of the Committee for environmental protection under the Government of the Republic of Tajikistan is a national institution responsible for the climate change issues in Tajikistan. The Director of the Hydromet is the UNFCCC national focal point. Hydromet leads the process of preparation of the national communications in coordination with the key ministries and agencies. Also it coordinates the Climate Change Research Center established in 2004. This Center analyses data from climate change research activities and reports related to adaptation and mitigation of consequences.

Secretariat of the Pilot Program Climate Change Resiliance (PPCR) (established in 2011) is responsible for the day-to-day coordination of the PPCR activities and reports to the program coordinators. The Secretariat can use the materials and experience of the Steering Committee, which serves as a contact group for the stakeholders, as well as Technical group, which was established to provide technical expertise upon the request. The guidelines for the PPCR Focal Point are implemented through the interagency committee, which is a government body led by the Deputy Prime Minister of the country.

Ministry of Energy and Water Resources of RT is a leading executive body authorized to implement the unified state policy and regulation in the fuel and energy sector, water resource management and development of renewable energy sources (RES). he Ministry is involved in climate change issues by performing the functions of the National Designated Authority for the purposes of the clean development mechanism under the Kyoto Protocol of the UNFCCC (until November 2013, these functions were with the ministry of energy and in the ministry of industry of the Republic of Tajikistan). Ministry has also taken an active part in investment projects.

Ministry of Economic Development and Trade of RT is a leading executive authority responsible for the oversight of the system of economic planning and forecasting. Among the tasks of this ministry are the development and implementation of the economic development programs, poverty reduction and sustainable development strategies.

Ministry of Agriculture of RT develops and coordinates the state policy, pleans and state programs in agriculture. It also supervises the work of the Academy of agricultural science - the center of the agrarian science in Tajikistan and closely linked with Tajik Agrarian University.

The Ministry of Industry and New Technologies of the Republic of Tatarstan is a government body that develops and implements a unified state policy in the republic's industrial sector.

Ministry of Industry and New Technologies of RT is a government body that develops and implements a unified state policy in the industry sector of the country. In terms of environment and climate change issues, the ministry organizes the development and implementation of inter-sectoral research and technical programs and innovative projects; conducts selection and control over the implementation of investment projects using modern energy-saving technologies and environmentally friendly production, carries out the reviews of industrial companies to check the compliance with the technological, environmental and other standards and government requirements.

Ministry of Education and Science of RT is a central executive authorities in the field of education that carries out the unified state policy and regulates regulatory framework in the field of education and science, in the field of teaching and upbringing, scientific and technical activities, guardianship and trusteeship, as well as support and social protection of students and pupils of educational and scientific institutions. The Ministry is actively involved in the development and implementation of environmental programs at schools and universities.

Forestry Agency under the Government of the Republic of Tajikistan is a central executive authority of the country that performs functions of policy making and implementation, legal regulation and state management of forest, forestry activities, forest resources, hunting and hunting facilities, flora and fauna, specially protected natural parks as well as operational management of the system and state control. It is actively involved in the implementation of climate change programs and projects.

Statistics Agency under the President of the Republic of Tajikistan is a government body in the field of statistical policy and economic analysis. It performs its activities on collection and dissemination of statistics using the principles of an objective and comprehensive research of social, economic and environmental processes taking place in the country, as well as registering the administrative and territorial units and settlements.

State Committee for Land Management and Geodesy of the Republic of Tajikistan is a leading government agency in the field of land use, related reforms and keeping records of land plots. The committee oversight the land use, conduct inventories and register land use rights, determining land tax, controls changes in land use and forestry management.

Committee for Emergency Situations and Civil Defence (CESCD) is involved in early warning, prevention and disaster managmenet and disaster risk reduction. There is a system of monitoring and early warning in case of outburst of Sarez lake under the CESCD. The Committee keep record and forecast disasters, conducts laboratory researches.

Institutuonal framework for climate change issues in Tajikistan is presented in the Annex 1.

2 NATIONAL GREENHOUSE GAS INVENTORY

Present chapter presents information on greenhouse gas inventory that was conducted for the preparation of the Biennial Report of the Republic of Tajikistan. GHG Inventory (presented in 2018[1]) covers the period from 2004 to 2014.

Tajikistan GHG Inventory was developed in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, including emissions and removals of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and perfluorocarbons — CF_4 (tetrafluorocarbon) and C_2F_6 (hexafluorocarbons).

In accordance with the key provisions of the Decision 1/CP16 and in accordance with the guidelines of the Annex III of the Decision 2/CP17 about the provision of information on the national inventories of greenhouse gases in the BUR by non-Annex I Parties, BUR1 of Tajikistan includes:

- Summary of the National Greenhouse Gas Inventory;
- Inventory Sector Tables in accordance with the 2006 IPCC Guidelines;
- Key category analysis (KCA);
- Uncertainty analysis;
- Agreed time series for 2000-2014;
- Summary table of inventory data for 2004 - 2014.

The following sectors have been reviewed in accordance with the 2006 IPCC Guidelines:

- Energy
- Industrial Processes and Product Use (IPPU);
- Agriculture, Forestry, other types of Land Use (AFOLU);
- Waste

2.1 Review of the Methodology Used

Guidelines

National inventory of greenhouse gases was prepared in accordance with the 2006[2] IPCC Greenhouse Gas Inventories Guidelines. IPCC 2006 Inventory Software - IPCC2006 V2.54[3] developed for these Guidelines was used to enter data, estimate emissions, analyze results and draw the conclusions.

Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC 2000[4]), Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC 2003[5]),

as well as 1996 IPCC Guidelines for National Greenhouse Gas Inventories[6].

[1] The year of submission of the GHG inventory does not correspond to the last reported year. In this case the year of the submission of the GHG inventory is – 2018 and the last reported year is - 2014.
[2] https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html
[3] https://www.ipcc-nggip.iges.or.jp/software/index.html
[4] https://www.ipcc-nggip.iges.or.jp/public/gp/english/index.html
[5] https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html
[6] https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html

Global Warming Potential

Emissions of CH_4, N_2O, PFCs were recalculated in CO_2 equivalent (CO_2 eq.) using global warming potential (GWP) values provided by the IPCC in the Second Assessment[7] Report based on the impact of greenhouse gases over a 100-year period.

GHG	GWP
CO_2	1
CH_4	21
N_2O	310
CF_4	6 500
C_2F_6	9 200

Methodologies

Greenhouse gases inventories were prepared in accordance with the below given principles:

- Clear adherence to the logic and structure of the 2006 IPCC Guidelines;
- Priority is given to the use of national data and indicators;
- Use of all possible sources of information.

In preparation of the greenhouse gases inventory the highest priority was given to direct emissions - CO_2, CH_4 and N_2O from the key categories as well as emissions of PFCs.

Emission estimates were based on a sectoral approach, using Tier 1 and Tier 2 methods.

Tier 2 method was used to estimate the emissions in the sector of waste: CH4 emissions as a result of solid waste disposal.

Other emissions were estimated using the Tier 1 method with the default parameters as provided in the 2006 IPCC Guidelines and based on country data.

2.2 Information on Total Greenhouse Gas Emissions in Tajikistan

Total greenhouse gas emissions in CO_2 eq. without LULUCF sector in 2014 were – 9 131,01 Gg. Emissions in 2014 were higher by 3,0 % compared to 2013.

The *Table 8* below presents the estimates of the GHG emissions in Tajikistan for 2004-2014.

Table 8. GHG emission trends for 2004-2014., Gg in CO_2 eq.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
GHG with LULUCF	8 108,45	7 921,95	8 718,21	8 485,09	8 015,45	7 235,25	6 586,18	7 311,50	6 844,49	7 303,55	7 554,42
GHG without LULUCF	9 568,87	9 382,37	10 209,81	9 981,33	9 517,18	8 733,15	8 097,97	8 847,43	8 394,98	8 867,53	9 131,01

[7] https://www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf

Table 9. GHG emissions by sectors and gases for 2014, Gg in CO_2 eq.

	CO_2	CH_4	N_2O	PFC	Total CO_2 eq.
Energy	2 475,46	56,02	12,12	NA	2 543,60
IPPU	798,75	NA	NA	359,90	1 158,65
Agriculture	57,89	3 988,75	509,51	NA	4 556,15
Waste	NO	790,22	82,39	NA	872,62
Total emissions (without LULUCF sector)	**3 332,09**	**4 834,99**	**604,03**	**359,90**	**9 131,01**
LULUCF	-1 576,60	NA	NO	NA	-1 576,60
Emissions including removals (with LULUCF sector)	**1 755,50**	**4 834,99**	**604,03**	**359,90**	**7 554,42**

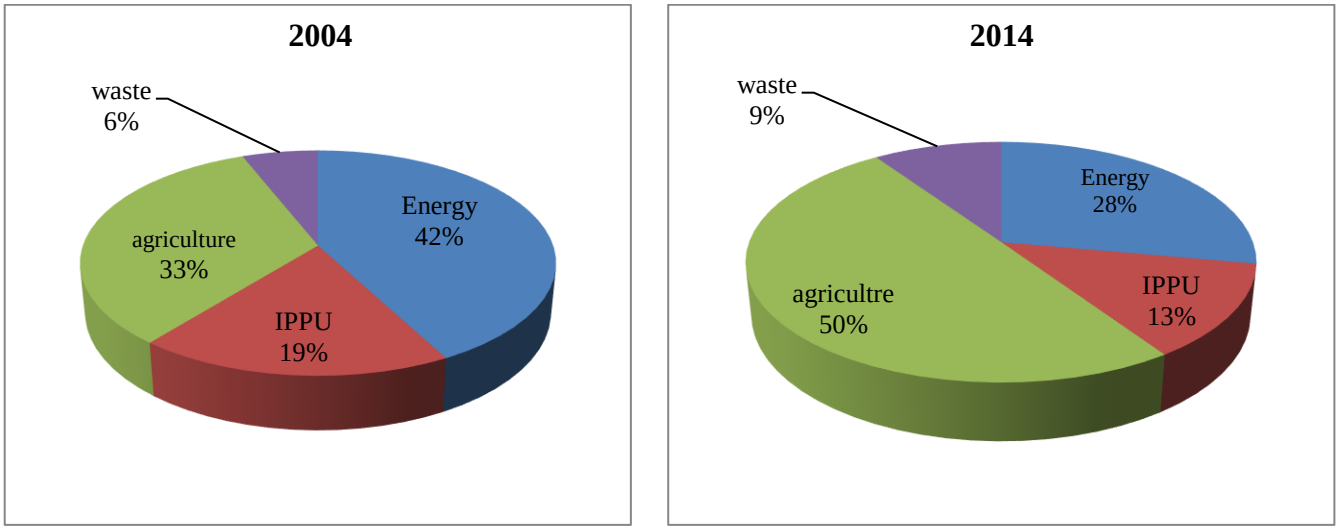


Figure 6. GHG Emissions by sectors without LULUCF, in CO_2 eq.

Agriculture sector is the key source of greenhouse gas emissions in Tajikistan, in 2014 the CO_2 eq. GHG emissions in this sector amounted to a half of all GHG emissions for the country. Key sources of emissions in the sector are: 3.C.7 – Rice Cultivations, CH4, 3.A.1 – Enteric Fermentation of animals, CH_4, 3.A.2 – Manure Management, CH4, 3.C.3 – Urea Application, 3.C.4 – Direct N_2O Emissions from managed soils.

Energy is the second key sector, in terms of its significance, contributing to GHG emissions. In 2014, the CO_2 eq. emissions in this sector were 28% from all emissions of the country. Sector includes: 1.A.1 – Energy industries (combined heat and power generation (CHP)), which provides for emissions of all key gases, key greenhouse gas is carbon dioxide, 1.A.2 – Manufacturing Industries and Construction, 1.A.3 – Transport, 1.A.4 – other industries, 1.B – Fugitive emissions from fuels.

The following *Figure 7* shows the shares of greenhouse gas emissions in 2004 and 2014.

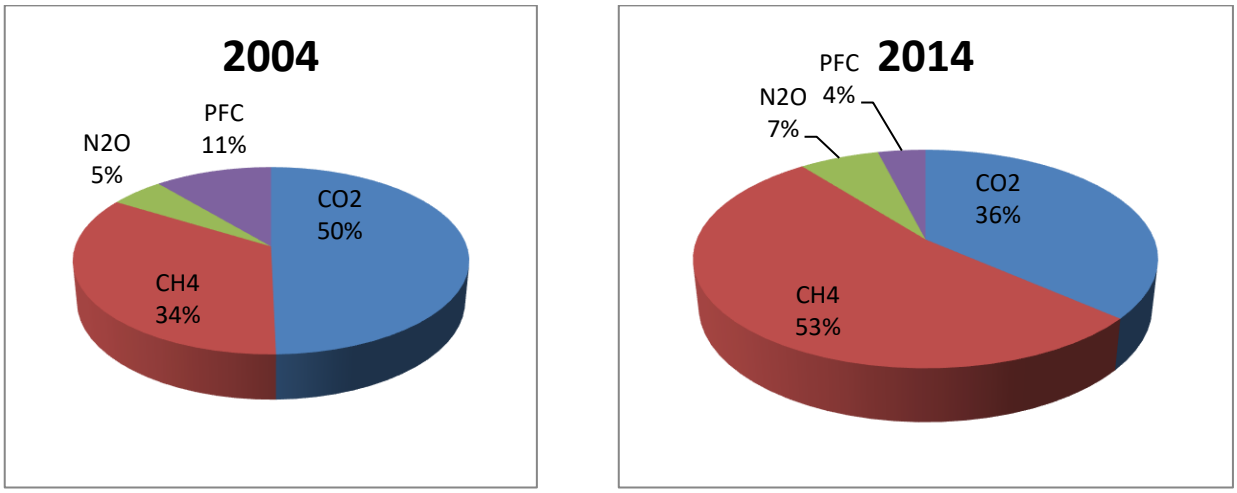


Figure 7. GHG Emissions by gases (without LULUCF)

Methan is the most significant greenhouse gas. Its share in total volume of GHGs in the country in 2014 was: 53%.

The following figure (*Figure 8*) gives GHG emissions by sectors and gas in 2014.

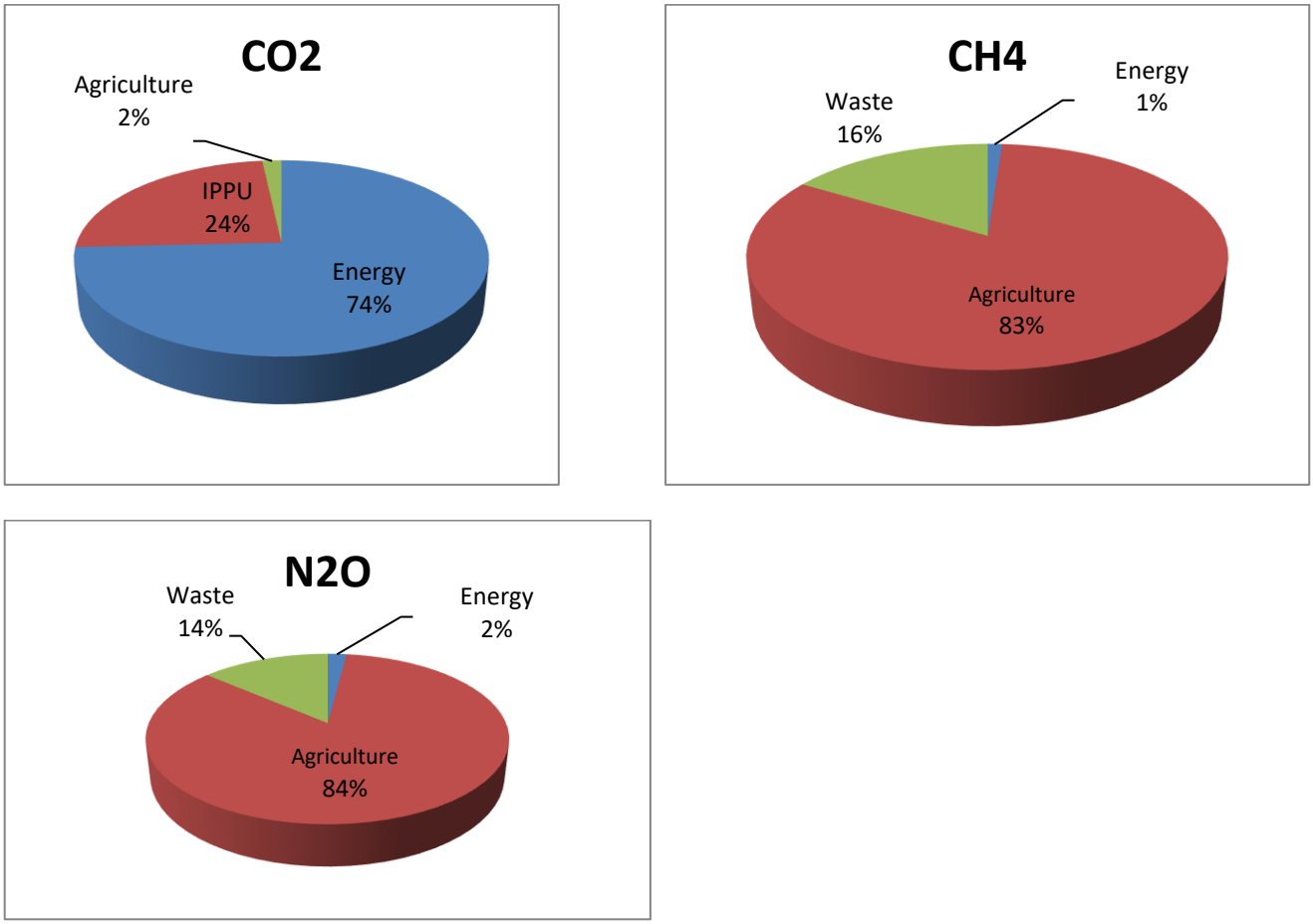


Figure 8. Emissions of the GHGs by sectors and gases in 2014 (without LULUCF).

The highest methane emissions in 2014 were observed in the Agricultural sector due to the high emissions in the sub-sectors 3.A.1 - Enteric Fermentation and 3.A.2 - Manure mnagement, which constituted up to 83% of all emissions of this gas.

The second largest sector of methane emissions - Waste, emissions accounted for about 16% of all emissions of this gas in 2014.

Carbon dioxide emissions account for 36% of the total emissions of all greenhouse gases.

The main part of carbon dioxide emissions occurred in the Energy Sector - about 74% of all carbon dioxide emissions in 2014. The largest emissions of this gas were observed in the sub-sectors 1.A.1 - Energy industry, 1.A.2 - Manufacturing industry and construction, 1.A.3 - Transport.

Industrial processes and product use (IPPU) is the second sector in terms of carbon emissions. CO_2 emissions in the sector accounted for 24% of the total emissions of this gas in 2014. Major subsectors: 2.A.1 - Cement production, 2.C.3 - Aluminum production.

N_2O nitrous oxide emissions account for almost 7% of the total emissions of all greenhouse gases. The largest share of the nitrous oxide emissions (84%) coming from the Agriculture sector. The most significant sub-sector is 3.C.4 - Direct N_2O emissions from cultivated soils. The next sector in terms of N_2O emissions is the Waste sector (14%) with the 4.D - Wastewater treatment and discharges as the most important sub-sector.

GHGs emissions in Tajikistan have reduced by 64.3% in 2014 compared to 1990 (25543 Gg in CO_2 eq.) and accounted for 9131,01Gg in CO_2 eq.

2.3 GHGs Emissions by Sectors

2.3.1 Sector 1 - Energy

According to the revised UNFCCC Guidelines, data on CO_2, CH_4, N_2O emissions are presented in the "Energy" sector,

Table 10. GHG emission trends in the Energy sector in Gg CO_2eq. by subsectors

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1 – Energy	**4 040**	**3 156**	**3 833**	**3 175**	**2 947**	**2 214**	**1 422**	**2 236**	**1 744**	**2 274**	**2 544**
1.A - Fuel Combustion Activities	4 013	3 126	3 800	3 139	2 910	2 177	1 383	2 195	1 698	2 229	2 494
1.A.1 – Energy Industry	283	91	400	251	300	300	251	584	509	774	759
1.A.2 - Manufacturing Industries and Construction	488	223	696	391	551	399	392	584	321	395	259
1.A.3 – Transport	408	460	514	274	213	263	256	436	183	370	225
1.A.4 – other sectors	2 834	2 352	2 190	2 224	1 846	1 214	484	591	685	689	1 251
1.B – Fugitive emissions from fuels	27	30	33	37	37	37	39	41	47	45	49
1.B.1 – Solid Fuels	2	2	2	3	4	4	4	5	9	11	18
1.B.2 – Oil and Natural Gas	25	28	30	33	33	34	35	36	38	35	31

Table 11. GHGs emissions trends in the Energy sector by gases in Gg, CO_2 eq.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CO_2	3 987	3 096	3 775	3 119	2 892	2 157	1 368	2 174	1 684	2 210	2 475
CH_4	36	45	46	45	43	45	44	47	50	53	56
N_2O	17	15	12	12	12	12	10	15	10	11	12
Total GHG emissions	4 040	3 156	3 833	3 175	2 947	2 214	1 422	2 236	1 744	2 274	2 544

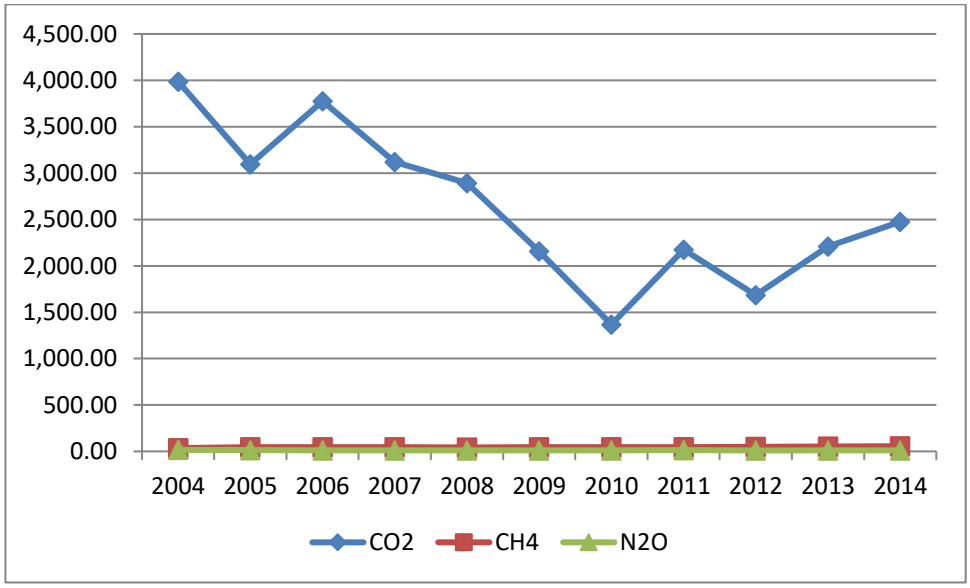


Figure 9. GHG emissions trends in Gg in CO_2 eq.in the Energy sector

In 2014, there was an increase in emissions of all major greenhouse gases compared to 2013: CO_2 emissions increased by 12.0%, CH_4 by 5.8%, nitrous oxide by 8.6%. Compared to 2004, carbon dioxide and nitrous oxide showed a decline of 37.9% and 26.9%, respectively. Compared to 2004, methane emissions increased by 56.9%.

According to the results of the present inventory of GHGs (submitted in 2018) and based on the results of the inventory of greenhouse gases as part of the Third National Communication (presented in 2014) carbon dioxide CO_2 was the most significant gas in the energy sector with the the largest shares of emissions in sub-categories: 1.A.4.a – Commercial/Institutional, 1.A.4.b - Residential and 1.A.1.a - Electricity and Heat Production

The second place in terms of CO_2 emissions is followed by 1.A.1 category- Energy industry and with minor fluctuations – category 1.A.2 – Manufacturing industries and construction and 1.A.3 - Transport.

2.3.1.1 Recalculations

Aggregated data on the GHG emissions in the Energy industry as a result of the clarifictions made in the present inventory of GHGs, submitted in 2018 (GHGI 2018) and inventory of the GHGs presented in 2014 (GHGI 2014) for 2004-2010 are shown in the *Table 12*.

Table 12. Recalculations in the Energy sector, Gg

	GHGI 2014			GHGI 2018		
Year	**CO_2**	**CH_4**	**N_2O**	**CO_2**	**CH_4**	**N_2O**
2004	2567	3,2	0,01	3987,46	1,70	0,054
2005	1857	3	0,01	3095,97	2,16	0,048
2006	2619	4	0,01	3775,21	2,19	0,038
2007	1676	2	0,01	3118,77	2,12	0,038
2008	1734	2	0,01	2891,67	2,05	0,040
2009	1334	1	0,01	2157,00	2,12	0,040
2010	1221	0,8	0,01	1367,87	2,10	0,031

While comparing the GHGI 2014 and GHGI 2018, one could say that there are no signigicant changes in the GHGs emissions trends. With some fluctuations, the general trend of emissions by the end of 2010 is tending to decline. This could be explained, as mentioned above, by the economic development of Tajikistan. It also suggests that the structural changes in the economy have already been completed and in the future one can only expect slow stable development without any sharp fluctuations.

For the Fugitive Emissions, the outcomes of the recalculations and clarifications of the GHGI 2014 and GHGI 2018 for the period of 2004-2010 are provided in the *Table 13*.

Table 13. Recalculations for GHGI 2014 and GHGI 2018 for 2004-2010 on fugitive emissions, Gg

	GHGI 2014			GHGI 2018		
Year	**CO_2**	**CH_4**	**N_2O**	**CO_2**	**CH_4**	**N_2O**
2004	0	3	0	0,302021	1,257	0,00
2005	0	3	0	0,328942	1,424	0,00
2006	0	4	0	0,347078	1,535	0,00
2007	0	2	0	0,503412	1,717	0,00
2008	0	2	0	0,583748	1,737	0,00
2009	0	1	0	0,537618	1,749	0,00
2010	0	0,8	0	0,592161	1,821	0,00

As a result of the analysis and as could be seen from the diagram, one could say that the fugitive emissions of GHGI 2014 and GHGI 2018 are different, which is explained by the refinement of statistical data.

In GHGI 2014, we observe a decline in CH_4 emissions by the end of 2010 and in GHGI 2018, on the contrary, there is an increase of emissions by the end of the reported period.

The fugitive emissions in GHGI 2014 show the highest emissions of CH_4, with the insignificant share of N_2O and a very small share of CO_2 emissions.

In GHGI 2018, the largest share of emissions accounts to CH_4, with the CO_2 emissions on the second place, followed by the minimal contribution of N_2O.

In GHGI 2018 indicators for the fugitive emissions have been adjusted. While comparing GHGI 2014 and GHGI 2018 there are noticeable differences in emissions of CH_4 and N_2O. These differences were due to the fact that in calculations of inventories a different approach was taken to the extraction of coal - surface and underground. In GHGI 2014, due to the lack of specific data on the types of coal

mining, the percentage of coal production was distributed to surface and underground, and most of it was allocated to underground mining. There is mainly open-pit coal mining in Tajikistan.

In GHGI 2018, the calculations were adjusted and after the specification of the data, the main part is given to surface coal mining in calculations. In GHGI 2014, the following factors were applied: 15 – for the underground mining and 1.2 for the surface mining.

Biomass fuel:

Biomass data is generally more uncertain than other energy statistics.

A large proportion of the biomass used for the energy production is part of the informal economy, and volume trends for these types of fuel (firewood, agricultural waste, manure, etc.) are often not recorded in national energy statistics.

Table 14. Recalculation of biomass emission (GHGI 2014 and GHGI 2018) for the period 2004-2010, Gg

	GHGI 2014	GHGI 2018
Year	CO_2	CO_{2s}
2004	3	5,41632
2005	2	3,66912
2006	0	3,31968
2007	1	4,19328
2008	1	4,54272
2009	1	2,97024
2010	3	7,51296

While calculating the emissions by biomass, only the part that was burned for energy purposes is taken into account.

In quantitative terms, share of CO_2 emissions is higher in GHGI 2018. Such difference is most likely related to a more detailed calculation in the updated version of the IPCC 2.54 Software.

In general, GHG emissions comply with the initial calculation of the GHGI 2014. However, there are discrepancies on fugitive emissions of CH_4. As noted above, this is due to the new approach to calculation of emissions in extraction of solid fuel.

2.3.2 Sector 2 - Industrial Processes and Product Use

Inventory of the GHG emissions in the Industrial Processes and Product Use (IPPU) includes the calculation of emissions on all main gases including two perfluorocarbons: CF_4 (tetrafluorocarbon) and C_2F_6 (hexafluorocarbons).

Table 15. GHG emissions trends in Gg CO_2 eq. in Industrial Processes and Product Use sector by sub-sectors

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
2 – Industrial Processes and Product Use	**718**	**784**	**845**	**864**	**773**	**696**	**735**	**616**	**584**	**572**	**799**
2.A – Mineral industry	118	152	162	179	122	121	177	171	148	226	605
2.A.1 – Cement Production	94,62	124	138	153	93,06	95,35	144	146	123	188	562
2.A.2 - Lime Production	7,05	2,10	3,75	3,08	4,28	3,30	5,93	1,50	4,13	8,18	9,15
2.A.3 – Glass Production	1,46	1,75	1,75	1,78	1,74	1,75	0,34	0,75	0,50	0,93	0,34
2.A.4 - Other Process Uses of Carbonates	14,44	24,66	18,66	20,94	22,46	21,07	27,02	22,13	20,82	29,18	32,91
2.B – Chemical industry	27,10	24,77	21,42	14,30	12,51	0,00	0,00	0,00	0,00	0,00	0,00

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
2.B.1 – Ammonia Production	27,10	24,77	21,42	14,30	12,51	0,00	0,00	0,00	0,00	0,00	0,00
2.C - Metal Industry	573	607	662	670	639	575	558	445	436	346	194
2.C.3 – Aluminium Production	573	607	662	670	639	575	558	445	436	346	194

Table 16. GHG emissions trends in Gg CO_2 eq. in the Industrial Processes and Product Use by gases

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CO_2	718	784	845	864	773	696	735	616	584	572	799
PFCs	1 063	1 127	1 228	1 244	1 185	1 067	1 036	826	809	642	360
Total GHG emissions	1 780	1 911	2 073	2 107	1 958	1 763	1 771	1 442	1 393	1 214	1 159

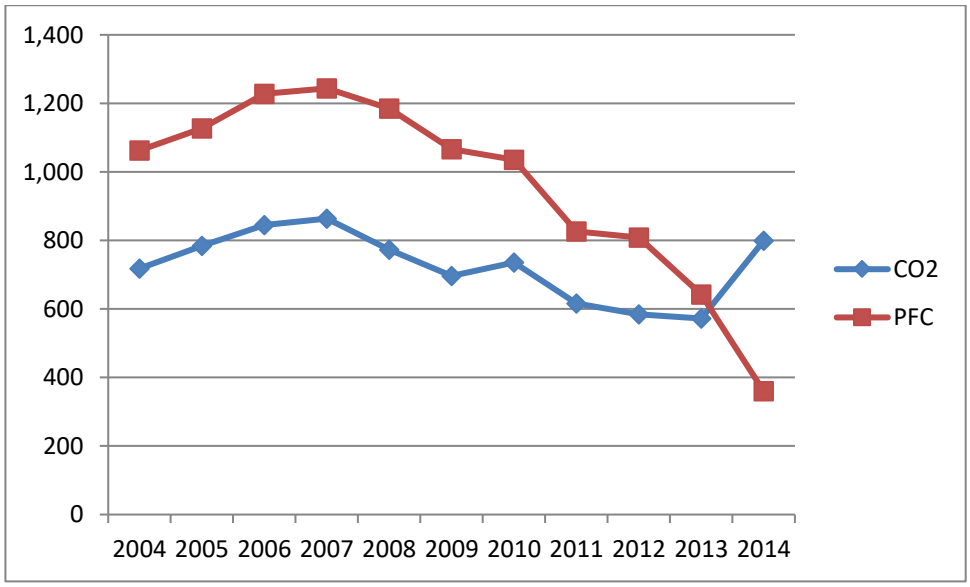


Figure 10. GHG emissions trends in Gg CO_2 eq. in the IPPU sector

CO_2 emissions in the IPPU sector in 2014 increased by 40% compared to 2013 and by 11% compared to 2004. At the same time, emissions of perfluorocarbons decreased by 44% compared to 2013 and by 66.1% compared to 2004. In CO_2 eq., emissions decreased by 5% and 34.9%, respectively.

2.3.2.1 Recalculations

Compared to the result of GHGI 2014, where the share of CO_2 emissions from ammonia was 6–11%, the decline in emissions in this category is associated with a drop in ammonia production and termination of its production since 2009, as well as with the recalculated emissions based on the use of allocated CO_2 for the production of urea (see section 2.3.1).

As required by the Revised UNFCCC Guidelines (FCCC|CP|2013|10|Add/3), emissions from all source categories were recalculated due to the transition to the 2006 IPCC Guidelines and the use of updated emission factors.

As a result of emission estimates for the Industrial Processes and Product Use sector, total CO_2 emissions in 2004 decreased by 13.4 Gg, in 2005 - by 16.9 Gg and increased in 2006-2010 from 34 Gg to 79.2 Gg, mainly due to recalculation of CO_2 emissions from the production of cement, primary aluminum and ammonia. When converted to CO_2 eq. total emissions for the period of 2004–2010 increased from

237.8 Gg to 347.5 Gg, mainly due to the recalculation of PFC emissions from primary aluminum based on updated emission factors. Volumes of the total carbon dioxide emissions by sector and emissions of all GHGs in CO_2 eq. are presented in *Table 17* and *Figure 11*.

Table 17. Recalculation of GHG emissions in Gg CO_2 eq. in Industrial Processes and Product Use sector

	Year						
	2004	2005	2006	2007	2008	2009	2010
CO_2 Emissions	717,60	779,10	845,30	863,70	773,10	696,50	735,20
PFC emissions in CO_2 eq.	1 062,80	1 126,70	1 228,20	1 243,80	1 185,40	1 066,70	1 035,90
Total emissions in CO_2 eq.,GHGI 2018	1 780,40	1 905,80	2 073,50	2 107,50	1 958,50	1 763,20	1 771,10
Total emissions in CO_2 eq.,GHGI 2014	1 478,00	1 668,00	1 756,00	1 760,00	1 616,00	1 452,00	1 478,00
Difference +,-	302,40	237,80	317,50	347,50	342,50	311,20	293,10

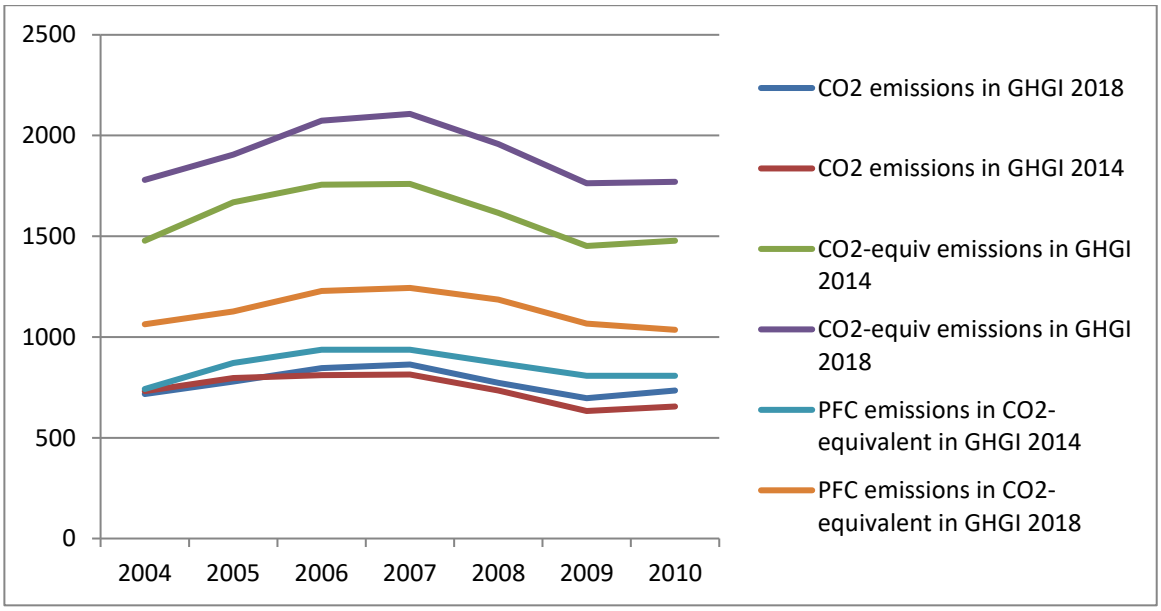


Figure 11. 2004-2010 CO_2 Emissions and PFC emissions in CO_2 eq. in Gg based on GHGI 2018 and GHGI 2014 for the IPPU sector

In the Mineral Industry category (2.A) CO_2 emissions from Cement production (2.A.1), Lime Production (2.A.2), Glass production (2.A.3) as well as from Other Process Uses of Carbonates (2.A.4): Ceramic production (2.A.4a), Soda ash use (2.A.4b) were estimated.

Data for brick and cement production as well as emission factors used as a basis of the CO_2 emissions calculation in GHGI 2014 were validated.

CO_2 emissions by Mineral Industry category for 2004–2010 were from 117.6 Gg (2004) to 178.9 Gg (2007). The largest contribution of CO_2 emissions comes from cement production - from 76.6% (2008) to 85.6% (2007), followed by emissions from the production of clinker and expanded clay - from 9.8% (2007) to 16.3% (2009). Emissions from glass production, consumption of soda ash and lime production are insignificant and total from 4.6% (2007) to 9.7% (2004).

The results of recalculation of CO_2 emissions by Mineral Industry categoryshowed an increase in estimates of CO_2 emissions compared with the results of GHGI 2014 from 0.9 Gg (2005) to 44.8 Gg

(2010). The difference in calculations was mainly due to the recalculation of CO_2 emissions from cement production.

In Cement production sub-sector (2.A.1), the highest CO_2 emissions were 143.6 Gg in 2010, the lowest 93.1 Gg in 2008 (due to a decrease in production). The difference in the estimated emissions was due to the fact that earlier in the calculations the actual amount of clinker was not taken, but recalculated, taking into account data on the production of sulphate-resistant cement. *Figure 12* shows CO_2 emissions from cement production for 2004–2010 based on the results of GHGI 2018 and GHGI 2014.

However the latest data from statisics agency on clinker production in the unit weight compared with the produced cement, as well as the fact that clinker was not exported and imported for the reviewed period give grounds to calculate emissions from cement production based on the actual amount of the clinker produced.

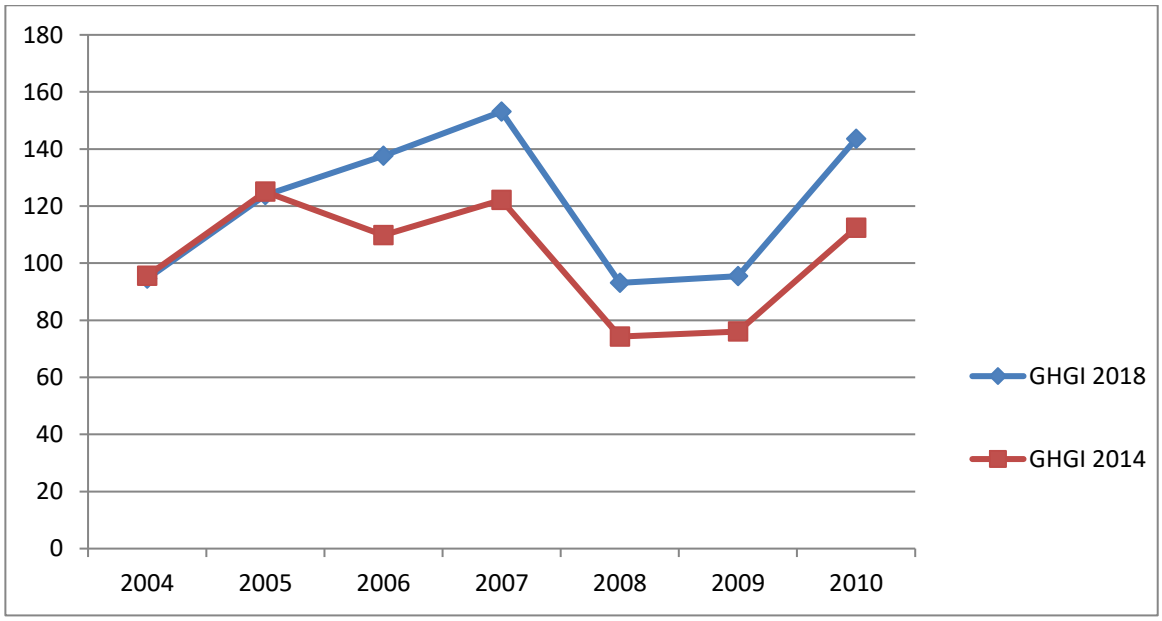


Figure 12. CO_2 emissions from the cement production for 2004-2010

It was revealed that during GHGI 2014, the emission of carbon dioxide from cement production was calculated not from the volume of produced cement, but from the volume of produced clinker, i.e. slightly reduced emissions were shown.

CO_2 is the main greenhouse gas in the Lime production sub-sector (2.A.2). Difference with GHGI 2014 was not revealed.

CO_2 emissions were observed in Glass production sub-sector (2.A.3). Emissions were calculated only for the glass container production, while the other glass in the country was not produced in the reviewed period. For the period of 2004-2010, CO_2 emissions from glass production ranged from 1,5 Gg in 2004 to 0,6 Gg in 2010.

The largest emissions of CO_2 were observed in 2007 and amounted to 1,8 Gg. Since emission factors and data on production volumes did not change compared to GHGI 2014, emission estimates are the same.

In the Ammonia production sub-sector (2.B.1), according to the IPCC guidelines (IPCC, 2006), an expenditure ratio of 0.733 tons of CO_2/per ton of urea was taken for calculating the CO_2 consumed for the production of urea.

CO_2 emissions from ammonia production in 2005 amounted to 89.307 Gg, and taking into account the consumed CO_2 of 64.533 Gg for the production of urea, CO_2 emissions were 24.773 Gg. compared with the results of the GHGI 2014, emissions have decreased by an average of 3 times.

Comparison comparison was carried out until 2008, given that from 2009 the production of ammonia was terminated in the country.

Table 18. Recalculations of emissions in Ammonia production sub-sector

Year	2004	2005	2006	2007	2008
CO_2 GHGI 2014, Gg	82	80	66	48	44
CO_2 GHGI 2018, Gg	27,1	24,8	21,4	14,3	12,5

CO_2 and perfluorocarbons (PFCs) emissions were observed during production of raw aluminium - Aluminium Production sub-sector (2.C.3).

CO_2 emissions from aluminum production were estimated using the tier 1 methodology (IPCC, 2006). The default emission factors were used: 1.6t.CO_2/t.of aluminum for prebaked anode technology (IPCC, 2006). The largest CO_2 emissions in this category were 670.5 Gg in 2007, the lowest 558.5 Gg in 2010. In 2005, CO_2 emissions were 717.6 Gg. In recalculation of CO_2 emissions, the difference with the results of the GHGI 2014 was towards increase from 34.5 Gg in 2010 to 41.5 Gg in 2007 due to the fact that earlier in the calculations the emission factor of 1.5 tons CO_2/ton of aluminum was applied according to IPCC 1996 Revised Guidelines for National Greenhouse Gas Inventories Workbook, page 2.30, Table 2-18 CO_2 emission factor - preburning 1.5 t CO_2/t of primary aluminum.

The amount of CF_4 and C_2F_6 emissions was calcultated using the tier 1 methodology (IPCC, 2006) based on the aluminium production date and applied prebaked anode production technology. The emissions of perfluorocarbon compounds in the production of primary aluminum are insignificant, but they have great potential for global warming and, when converted to CO_2 equivalent, emissions from perfluorocarbons for the period 2004-2010 amounted to 1126.742 Gg in 2005, 1035.9 Gg in 2010, which exceeds the total CO_2 emissions in the sector by 1.45 times.

Difference in PFC emissions in CO_2 eq. compare to the results of GHGI 2014 has appeared due to the fact that emissions were estimated using the 1996 IPCC methodology and therefore other factos were applied.

2.3.3 Sector 3 - Agriculture

Greenhouse gas emissions in the Agriculture sector include estimates for all three main gases: CO_2, CH_4, N_2O.

Key sources in the sector:

- Livestock: Enteric Fermentation (CH_4) and manure depending on the methods of its use and storage (CH_4, N_2O);
- Rice cultivation: flooded rice fields (CH_4);
- Burning agricultural waste in the fields (CH_4, N_2O, NOx, CO);
- Direct N_2O emissions from agricultural soils;
- Direct N_2O emissions associated with livestock;
- Indirect N_2O emissions from use of nitrogen-containing substances in agriculture.

Table 19. GHG emissions trends in Gg CO_2 eq. in Agriculture sector by sub-sectors

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Agriculture	3 175	3 706	3 666	4 032	3 914	4 042	4 159	4 388	4 447	4 535	4 556
3.A – Livestock	2 503	2 530	2 637	3 104	3 315	3 374	3 506	3 606	3 660	3 763	3 820
3.A.1 – Enteric Fermentation	2 103	2 107	2 193	2 595	2 766	2 815	2 927	2 996	3 042	3 129	3 177
3.A.2 – Manure management	400	424	445	509	549	559	579	610	617	634	643
3.C – Aggregated and non- CO_2 sources on the earth	672	1 176	1 029	928	599	668	653	782	787	773	736
3.C.3 – Urea Application	46,48	41,48	22,46	37,69	41,60	42,81	38,95	53,87	58,17	60,29	57,89
3.C.4 - Direct N_2O emissions from managed soils	309	822	733	580	268	284	259	358	386	400	385
3.C.5 – Indirect N_2O emissions from managed soils	100	89,56	48,49	81,37	87,12	92,43	84,09	116	86,94	130	125
3.C.7 – Rice cultivation	216	223	225	229	203	248	271	254	255	182	169

Table 20. GHG emissions trends in Gg CO_2 eq. in Agriculture sector by gases

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CO_2	46,48	41,48	22,46	37,69	41,60	42,81	38,95	53,87	58,17	60,29	57,89
CH_4	2 719	2 753	2 862	3 333	3 518	3 623	3 777	3 860	3 915	3 944	3 989
N_2O	409	911	782	661	355	377	343	474	473	531	510
PFC	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Total GHG emissions	3 175	3 706	3 666	4 032	3 914	4 042	4 159	4 388	4 447	4 535	4 556

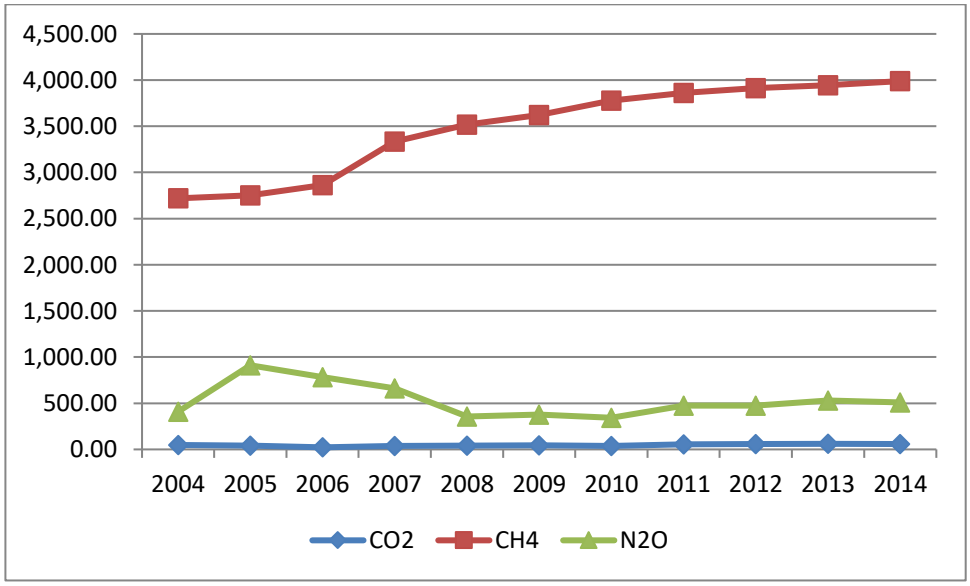


Figure 13. GHG emissions trends in Gg CO_2 eq. in Agricultre sector

The main greenhouse gases are CH_4 and N_2O in the Agriculture sector. The main share of methane emissions comes from enteric fermentation of livestock, and to a lesser extent, from manure related activity. Methane emissions from rice fields do not exceed 12.1%. In 2011, methane emissions amounted to 183.83 Gg, in 2012 - 186.43 Gg, in 2013 - 187.82 Gg, and in 2014 - 189.94 Gg. In the

reviewed period 2011-2014, the highest methane emissions in the sector Agriculture occurred in 2014, which corresponds to the dynamics of the livestock of farm animals.

Therefore, in Tajikistan, the GHG contribution to the total CO_2 eq. emissions in the Agriculture sector in different years ranged from 20% to 50%.

2.3.3.1 Recalculations

Table 21. Recalculations of the methane emissions in the Agriculture sector, in Gg

	Year						
	2004	2005	2006	2007	2008	2009	2010
CH_4 Emission in GHGI 2014	91,3	102,4	108,3	111,8	104,5	117,3	165,2
CH_4 Emission in GHGI 2018	129,5	131,1	136,3	158,7	167,5	172,5	179,9
Difference+,-	38,2	28,7	28,0	46,9	63,0	55,2	14,7

The difference is the results of clarification of some statistics data on the number of horned livestock and on the rice sown area for 2004-2010. There was no difference observed for other gases between GHGI 2014 and GHGI 2018.

2.3.4 Sector 4 – Land use, Land Use Changes and Forestry

This section gives baseline data and outcomes of the calculation of GHG emissions and sinks as a result of the anthropogenic activities in Land Use, Land Use Changes and Forestry (LULUCF).

Table 22. GHG emissions trends in Gg CO_2 eq. in the sector of Land Use, Land Use Changes and Forestry

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
LULUCF	-1460,42	-1460,42	-1491,61	-1496,24	-1501,73	-1497,90	-1511,78	-1535,93	-1550,49	-1563,98	-1576,60

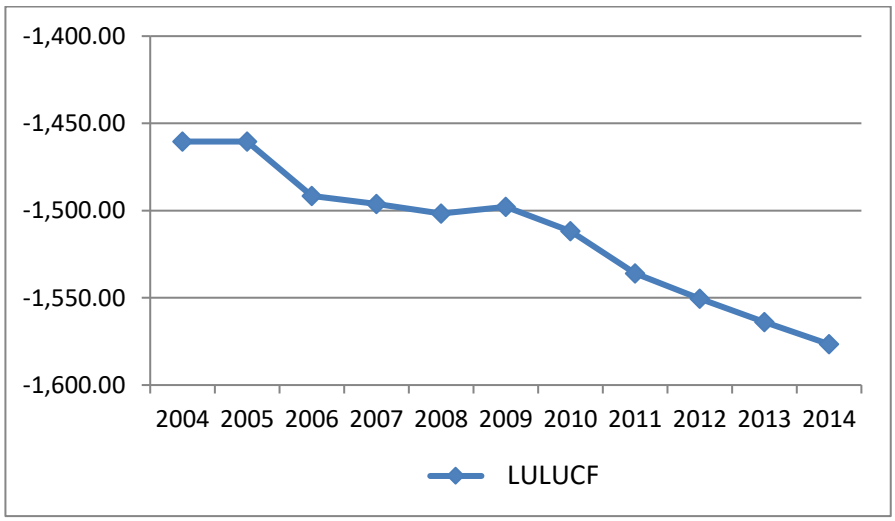


Figure 14. GHG emissions trends in Gg CO_2 eq. in the LULUCF sector

2.3.4.1 Recalculations

Table 23. Recalculation of CO_2 in Gg in LULUCF for 2004-2010 using the IPCC2006 V2.54 software

Source		Years						
		2004	2005	2006	2007	2008	2009	2010
Total for the LULUCF, GHGI 2018	Sink	-1460,4	-1460,4	-1491,6	-1496,2	-1501,7	-1497,9	-1511,8
Total for the LULUCF, GHGI 2014	Sink	-2038,2	-2063,4	-2086,2	-2091,0	-2086,9	-2089,9	-2091,4

Comparison of the inventory data on CO_2 emissions and sinks for 2004-2010 in recalculating them using the IPCC2006 V2.54 software with the final data on GHGI 2014, a noticeable decrease by 30% is observed in the total carbon dioxide accumulation data for the LULUCF sector as a whole for all years.

Calculation of the GHG carried out using a new computer program that more fully takes into account the characteristics of this sector and, depending on this, recommends in each case different factors by default (for example, for pasture management based on the extent of its degradation etc.) that should be considered more accurate.

2.3.5 Sector 5- Waste

Waste sector estimates of methane (CH_4) and nitrous oxide (N_2O) emissions in the following categories:

- Solid Waste Disposal (SWD) at landfills/disposal sites.
- Wastewater Treatment and Discharge in the centralized sewage treatment plants (CSTP).

Table 24. GHGs emissions trends in Gg, CO_2 eq. in the Waste sector, by subsectors

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
4 - Waste	**573,87**	**609,28**	**637,36**	**666,61**	**697,11**	**713,77**	**745,86**	**780,39**	**810,83**	**843,80**	**872,62**
4.A – Solid Waste Disposal	460,53	494,08	526,37	559,08	588,98	619,25	649,17	678,56	707,58	738,06	763,78
4.D - Wastewater Treatment and Discharge	113,34	115,20	110,99	107,52	108,12	94,52	96,69	101,83	103,26	105,74	108,84

Table 25. GHGs emissions trends in Gg, CO_2 eq. in the Waste sector, by gases

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CH_4	509	543	570	598	627	642	673	703	732	763	790
N_2O	65,10	66,28	67,50	68,72	70,01	71,53	73,17	77,02	78,80	80,51	82,39
Total GHG emissions	574	609	637	667	697	714	746	780	811	844	873

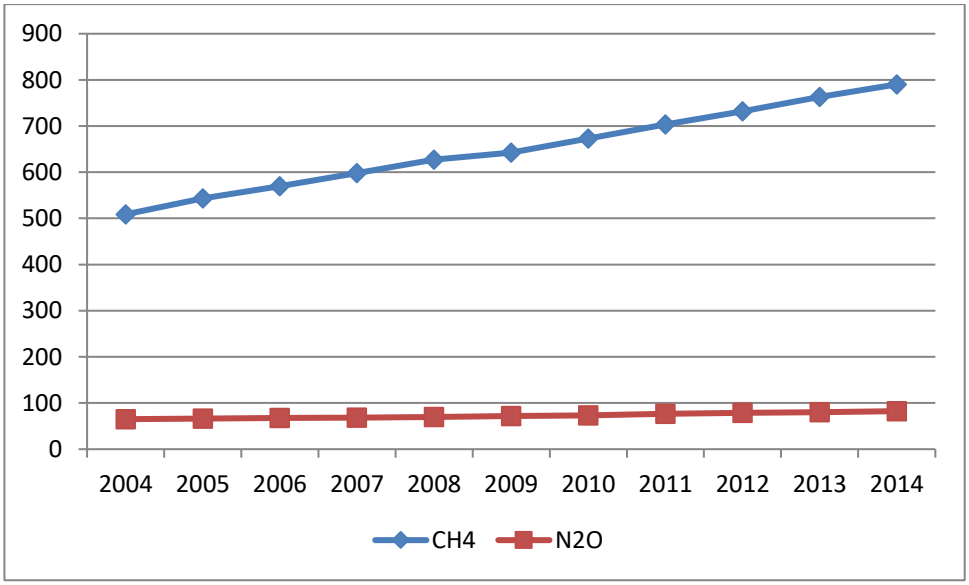


Figure 15. GHG emissions trends, in Gg CO_2 eq. for the Waste sector

2.3.5.1 Recalculations

Table 26. Recalculation of GHG emissions in the Waste sector for GHGI 2014 and GHGI 2018

	2004	2005	2006	2007	2008	2009	2010
Total GHG emissions in the Waste sector in CO_2 eq. GHGI 2018	574	609	637	667	697	714	746
Total GHG emissions in the Waste sector in CO_2 eq. GHGI 2014	480,06	497,91	501,06	516,18	514,92	515,97	537,60

The difference in the results seems to be due to the fact that the estimation of CH_4 emissions from disposal sites is carried out in accordance with the new IPCC 2006 National Greenhouse Gas Inventory Guidelines. Unlike GHGI 2014. A more accurate First Order Decay Model was used (FODM).

2.3.6 Key Source Analysis

In accordance with the requirements of the IPCC Guidelines (IPCC 2006), the key sources of GHG in CO_2 eq. are those that contribute to 95% of emissions during a specified period (usually for one year). Identification of these main sources and their analysis enables the identification of priorities for an improvement in the quality of the national inventory and the development of measures to reduce the largest emissions.

Table 27. Key categories of the emission sources in the breakdown by its contribution to total GHG emissions in 2014 (without LULUCF)

IPCC Category Code	IPCC category	GHG	2014 Estimate Ex,t [in Gg, CO_2eq.]	Cumulative total,t	Aggregate total %
3.A.1	Enteric Fermentation	CH_4	3176,76	3176,76	0,34791
4.A	Solid waste disposal	CH_4	763,78	3940,54	0,43156
1.A.4	Other sectors – Solid fuel	CO_2	694,12	4634,66	0,50757
3.A.2	Manure management	CH_4	643,44	5278,10	0,57804
2.A.1	Cement production	CO_2	562,34	5840,43	0,63963
1.A.4	Other sector – Liquid fuel	CO_2	546,81	6387,24	0,69951
1.A.1	Energy – Liquid fuel	CO_2	505,36	6892,61	0,75486
3.C.4	Direct N_2O Emissions from Managed soils	N_2O	384,54	7277,14	0,79697
2.C.3	Aluminum production	PFCs	359,90	7637,05	0,83639
1.A.2	Manufacturing Industries and Construction – liquid fuel	CO_2	254,72	7891,76	0,86428
1.A.1	Energy – Solid fuel	CO_2	248,57	8140,33	0,89150
2.C.3	Aluminum production	CO_2	194,02	8334,35	0,91275
1.A.3.b	Road transport	CO_2	193,36	8527,71	0,93393
3.C.7	Rice Cultivations	CH_4	168,55	8696,25	0,95239

Table 28. Key categories of the emission sources by contribution into trend of aggregate GHG emissions for the period of 2004-2014, covered by the inventory (without land use, land-use changes and forestry).

IPCC Category Code	IPCC Category Code	GHG	2004 Estimates Gg CO_2 eq.	2014 Estimates Gg CO_2 eq.	Trend Assessment	% contribution to trend	Cumulative total
1.A.4	Other sectors - Gas	CO_2	1747,6	0,0	0,148	0,226	0,226
3.A.1	Enteric Fermentation	CH_4	2103,1	3176,8	0,110	0,169	0,395
1.A.4	Other sectors –solid fuel	CO_2	1,4	694,1	0,063	0,096	0,491
2.C.3	Aluminium production	PFCs	1062,8	359,9	0,057	0,087	0,578
2.A.1	Cement production	CO_2	94,6	562,3	0,043	0,066	0,644
1.A.4	Other sectors – Liquid fuel	CO_2	1074,7	546,8	0,041	0,063	0,707
2.C.3	Aluminium production	CO_2	572,9	194,0	0,031	0,047	0,754
4.A	Solid waste disposal	CH_4	460,5	763,8	0,030	0,046	0,800
3.A.2	Manure management	CH_4	400,1	643,4	0,025	0,038	0,838
1.A.1	Energy-Solid fuel	CO_2	0,0	248,6	0,023	0,034	0,872
1.A.1	Energy-Liquid fuel	CO_2	279,9	505,4	0,022	0,034	0,906
1.A.3.b	Road transport	CO_2	349,9	193,4	0,012	0,018	0,925
1.A.2	Manufacturing Industries and Construction – liquid fuel	CO_2	411,7	254,7	0,012	0,018	0,943
3.C.4	Direct N_2O emissions from managed soils	N_2O	308,8	384,5	0,009	0,013	0,956

2.3.7 Uncertainty Assessment

Uncertainty characterizes the level of dispersion and possible deviations of the data in comparison with true value. Information on uncertainty enables for identification of the priority measures for more accurate assessment of emissions in the next inventories and consideration of the information on uncertainty while planning for GHG emission reduction. The final uncertainty is a combination of uncertainties of emission factors and uncertainties in data on activities.

According to the IPPC methodology, uncertainties are subdivided into three levels. Low level (highreliability) if uncertainty is <10%, medium level if uncertainty is between 10 and 50% and high level if uncertainty is high (low reliability) and is equivalent to more than 50%.

Based on expert estimates, the final uncertainty of the present inventory is assessed to be at the medium level. At the same time, for some sectors such as 'Industrial processes' the level of uncertainty is low, whilst for other sectors such as Agriculture, LULUCF, and Waste the uncertainty level is high. Due to the lack of a robust energy balance and taking into account the most reliable data on fuel consumption, the level of uncertainty in the Energy sector is medium.

2.4 National System of GHG Inventory

Agency for Hydrometeorology of the Committee for Environmental Protection under the Government of the Republic of Tajikistan is the organization responsible for the preparation and conducting of the inventory of greenhouse gases and ensures communication with the Secretariat of the UN Framework Convention on Climate Change and with the National Communications Support Program.

Following the chapters of the GHG Inventory, the expert group consists of an expert who works with the aggregated data, five subgroups (Energy, Industrial processes, Agriculture, Land-Use Change and Forestry, Waste), and also a team for the monitoring, quality assessmentingy and technical processing of the findings recieved (graphs, tables, databases).

The data necessary for calculations of GHG emissions and removals were selected from the statistical database of government institutions, including: Statistics Agency, Committee on Land Management, Customs Committee, as well as the sectoral companies and enterprises (Barki Tojik for the energy industry, SUAH "Tochikiston" and GUP "Rokhi Ohani Tochikiston" for the transport sector, AOOT "Naftrason", GUP "Tajikgaz" for fuel and SUE "Hojagii Manziliyu Kommunali" for waste sector). FAO data is used for a number of categories.

3 CLIMATE CHANGE MITIGATION ACTIONS

This chapter provides information on actions to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol.

Table 29 provides a detailed list of key mitigation measures and policies to achieve emission reductions in accordance with Decision 2/CP 17, Annex III, item IV. Mitigation actions.

In recent years, Tajikistan has taken a number of key measures to mitigate climate change to reduce greenhouse gas emissions in accordance with Decision 2/CP 17 Annex III, item **IV** Mitigation actions. Information on measures taken in the form of national and sectoral mitigation programs and strategies, covering anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol was collected, based on the analysis and consultation meetings with representatives of key sectors. Information on key measures was collected in tabular form, including:

- The name of the measure, primarily in the form of programs and strategies;
- Description of an action for mitigation and resilience;
- The status of the measures taken (adopted by the Government, draft or at the stage of adoption);
- Determination of public or private organizations responsible for the implementation of this action;
- The period of the action implementation and, above all, the programs and strategies that have been adopted, or are at the stage of adoption after 2015;
- The level of implementation of measures taken, both at the national and the specific industry level;
- Quantitative indicators that asses the climate change mitigation measures (both GHG related and non-GHG related, if applicable);
- The type of greenhouse gases that is defined in this action for removal;
- General description of the monitoring and reporting system for adopted programs and strategies.

Information was collected in key sectors such as agriculture, energy, transport, industry, housing and communal services, including waste. The matrix included all the programs and strategies with implementation periods until 2020, 2025 and 2030. Those measures in the form of programs and strategies which were completed before the study, were excluded from the action matrix.

The actions (objectives) aimed at reducing greenhouse gas emissions in accordance with Decision 2/CP 17. Annex III, IV Mitigation ations were chosen from the adopted and being at the stage of adoption programs and strategies, both at the national and sectoral level,

The study revealed that at present, taking into account the implementation periods untill 2020, 2025 and 2030, there are 8 actions in agriculture, 3 in energy sector, 2 in transport, 1 in industry and 5 in residential - community facilities, including waste, which have climate change mitigation in their objectives.

Table 29. Key policies and measures on climate change mitigation

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
Agriculture									
Agricultural Reform Programme of the Republic of Tajikistan for the period of 2012 – 2020	Development of agricultural climate change mitigation technologies (drought-resistant grain crops); conducting research works	|Implementing	MA, MEDT, AAS	2011-2020	Nftional	Not defined	N_2O CH_4	-	General control over the implementation of this Program is carried out by the Ministry of Agriculture, which annually submits a report on the Program implementation to the Government of the Republic of Tajikistan.
Programme of development of biotechnology of cattle in the Republic of Tajikistan for 2013-2017.	Growing highly productive breeding stock, reducing the number of non-breeding cattle, efficient use of land and pastures	Implementing	MA, AAS	2013-2018	National	Not defined	CH_4	-	Academy of Agricultural Sciences

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
Pasture Development Program of the Republic of Tajikistan for 2016-2020 (Decree of the Government of the Republic of Tajikistan No. 724 of 2015)	Selection and preparation of land for sowing natural grass seeds, importing and producing natural pasture grass seeds, revising the distribution of seasonal pastures, improving pasture condition with methods of primary and surface processing, as well as their protection from erosion.	Implementing	MA, SCLNG, local executive bodies, AAS	2016-2020	Regional	Not defined	CO_2, N_2O, CH_4	-	General control over the implementation of this Program is carried out by the Ministry of Agriculture, which annually submits a report on the Program implementation of to the Government of the Republic of Tajikistan
Forest Sector Development Strategy 2016-2030	1. Planting new forests on an area of more than 10 thousand hectares 2. Creating forest sharing groups	Draft	FA, CEP	2016-2030	National	Not defined	CO_2, N_2O	-	Develop an action plan for 2016-2020. Annual planting of 1 thousand hectares of forests
Draft National Climate Change Adaptation Strategy until 2030	1. There are several adaptation options that can help reduce the current and future vulnerability of the agricultural sector to climate change 2. Five project proposals for adaptation activities in agriculture is developed	The project is under approval by the Government of the Republic of Tajikistan.	MA, CEP, AAS	2018-2030	National	Not defined	N_2O CH_4	-	The system of indicators of the Pilot Program for Climate Resilience will be used as a monitoring tool.

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
The program of development of gardening and viticulture in the Republic of Tajikistan for 2016–2020	1. Take specific measures to develop new lands and introduction vacant lands into agricultural circulation to create orchards and vineyards 2. Develop and publish recommendations on modern methods of cultivation and growing of fruit trees and grapes	Implementing	MF, MA, MEDT, SCISPM, AAS	2016-2020	National	Not defined	CO_2, N_2O	-	General control over the implementation of this Program is carried out by the Ministry of Agriculture, which annually submits a report on the Program implementation of to the Government of the Republic of Tajikistan
Midterm Development Program of the Republic of Tajikistan for 2016-2020	1. Develop awareness raising measures on the ecological status of land and water resources and ensure the effective implementation of sectoral programs 2. Creating a sustainable seed base of crops and livestock breeding	Implementing	MEDT, MA, MF, SCLNG, AAS	2016-2020	National	Not defined	N_2O CH_4	-	The Program will be monitored based on the values of the indicators for the entire country, and (when it is possible and appropriate) by region, gender, environmental and other features
Water Sector Reform Program of the Republic of Tajikistan for the period 2016 — 2025	1. Restoration of irrigation infrastructure and improvement of conditions for maintenance and operation of infrastructures 2. Rehabilitation of water supply and sanitation infrastructure	Implementing	MEWR, ARI, SUE HMC	2016-2025	National	Not defined	N_2O	-	An action plan has been developed, sources of funding, implementation dates and responsible executive agencies have been defined

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
Energy									
Midterm Development Program of the Republic of Tajikistan for 2016-2020	Provide support for introduction of RES (solar, biogas, wind) in economic activity on the basis of preferential loans for entrepreneurship in the design, production and use of renewable energy installations and the creation of training and service centers to promote the expansion of renewable energy use	Implementing	MEWR and MEDT	2016-2020	National	Not defined	CO_2, N_2O, CH_4	-	The Program will be monitored based on the values of the indicators for the entire country, and (when it is possible and appropriate) by regions, gender, ecological and other features, placind emphasis on specific vulnerable population.
National Programme for Development of Renewable Energy Sources and Construction of Small Hydropower Plants for 2016 -2020	1. Installation of solar electrical plants in the field for which feasibility studies have been developed, with the attraction of investments for the period 2016-2020 2. Preparation of feasibility studies for windpower plants, attracting investments for the period 2016-2020 3. Construction of small hydropower plants at irrigation facilities and waterways with feasibility studies provided to investors for the period 2016-2020	Implementing	1. OSHC Barki Tojik 2. UNDP 3. Private sector	2016-2020	National	Not defined	CO_2, N_2O, CH_4	-	The program have no specific monitoring and evaluation procedures. Sources of funding, capacity and location of objects are identified.

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
Draft National Climate Change Adaptation Strategy until 2030	1. There are several adaptation options that can help reduce vulnerability of the energy sector to climate change 2. 10 project proposals for adaptation activities in energy sector is developed	The project is under approval by the Government of the Republic of Tajikistan	1. MEWR; 2. OSHC Barki Tojik	2018-2030	National	Not defined	CO_2	-	The system of indicators of the Pilot Program for Climate Resilience will be used as a monitoring tool.
Transport									
State Target Program for the Development of the Transport Complex of the Republic of Tajikistan until 2025	1. Reduction of pollutant emissions from stationary sources of transport enterprises 2. Construction of gas refueling stations 3. Creation of production for the disposal of vehicles and waste from their operation 4. Preparation and implementation of a production project for the processing and recycling of used motor oils and lubricants 5. Creation of protective forest lines (roadside) along the roads	Implementing	MT, private sector, airline companies, Tajikistan Railways	2016-2025	National, regional	Not defined	CO_2 CH_4, N_2O	-	The mechanism for the Program implementation includes a system of measures to ensure the selection of participants, the identification of sources of funding and the creation of conditions for the implementation of the most important projects covered by the Program

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
Draft National Climate Change Adaptation Strategy until 2030	1. 1. There are several adaptation options that can help reduce vulnerability of the transport sector to climate change 2. 10 project proposals for adaptation activities in transport sector is developed	The project is under approval by the Government of the Republic of Tajikistan	MT	2018-2030	National	Not defined	CO_2	-	The system of indicators of the Pilot Program for Climate Resilience will be used as a monitoring tool.
Industry									
Strategy of Innovative Development of the Republic of Tajikistan for 2020	1. Increase the share of industrial enterprises practicing technological innovation in the total number of industrial enterprises to 5-8% by 2020 2. Increase the share of innovative products in the total industrial output by 2020 3. Develop priority technologies and sectors of the economy based on the tightening of requirements of technical regulations in environmental legislation	Implementing	AS, sectoral ministries and departments, state executive bodies of regions, cities and districts	2015-2020	National, regional	Not defined	CO_2, CH_4 N_2O	-	Creating a system for result monitoring of planned indicators and determining. Ministry of Economic Development and Trade of the Republic of Tajikistan, continuously until the end of 2020

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
Housing and communal services									
Concept of housing and communal services in the Republic of Tajikistan for 2010-2025	1. Improving the spatial planning system, compulsory compliance with land use and development rules, the formation and development of engineering utility infrastructure for construction of housing and other facilities, allocation of land for greening households under public utilities 2. The introduction and use of the latest technology by the development and implementation of sectoral programs for energy saving and insulation of buildings, which will be covered by the relevant programs of sectoral ministries and departments	Implementing	SUE HMC, local authorities	2010-2025	National, regional	Not defined	CO_2, CH_4, N_2O	-	Various forms of ownership implies state regulation for the safety of the housing stock and public utilities, ensuring compliance with the parameters of the republican standard mandatory for all owners.

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
The Program for development of housing and communal services of the Republic of Tajikistan for the period 2014-2018	1. Updating and development of municipal engineering infrastructure of cities, towns and rural areas, ensuring their reliable and sustainable operation, introduction of modern and economical equipment and technology 2. Execution of certain types of works on the provision of housing and communal services (water supply, municipal improvement and greening of the regions, sanitary cleaning, maintenance of elevator facilities and other types of works and services)	Implementing	SUE HMC, local authorities	2014-2018	National, regional	Not defined	CO_2, CH_4, N_2O	-	In order to create an effective mechanism for regulating and interacting with interested structures, it is reasonable to create a Program Implementation Support Group at the State Unitary Enterprise "Hochagii Manziliyu Communali".
Waste management									
National Concept for the rehabilitation of tailing dumps of uranium ore processing waste of the Republic of Tajikistan for 2014-2024	The current situation in the area of uranium tailing dumps and their impact on the environment is considered. The most priority task is to rehabilitate the tailing dump in Istiklol, Degmai, cut-off grade ores and mining water in Khujand on the right bank of the Syr Darya River	Implementing	Not defined	2014-2024	National	Not defined	CH_4 N_2O	-	After the adoption of this Concept, an action-oriented programme will be developed, including specific projects aimed at implementing the measures provided in the Concept

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
National Development Strategy of the Republic of Tajikistan until 2030	Suggested activities include improving industrial waste management	Implementing	Not defined	2016-2030	National	Not defined	CH_4 N_2O	-	Waste enrichment measures are formulated in general terms and their practical implementation will require detailed elaboration.

Name of a mitigation action	Description of a mitigation action	Status	Implementing agency	Duration, years	Level of implementation	Quantitative target indicators	GHG	Methods and assumptions	General description of the monitoring and reporting system
National Waste Management Strategy of the Republic of Tajikistan for the period 2017-2030	1. Improving legal policy in waste management 2. Improving institutional policy in waste management 3. Improving economic mechanisms in waste management 4. Stimulation of the activities of enterprises and the public on the prevention of environmental pollution and reus of waste 5. Development of a system of static accounting for the formation of production and consumption waste, secondary resources and monitoring the movement of production, consumption waste and dumping sites 6. Improving the system of education and training of the population on the issues of waste management and use of secondary resources 7. Development of innovative technologies and infrastructure for the introduction of waste in economic circulation 8. Preparation and implementation of investment projects and programs	The Project is under approval by the Government of the Republic of Tajikistan	CEP, MEDT, SUE HMC, local authorities, SAP	2016-2030	National	Not defined	CH_4 N_2O	-	An action plan has been developed, sources of funding, implementation dates and responsible executive agencies have been defined

4 LEVEL OF SUPPORT RECEIVED FOR ACTIVITIES RELATED TO CLIMATE CHANGE, INCLUDING PREPARATION AND SUBMISSION OF THE CURRENT BIENNIAL REPORT

Table 30 provides information on support in terms of financial resources, technology transfer, capacity building as well as technical assistance received from the Global Environment Facility (GEF), Parties of the Annex II of the Convention, and other developed countries, which are the Green Climate Fund Parties and multilateral institutions for the climate change related activities.

Information in the form of financial resources, technology transfer, capacity building and technical support related to climate change was collected in a form of a table that provides for the following categories: project name, project objectives related to climate change, donors and accredited organizations, project budget in USD, executing organizations, implementation periods, sectors and project monitoring and evaluation mechanisms.

The matrix of projects for climate change mitigation includes projects, which are currently implemented, approved, e.g. by the Green Climate Fund, or currently under the approval. The matrix mainly includes those projects, which are aimed at climate change mitigation and, above the all, at projects of the Pilot Program for Climate Resilience (PPCR) - 6 projects, projects approved by the Green Climate Fund - 5 projects, as well as projects of the Global Environment Facility (GEF). In total, the matrix includes 17 projects that are currently implemented in Tajikistan, approved or are under the approval.

Project information was collected from PPCR Secretariat reports, meetings with donors and accredited organizations operating in Tajikistan, executing organizations, managers and specialists of the Project Implementation Centers.

The action matrix included those components of projects that are directly aimed at climate change mitigation and resilience.

This review has revealed that 11 projects are currently implemented in Tajikistan and 6 projects are under approval (5 GCF projects and one Adaptation Fund project). The total budget of both implemented and approved projects is more than 211 million US dollars.

Table 30. Support in terms of financial resources, technology transfer, capacity building as well as technical assistance received for climate change activities.

Project objectives related to Climate Change	Donors	Project budget, million USD	Executing Agencies	Implementation period	Sector	M & E
1. Building Climate Resilience in the Pyanj River Basin[8]						
1. *Flood protection infrastructure climate-proofed in 10 jamoats;* 2. *Irrigation systems climate-proofed in eight jamoats;* 3. *Water supply infrastructure climate-proofed in seven jamoats;* 4. *Micro credits and micro deposits made available to promote climate resilience in the Pyanj River Basin*	*Strategic Climate Fund ADB*	***21,55***	*MF, ARI, SUE HMK*	*2013-2020*	*Natural disasters, drinking water, irrigation system*	*The executing agencies develop integrated systems for monitoring the progress of project activities, intermediate and final results in accordance with the Design and Monitoring Framework.* *The executing agencies submit information to PPCR Secretariat for delivery to CIF[9]*
2. Adaptation to Climate Change through sustainable reforestation in key river basins in Tajikistan						
1. *The choice of sites and planning for the creation and rehabilitation of forests;* 2. *Support and development of the State Unitary Enterprise for nurseries, small nurseries for forestry and private nurseries;* 3. *Implementation of repair and construction work of forestry facilities within the project;*	*German Development Bank (KFW)*	***8,0 mln EURO***	*FA and Caritas (Switzerland)*	*2015-2019*	*Adaptation of the forests of Tajikistan to the Climate Change by increasing the forest area*	*The FA provides information to the PPCR Secretariat.*

[8] **https://www.adb.org/sites/default/files/project-document/81389/45354-002-taj-pds-ru.pdf**
[9] Climate Investment Funds

Project objectives related to Climate Change	Donors	Project budget, million USD	Executing Agencies	Implementation period	Sector	M & E
4. *Capacity building of forestry through training sessions;* 5. *Increase the potential of farms by purchasing equipment;* 6. *Implementation of forest inventory.*						
3. Building Capacity for Climate Resilience [10]						
1. *Establish a climate modeling facility in the national hydrometeorological agency;* 2. *Training of employees in climate modeling facility* 3. *Development of a climate model for predicting climate changes (dynamic unbundling)* 4. *Climate impact assessments on priority sectors of the economy*	*Strategic Climate Fund ADB*	***6,0***	*CEP, Agency for Hydrometeorology*	*2013-2018*	*Hydrometeorology, natural disasters*	*The project was responsible for reporting on the assessment of all PPCR projects in accordance with CIF indicators.*
4. Central Asia Hydrometeorology Modernization Project						
1. *Institutional strengthening of the Agency for Hydrometeorology, including improving human resources and models for financial sustainability;* 2. *Improvement of hydrometeorological observation networks;* 3. *Improving the service delivery system.*	*Strategic Climate Fund WB*	***13,0***	*Agency for Hydrometeorology*	*2013-2019*	*Natural disasters, water resources*	*The Agency submits information to PPCR Secretariat for delivery to CIF.* *M & E is carried out in accordance with the WB procedures. Monitoring is carried out in accordance with the results and monitoring framework.*

[10] https://www.adb.org/projects/45436-001/main#project-pds

Project objectives related to Climate Change	Donors	Project budget, million USD	Executing Agencies	Implementation period	Sector	M & E
5. Qairokkum HPP Climate Resilience Upgrade[11] -						
Strengthen the power plant's resilience to the expected impacts of climate change through continued physical upgrades designed to take into account projected increases in climatic and hydrological variability.	*Strategic Climate Fund EBRD*	*59,0 (38,0-EBRD 21-CIF)*	*OSHC Barqi Tojik*	*2014-2020*	*Power and energy, water resources*	*The OSHC Barqi Tojik submits information to PPCR Secretariat for delivery to CIF. M & E is carried out in accordance with the EBRD procedures. Monitoring is carried out in accordance with the results and monitoring framework.*
6. Environmental Land Management and Rural Livelihoods Project – ELMARL[12]						
1. *Prevent or reduce soil erosion;* 2. *Increase vegetative cover through perennial crops and pasture;* 3. *Improve sustainable pasture management;* 4. *Provide soil and moisture conservation;* 5. *Improve water use efficiency;* 6. *Increase sustainable renewable energy supply*	*GEF; WB; Strategic Climate Fund*	***19,0***	*CEP*	*2013-2018*	*Agriculture*	*The Committee submits information to PPCR Secretariat for delivery to CIF. M & E is carried out in accordance with the WB procedures. Monitoring is carried out in accordance with the results and monitoring framework.*
7. CLIMADAPT – phase 1						
Providing an innovative financing mechanism aimed at helping people and businesses to cope with the impacts of	*Strategic Climate Fund*	*13,0 (5-CIF, 8- EBRD)*	*Bank Eskhata, microfinance organization*	*2016-2019*	*Energy, residential sector, private sector*	*The Project submits information to PPCR Secretariat for delivery to*

[11] https://www.ebrd.com/cs/Satellite?c=Content&cid=1395251539868&d=&pagename=EBRD%2FContent%2FDownloadDocument

[12] http://projects.worldbank.org/P122694/second-upland-agricultural-livelihood-environmental-management-project?lang=en

Project objectives related to Climate Change	Donors	Project budget, million USD	Executing Agencies	Implementation period	Sector	M & E
climate change by increasing resilience in the energy sector, agriculture, small and medium businesses and the residential sector.	*EBRD*		*IMON International, Microcredit organization "Humo"*			*CIF.* *Internal M & E is carried out in accordance with the EBRD procedures.* *Monitoring is carried out in accordance with the results and monitoring framework.*
8. Supporting the development of effective hydrological and meteorological (hydromet) data and information in Tajikistan						
1. *Support for legal and structural transformation of the Agency for Hydrometeorology;* 2. *Improving climate risk management data through timely and reliable information.*	*GCF* *ADB*	*10,0 (5-GCF, 5-ADB)*	*Agency for Hydrometeorology*	*Approved by GCF and ADB 2019-2023*	*Natural disasters, water resources*	*The M & E mechanism is under development by the GCF and Accredited Organizations*
9. Building climate resilience of vulnerable and food insecure communities through capacity strengthening and livelihood diversification in mountainous regions of Tajikistan						
1. *Disaster Risk Management;* 2. *Health and well-being, and food and water security;* 3. *Livelihood of people and communities;* 4. *Ecosystem and ecosystem services*	*GCF*	***10,0***	*WFP*	*Approved by GCF in 2018. The project terms are under consideration.*	*Natural disasters, agriculture, environmental protection*	*The M & E mechanism is under development by the GCF and Accredited Organizations*
10. CLIMADAPT-phase 2						
1. *Energy production and access;* 2. *Buildings, cities, industries and household appliances;* 3. *Health, food and water security;* 4. *Infrastructure and environment;* 5. *Gender Benefits - This project will*	*GCF*	*10,0*	*Not defined*	*Approved by GCF in 2017. The project terms are under consideration*	*Energy, food, environment, drinking water*	*The M & E mechanism is under development by the GCF and Accredited Organizations*

Project objectives related to Climate Change	Donors	Project budget, million USD	Executing Agencies	Implementation period	Sector	M & E
benefit at least 33,000 women; *6. UN Sustainable Development Goals* *7. Affordable and clean energy;*						
11. Climate Adaptation and Mitigation Program for Aral Sea Basin (CAMP4ASB – phase 1)						
The second component, regional climate investment facility, will provide technical assistance and facilitation support to plan, implement, and manage climate investments. The second component consists of following two sub-components: (i) investment financing; and (ii)capacity building and community support. The third component, regional and national coordination consists of the following two sub-components:(i) regional coordination; and (ii)national coordination.	*WB*	***9,0***	*MF*	*2016-2021*	*Agriculture*	*M & E is carried out in accordance with the WB procedures. Monitoring is carried out in accordance with the results and monitoring framework.*
12. Climate Adaptation and Mitigation Program for Aral Sea Basin (CAMP4ASB phase II) by supporting adaptation activities in Tajikistan and Uzbekistan.						
1. Livelihood of people and communities; ***2.*** *Ecosystem and ecosystem services;* 3. *UN Sustainable Development Goals №11. Make cities and human settlements inclusive, safe, resilient and sustainable*	*GCF, WB*	***10,0***	*CEP*	*Approved by GCF in 2018. The project terms are under consideration*	*Natural disasters, agriculture, environmental protection*	*The M & E mechanism is under development by the GCF and Accredited Organizations*
13. Development of a National Action Plan for Climate Change Mitigation						
1. Develop mitigation and adaptation measures for key sectors of the	*GCF UNDP*	***3,0***	*CEP*	*Under the approval by the*	*Key sectors of the economy*	*The M & E mechanism is under development by the*

Project objectives related to Climate Change	Donors	Project budget, million USD	Executing Agencies	Implementation period	Sector	M & E
economy; 2. *Develop recommendations for budgeting climate change issues during the planning process;* 3. *Develop a monitoring mechanism for the implementation of the National adaptation plan;* 4. *Develop and implement standards and procedures for climate data and information management* 5. *Develop standard projected climate changes;* 6. *Create a climate change database*				*GCF Board of Directors*	*(agriculture, water resources, education)*	*GCF and Accredited Organizations*
14. Integrated landscape approach to improve climate resilience of small farmers and cattle herders in Tajikistan						
Component 1: Integrated watershed management to increase climate resilience *Component 2: Ecosystem adaptation in agro-ecological landscapes.* *Component 3: Knowledge management on building climate resilience through an watershed management and ecosystem-based adaptation*	*Adaptation Fund*	***10,0***	*CEP*	*Under approval by the Adaptation Fund*	*Agriculture*	*The M & E mechanism is under development by the GCF and Accredited Organizations*
15. Zarafshon Irrigation Rehabilitation and Management Improvement Project						
1. *Restoration of the on-farm irrigation system and Water Users Association support;* 2. *Introduction of drip irrigation;* 3. *Improving the capacity of farms to effectively use water resources in view of climate change.*	*EU Trust Fund WB*	***14,0***	*ARI*	*2017-2022*	*Agriculture*	*M & E is carried out in accordance with the WB procedures. Monitoring is carried out in accordance with the results and monitoring framework.*

Project objectives related to Climate Change	Donors	Project budget, million USD	Executing Agencies	Implementation period	Sector	M & E
16. Strengthening Critical Infrastructure against Natural Hazards						
1. *Reconstruct and upgrade critical bridges in the Gorno-Badakhshan Autonomous Oblast (GBAO);* 2. *Modernize the national crisis management center and emergency communication systems to enable first responders to rapidly access hazard information, generate timely warnings for at-risk communities, and dispatch emergency services more effectively;* 3. *Develop a disaster risk financing strategy for Tajikistan to prepare for efficient financing mechanisms for post-disaster response, recovery and reconstruction*	*WB*	***50,0***	*MF and MT*	*2017-2022*	*Transport*	*M & E is carried out in accordance with the WB procedures. Monitoring is carried out in accordance with the results and monitoring framework.*
17. Strengthening of livelihoods through climate change adaptation in Kyrgyzstan and Tajikistan						
1. *Measures to support agriculture include the introduction of water-saving irrigation methods and water-efficient crops, the use of quality seed and the rehabilitation of water reservoirs;* 2. *The disaster risk reduction measures include the construction of dams and riverbank reinforcement and, in particular, erosion control.*	*German Federal Ministry for Economic Cooperation and Development (BMZ)*		*GIZ*	*2014-2018*	*Agriculture, natural disasters*	*M & E framework is created in accordance with GIZ procedures.*

Project objectives related to Climate Change	Donors	Project budget, million USD	Executing Agencies	Implementation period	Sector	M & E
18. Sustaining agricultural biodiversity in the face of climate change in Tajikistan						
1. *Agro-biodiversity conservation and adaptation to climate change through supportive policy, regulatory and institutional frameworks;* 2. *Improved capacity for sustaining agro-biodiversity in the face of climate change;* 3. *Market conditions favour sustainable agro-biodiversity production*	*GEF UNDP*	*0,54*	*National Biodiversity and Biosafety Center under the CEP*	*2009-2016*		*M & E framework is created in accordance with UNDP procedures.*
19. Technology transfer and market development for SHP in Tajikistan						
1. *Assist the implementation of policies, legislation and regulations that improve market conditions for RES development;* 2. *Demonstrate sustainable delivery models and financing mechanisms to encourage small-scale RES projects (and improve social infrastructure) and support project implementation;* 3. *Develop viable end-use RES applications;* 4. *Conduct training on the proper RES systems management (for example, tariff collection) to strengthen local ownership and sustainability.*	*GEF/ UNDP, UK Government*	***3,33***	*MEWR and Ministry of Industry, MEDT, Agency for Hydrometeorology, OJSHC Barqi Tojik*	*2012-2016*		*M & E framework is created in accordance with UNDP procedures*

Project objectives related to Climate Change	Donors	Project budget, million USD	Executing Agencies	Implementation period	Sector	M & E
20. Enabling activities for preparation of First Biennial Update Report (FBUR) and Fourth National Communication (FNC) under UNFCCC						
The project objective is to assist the Government of Tajikistan in preparation of its First Biennial Update Report (FBUR) and Fourth National Communication (FNC) under the UNFCCC Convention in accordance with its commitments as a non-Annex 1 Party (as mandated by Article 4 and 12 of this Convention) and COP 17 decisions7	*GEF/ UNDP*	**0,852**	*Agency for Hydrometeorology*	*2016-2020*	*Key sectors of the economy*	*M & E will be carried out in accordance with the WB UNDP requirements*

5 CHALLENGES AND GAPS AND RELATED FINANCIAL AND TECHNICAL CAPACITY NEEDS

With the purpose of fulfillment of the commitments arising from the decisions of the Cancun and Durban Conferences of the Parties (COP) related to submission of the national communications and biennial reports, further support is needed for the development and strengthening of the existing technical and institutional capacity and continuation of the efforts for integration of the climate change issues into the national policies, plans and programs.

Technical needs and demand for capacity building and strengthening in the field of greenhouse gas inventory:

1. Ensure sustainability as well as quality assurance/quality control and verification (QA/QC and verification) of the GHG inventory process:

- Capacity building of the national experts, in particular, of the Climate Change Research Center of the Agency for Hydrometeorology of the RT in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and on the software.
- Training of experts on application of international experience and use of satellite data (GIS) to reduce uncertainties in estimations of emissions/ removals in forestry and other land use.
- Capacity building and technical support for the experts of Statistics Agency, which are responsible for the development of the energy balance, collection and submission of data on fuel consumption in aviation, road transport and data in the waste sector.
- Development and approval of the special forms of statistical accounting and reporting of all missing data necessary for GHG inventory.

2. Reduce GHG emissions in the future:

   - Introduce interested parties to the methods of identifying key sources and sinks of GHG in terms of volumes and trends of emissions.
   - Train experts on possible methods for reducing GHG emissions for their subsequent use by the decision-makers at the country level using the international experience.
   - Advocate for and assist in introduction of the GHG emissions reduction.

3. Develop projections of greenhouse gas emissions based on one or another decision-making scenarios:

   - Train experts on application of extrapolation techniques for the GHG
   - In close cooperation with the Statistics Agency experts, develop projected changes of the aggregated data on activities related to GHG emissions and removals in accordance with the technology development scenarios.
   - Provide decision makers with the findings of the projected emissions in case of various country development scenarios.

Financing needs:

1. Financial support is required for the program of Statistics Agency on development of the country's energy balance on a regular basis, at least, every two years and compilation of the energy balance for the previous years.

2. Financial support is required for the program of Statistics Agency on development, piloting and approval of the special forms of statistical accounting and reporting for all missing data necessary for inventory of GHG.

Needs in technology transfer:

The need for infrastructure investments is very high: significant part of the infrastructure in Tajikistan is outdated, worn out and ineffective. Up to 80 percent of the technological equipment of companies is worn-out and obsolete and cannot be used for the manufacturing of goods that meet the modern market requirements. These factors have caused an increase of operational costs, raw materials and energy resources above the normal rates, and cost of products. However, low level of working capital of enterprises, limited investment, lack of bank financing for the restoration of fixed assets caused a decline in production. At the same time, low level of working capital of enterprises, limited investments, lack of access to finance for the restoration of fixed assets caused a decline in production.

In 2013-2014, climate finance in the development context allocated to Tajikistan was $ 260 million per year. This is slightly less than the average for EECCA countries (Eastern Europe, the Caucasus and Central Asia) - $ 303 million per year. Climate financing for Tajikistan is slightly less than the average level and per capita amount to: $ 31.3 USD in Tajikistan and $ 33.2 on average in EECCA. The funding allocated to Tajikistan was mainly in a form of grants or concessional loans, due to the relatively low level of economic development of the country, with 61% of funding allocated for the climate change mitigation projects; a significant part (20%) was allocated for complex projects (mitigation and adaptation) - mainly for two large projects in the energy and agriculture sector.

Climate change and intensification of extreme weather events are expected to adversely affect the ability of existing drinking water supply infrastructure to provide stable water supply in Tajikistan - in particular, due to variability of patterns and dynamics of precipitation and reduced flows of the melted glaciers. More than 60% of water resources in the Central Asian region are formed by the high mountain glaciers of the country, and Tajikistan understands that changes in the state of the water resources and its use in this part of the region will have serious consequences for the region and downstream countries. Significant investments are already required to upgrade or replace obsolete water supply and sanitation infrastructure in Tajikistan. Financial needs may increase due to projected climate changes and their negative impact on water supply. Currently, only 59% of Tajik population uses municipal water supply. Japan has committed to support the investments into water supply infrastructure in Khalton region to provide population with more reliable drinking water supply services.

Fiscal schemes and domestic financing mechanisms from the government sources are used to support “low-carbon” projects (in particular, in the field of renewable energy) in Tajikistan. Nevertheless, the share of international financial support in the state investments remains very high.

Measures to adapt the country's economy to climate changes depend on technical and economic opportunities. It should be noted that the success of implementation of mitigation measures will have a positive impact on the water supply of the downstream countries of the Amu Darya River. Therefore, all water-saving activities and projects in Tajikistan are of the regional importance and in case of investments, this factor should be taken into account by the countries of the region and investors.

6 SYSTEM OF THE MONITORING, REPORTING AND VERIFICATION AT INTERNAL LEVEL

System of monitoring, reporting and verification (MRV) is an important tool for the monitoring of the progress of the country towards the development with the low level of emissions and achievement of sustainable development goals. MRV is considered an important tool that allows you to plan and manage mitigation actions and track their implementation, as well as analyze its impact and effectiveness.

According to the agreements under the UNFCCC, the MRV system should be established by 2020, before the start of the commitment period for the limitation of the greenhouse gas emissions.

The proposed path for creating an MRV system in Tajikistan is presented below and includes legal/formal mechanisms and methodological issues.

National inventory of GHGs is the key (measurement) component of the MRV system at the national level, given that planning of the national mitigation measured of climate change and its impact assessment are based on the GHG inventory data. Existing institutional mechanisms and the process of development of GHG inventory are described in the chapter 1.12. and 2.3.

Based on the decisions taken at COP 16 and 17, non-Annex I Parties now shall identify the specific effects of national mitigation measures, as well as the necessary support, and provide this information, including a national inventory report, as part of Biennial reports.

Therefore, it is considered that introduction of this system in Tajikistan shall be done gradually taking into consideration national conditions and national priorities and it shall be based on the existing internal systems and capacities as well as on best international practice. This implies institutional improvements aimed at coordination of all activities on development of the national communications and biennial reports and will define the responsibilities of the designated authority for:

- the development of the GHG national inventories
- the monitoring and reporting on the policy, activities and projects on climate change mitigation
- the methodological issues

SOURCES OF INFORMATION

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16. National Development Strategy of the Republic of Tajikistan for the period up to 2030
17. National Environmental Action Plan for Republic of Tajikistan
18. Concept of Transition of the Republic of Tajikistan to Sustainable Development
19. The concept of environmental protection, the State Environmental Programof the Republic of Tajikistan for 2009-2019
20. Program for improving the supply of the population of the Republic of Tajikistan with clean drinking water for 2008-2020
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25. Asian Development Bank. Environmental Profile of Tajikistan, 2000
26. S. Ibatullin, V. Yasinsky, A. Mironenkov. The Impact of Climate Change on Water Resources in Central Asia. Sector report. Eurasian Development Bank, 2009
27. United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP). Trends and progress in the field of environment and development: emerging and persistent issues in water resources management, 2011
28. Asian Development Bank's Report on Climate Change in Tajikistan, 2017

RECOMMENDED WEB-SITES

1. President of the Republic of Tajikistan www. president. tj
2. RT Ministry of economic development and trade http://www.medt.tj
3. RT Ministry of agricutlure http://www.moa.tj
4. RT Ministry of education and science http://maorif.tj/
5. RT Ministry of health and social protection http://www.health.tj/
6. Committee for environment protection under the Government of the Republic of Tajikistan http://hifzitabiat.tj/
7. Agency for Hydrometeorology http://www.meteo.tj/
8. Statistics Agency under the President of the Republic of Tajikistan http://www.stat.tj/
9. National Bank of the Republic of Tajikistan http://www.nbt.tj/
10. Greenpak http://www.rec.org/REC/Programs/Greenpack/
11. IPCC www.ipcc.ch
12. UNFCCC www.unfccc.int
13. Youth envrionmental center http://www.ecocentre.tj/
14. UNDP Tajikistan http://untj.org
15. RIO+20 http://www.uncsd2012.org/rio20/
16. Pilot Project for Climate Change Resilience http://ppcr.tj/
17. Regional Environment Center of Central Asia
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19. http://www.unpei.org
20. www.worldbank.org
21. http://www.osce.org
22. http://www.adb.org
23. http://www.ebrd.org

ANNEXES

THE LIST OF PERFORMERS

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Khodjaev Z.A.	Statistical agencies under the President of the Republic of Tajikistan
Rajabova N.S.	Statistical agencies under the President of the Republic of Tajikistan
Shodmonov M.T.	Agency for Hydrometeorology of the Committee on Environmental Protection under the Government of the Republic of Tajikistan
Khudoyorova R.Kh.	Agency for Hydrometeorology of the Committee on Environmental Protection under the Government of the Republic of Tajikistan

Annex 1

Institutional structure for climate change issues in Tajikistan

Institution	Its agencies/bodies	Institutional mandate and its relevance to CC	Relevance for the NC and NRGHGI
Government bodies, ministries and agencies			
Executive office of the President of the Republic of Tajikistan	Department on environment protection and emergency situations	▪ Coordinate state policy and policies in the field of environment and emergency situations in Tajikistan; ▪ Review and approve the laws and bylaws on environment and emergencies in Tajikistan; ▪ Monitor sector development strategies developed in accordance with the basic laws and regulations on environment and emergency prevention	▪ Provide political support for the large programs on CC in Tajikistan and ensure compliance with the environmental legislation at all sectoral levels in Tajikistan; ▪ Review and approve national development strategies and action plans, including NAP (2003), National strategy and Action Plan for climate change adaptation (being developed now); ▪ Supervise the activity of PPCR and host PPCR coordination center
Committee for environmental protection under the Government of the Republic of Tajikistan (CEP)	General overview	CEP is a key specialized government body, responsible for the implementation of the state policy in the field of environment protection in Tajikistan. Main responsibilities of the Committee and its subordinated institutions, involved in CC issues are as following: ▪ Develop and implement state policy, strategies and plans of actions for protection of environment; ▪ Develop draft laws, bylaws and decisions on environment protection; ▪ Supervise implementation of laws, bylaws, state policy and environment protection measures; ▪ Provide oversight of all environmental conventions to which Tajikistan is a party.	▪ CEP ensures the process of FNC/ BRGHGI through PIG ▪ CEP implements CC projects through PIG (e.g. capacity building, PPCR); ▪ Chair of the CEP acts as a focal point for CAMP4ASB (Climate Change Adaptation and Mitigation Program for Aral Sea Basin) and can coordinate information exchange between various climate change projects based on complementarity principle.

Institution	Its agencies/bodies	Institutional mandate and its relevance to CC	Relevance for the NC and NRGHGI
Agency for Hydrometeorology of Committee for environmental protection under the Government of the Republic of Tajikistan (Agency)	General overview	The agency is responsible for the climate-related environment and hydro meteorological monitoring. It is in charge of preparation and presentation of short-term weather forecasts to the Government of the Republic of Tajikistan and local authorities. Scope of work related to the preparation of national communications: ▪ Monitor and collect data on water, meteorology and climate related regime in Tajikistan; ▪ Monitor extreme weather conditions and other hydro meteorological disasters; ▪ Archive historical and current data and trend analysis; ▪ Act as a national focal point under the UNFCCC and provide technical support and policy advice to the CEP in its implementation process and represents the Government of Tajikistan at the UNFCCC negotiations; ▪ Act as national focal point for the IPCC.	▪ Agency covers all aspects related to climate change and presentation of information on climate change mitigation and adaptation through its Climate Change Research Center; ▪ Strengthen dialogue, share information and facilitate cooperation among all relevant stakeholders, including government and non-governmental organizations, academia and private sector on climate change and related issues; ▪ Facilitate development of V&A for the monitoring of CC (temperature, precipitation, extreme weather conditions, glaciers and floods caused by the outburst of glacier lakes and forecasts); ▪ Implement large regional project on modernization of hydro meteorological services in Central Asia (HMSMP CA), the outcomes of which contribute to the FNC/ BRGHGI.
Ministry of economic development and trade of the Republic of Tajikistan (MEDT)	Macroeconomic analysis and forecasting department	▪ Oversight of the state economic planning and forecasting system and facilitate effective implementation of the social and economic development priorities in Tajikistan. One the key tasks of the ministry is to develop and implement program and strategies for economic development of RT with the purpose of poverty reduction and stabilization of the social and economic conditions. ▪ Representatives of the ministry lead the editor's group in the process of	▪ MEDT is one of the *co-executive* bodies for the National Action Plan for Climate Change Mitigation. MEDT is also one of the co-executive bodies for the preparation of the National Strategy and Action Plan for Climate Change Adaptation (at the stage of preparation). ▪ MEDT should be included into the Project Steering Committee (PSC) and into the relevant sectoral working groups, which develop sustainable strategies, plans and budgets.

Institution	Its agencies/bodies	Institutional mandate and its relevance to CC	Relevance for the NC and NRGHGI
		preparation of the National Development Strategy (NDS), National Action Plan (2016-2030) and Strategy for the improvement of the welfare of population (up to 2015); ▪ MEDT should be included as the key government body for consideration of climate change issues into the key national policies and strategies as reflected in the NDS for 2016-2030.	▪ MEDT provide macroeconomic data and long term development forecasts that should be used for the situation analysis (national conditions), FNC/ BRGHGI processes.
Ministry of Agriculture of the Republic of Tajikistan (MA)	General overview	▪ The ministry is responsible for the implementation of the sectoral strategies and activities in the agricultural sector and therefore, monitor a significant segment of the economy that is vulnerable to CC. ▪ The ministry develops, creates and coordinates agrarian and regional policies, strategic plans, national and sectoral programs in the agriculture. ▪ The ministry also oversees the work of the AS which is the scientific and coordination center for agrarian science in Tajikistan. ▪ Scope of AS work is directly related to adaptation, as it conducts researches on cotton, wheat, barley and legumes, including work on the introduction of high-yielding varieties.	▪ Representatives of the ministry shall keep responsibility for the development of the section on LULUCF (*Land Use, Land-use Change and Forestry*) in the context of greenhouse gas emission inventory; ▪ Specialists of the ministry shall make their contribution into the vulnerability and adaptation assessment, in FNC/ BRGHGI processes; ▪ MA through the PIG implements a number of projects related to climate change, which could be an addition to the information exchange, coordination of sectoral activities on CC
Ministry of energy and water resources of the Republic of Tajikistan (MEWR)	General overview Barki Tojik	The ministry as a whole is delegated with the task of development and implementation of the national energy and water-related policy. Specific climate-related activities of the MEWR include the following: • Development, revision and regular	▪ MEWR representatives shall contribute to vulnerability and adaptation assessment and mitigation of CC impacts in the FNC/ BRGHGI processes; ▪ Representatives of Barki Tojik/Research Hydroenergy Institute are responsible for

Institution	Its agencies/bodies	Institutional mandate and its relevance to CC	Relevance for the NC and NRGHGI
		update of the national energy and water development strategies; • Drafting the relevant legal documents on improvement and development of the sectoral energy and water related projects; • Monitoring of the implementation of national development programs and action plans for the development of RES; • Participation in strategic development projects on construction of hydroelectric power plants.	the development of the energy section in the GHGI; ▪ MEWR shall be included as a member of the PSC; ▪ MEWR through PIG implements a number of water and climate related projects, which could serve as annex in information exchange and coordination of the FNC/ BRGHGI processes.
Ministry of health and social protection of population of the Republic of Tajikistan	General overview	▪ The ministry implements and supervise the sectoral policy in the field of health and ensures sanitary and epidemiological services to population; ▪ Ministry carries out state sanitary and epidemiological surveillance; implements measures to ensure environmental safety, environmental protection and sanitation, and also develops and approves state and industrial health regulations and hygienic standards; ▪ State Epidemiological Service under the Ministry participated in the WHO regional project on health and climate change and it drafted a Health protection and climate change strategy.	▪ Representatives of the ministry shall contribute to V&A assessment, especially during the analysis of the impact of climate change on population health during the processes of FNC/ BRGHGI
Ministry of education and science of the Republic of	General overview	▪ The ministry is responsible for the development and implementation of the policies at all levels of education. ▪ In accordance with the Law on	▪ Representatives of MoE and its institutions shall be involved into awareness raising activities and education on climate change issues during the processes of FNC/

Institution	Its agencies/bodies	Institutional mandate and its relevance to CC	Relevance for the NC and NRGHGI
Tajikistan (MoES)		environmental education, MoES has authority to develop and implement projects on environmental education.	BRGHGI
Ministry of finance of the Republic of Tajikistan (MoF)	General overview	▪ Implement fiscal policy of the Government of the Republic of Tajikistan; ▪ Formulate the annual state budget of the Republic of Tajikistan and controls the execution of the budget; ▪ Oversee investment climate projects, especially those for loans and credits	▪ Act as one of the focal point for the CAMP4ASB in Tajikistan and responsible agency for the monitoring and implementation of the credit line component (Component 2); ▪ MoF shall be involved into the PSC, conduct consultations for the organization of MRV and provide financial support.
Ministry of industry and new technologies of the Republic of Tajikistan	General overview	▪ Implement a national policy in the field of industrial and technology development; ▪ Served as the Coordination Agency for CDM (Clean Development Mechanism) projects at the government level.	▪ Representatives of the ministry shall be involved in provision of data and estimates of GHG emissions as part of "industrial processes", as well as provide advisory support in the development of strategies and planning for reducing GHG emissions; ▪ Act as political and supervisory department to keep contact with the government and private companies such as TALCO and Tajik Cement factory.
Ministry of transport of the Republic of Tajikistan	General overview	▪ Implement national transport and infrastructure policy; ▪ Carry out a guaranteed environmental impact assessment for the large investment projects in the transport sector to ensure air quality considering CC	▪ Representatives of the ministry shall take part in development of the GHGI for collection of data and estimation of emissions in the 'Energy' chapter (subsection on transport) and provide advisory support for the development of strategy and planning of the GHG emission reduction.
Forestry Agency under the	General overview	▪ Develop improvements, amendments to the forest sector reform and implement	▪ Take part in development of the carbon sequestration projects and afforestation

Institution	Its agencies/bodies	Institutional mandate and its relevance to CC	Relevance for the NC and NRGHGI
Government of the Republic of Tajikistan		afforestation and reforestation policy; ▪ Control policy and regulations for protection of wood material	and reforestation activities in Tajikistan (NAMA)[13]. ▪ Provide data for the development of the LULUCF category in the context of a GHGI.
Committee for emergency situations and civil defense under the Government of the Republic of Tajikistan (CESCD)	General overview	▪ The Committee is a government agency delegated with the task of reducing disaster risk and responding to it, covering severe natural disasters. ▪ CESCD conducts reviews and analyzes the disaster risk assessments from the CC point of view; the committee has a department that pays special attention to evacuation and relocation.	▪ In the process of the preparation of FNC/ BRGHGI, CESCD representatives shall facilitate collection and analysis of the date on impact of severe natural disasters on socio-economic development in Tajikistan.
Statistics Agency under the President of the Republic of Tajikistan	General overview	Agency is official data provider in the Republic of Tajikistan: ▪ Collect, process, analyze and distribute statistical data related to the economy, demography and social life ▪ Create and maintain databases and statistical registries at the national level, develop statistical methodologies, cooperate in the field of statistics, interact with beneficiaries, etc. ▪ Collect, process, analyze and distribute statistical data related to transport, housing and utilities as well as to environment.	▪ Provide data records for the development of GHG emissions inventory; ▪ May potentially be considered as a government authority responsible for the institutional arrangements for MRV.
Academy of Science and Research institutions			
Academy of Science of the Republic of Tajikistan and its	General overview	▪ Conduct research activity and analysis of the relevant researches and thematic studies in physics, mathematics,	▪ Participate as local experts in NR/BRGHGI for the estimations of greenhouse gases, carbon sequestration

[13] http://www.nama-facility.org/projects/tajikistan.html

Institution	Its agencies/bodies	Institutional mandate and its relevance to CC	Relevance for the NC and NRGHGI
research institutes		geography, climate, social and gender issues, ▪ conduct research on the effects of anthropogenic factors on CC.	and emission reduction methods, provides technical advice on GHG inventory issues; ▪ Take part in social and medical research activities as part of the National Communication.
Strategic Research Center under the President of the Republic of Tajikistan	General overview	▪ Conduct research and development activities and analysis relevant to the strategic development of the country, including sectoral development, introduction of RES, migration, etc.	▪ Participate as local experts for the review of the potential of RES for reduction of greenhouse gas emission by 2030 (% of shares) as a contribution to the chapter on mitigation of the NR/ BRGHGI.
Higher education universities (RTSU, State National University, Tajik Technical University, Tajik State Medical University)	General overview	▪ Most higher education universities conduct studies related to water, climate-smart agriculture practices. ▪ Tajik State Medical University conducts regular studies of the effects of CC on human health	▪ Take part in the development of the NR/ BRGHGI chapter on public awareness and education as authors of this chapter; ▪ Take part in medical study on CC issues as local experts.
Non-government sector (Civil Society Organization (SCOs), Nongovernment organizations (NGOs))			
▪ **Local NGOs:** Small earth fund "Kuhiston", Youth ecological center" etc. ▪ **International NGOs:** CAREC, Oxfam, ACTED etc.	General overview Local and International NGOs	▪ Most of the projects implemented by local NGOs promote local communities in climate change independent development, and majority of them provide for education, capacity building on best practices and know-how for farmers and households ▪ International NGOs implement a number of CC projects, promote assessment-based research, capacity building and development of the multi-disciplinary cooperation (for example, water and climate, gender and climate, migration and climate, health and climate, energy and climate).	▪ Participate as local information providers; facilitate exchange of information on CC issues in Tajikistan during the meetings of the platform for coordination and interaction with stakeholders of the NR/BRGHGI ▪ Participate as experts for the development of the chapter on vulnerability and adaptation and mitigation.

Annex 2

Summary report for GHG emissions inventory

Inventory Year: 2014

	Emissions (Gg)			Emissions CO2 Equivalents (Gg)				Emissions (Gg)				
Categories	Net CO2 (1)(2)	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (3)	Other halogenated gases without CO2 equivalent conversion factors (4)	NOx	CO	NMVOCs	SO2
Total National Emissions and Removals	1755,495834	230,238	1,948	0	359,903	0	0	0	0	0	0	0
1 - Energy	2475,456241	2,6674	0,039	0	0	0	0	0	0	0	0	0
1.A - Fuel Combustion Activities	2473,261737	0,42828	0,039	0	0	0	0	0	0	0	0	0
1.A.1 - Energy Industries	756,3562234	0,02084	0,007						0	0	0	0
1.A.2 - Manufacturing Industries and Construction	258,3701404	0,00947	0,002						0	0	0	0
1.A.3 - Transport	217,6080034	0,12131	0,015						0	0	0	0
1.A.4 - Other Sectors	1240,92737	0,27665	0,015						0	0	0	0
1.A.5 - Non-Specified	0	0	0						0	0	0	0
1.B - Fugitive emissions from fuels	2,1945035	2,23911	0	0	0	0	0	0	0	0	0	0
1.B.1 - Solid Fuels	2,0889999	0,76483	0						0	0	0	0
1.B.2 - Oil and Natural Gas	0,1055036	1,47429	0						0	0	0	0
1.B.3 - Other emissions from Energy Production	0	0	0						0	0	0	0
1.C - Carbon dioxide Transport and Storage	0	0	0	0	0	0	0	0	0	0	0	0
1.C.1 - Transport of CO2	0								0	0	0	0
1.C.2 - Injection and Storage	0								0	0	0	0
1.C.3 - Other	0								0	0	0	0
2 - Industrial Processes and Product Use	798,750308	0	0	0	359,903	0	0	0	0	0	0	0
2.A - Mineral Industry	604,732708	0	0	0	0	0	0	0	0	0	0	0
2.A.1 - Cement production	562,3362								0	0	0	0
2.A.2 - Lime production	9,15								0	0	0	0
2.A.3 - Glass Production	0,3366								0	0	0	0

	Emissions (Gg)			Emissions CO2 Equivalents (Gg)				Emissions (Gg)				
Categories	Net CO2 (1)(2)	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (3)	Other halogenated gases without CO2 equivalent conversion factors (4)	NOx	CO	NMVOCs	SO2
2.A.4 - Other Process Uses of Carbonates	32,909908								0	0	0	0
2.A.5 - Other (please specify)	0	0	0						0	0	0	0
2.B - Chemical Industry	0	0	0	0	0	0	0	0	0	0	0	0
2.B.1 - Ammonia Production	0								0	0	0	0
2.B.2 - Nitric Acid Production			0						0	0	0	0
2.B.3 - Adipic Acid Production			0						0	0	0	0
2.B.4 - Caprolactam, Glyoxal and Glyoxylic Acid Production			0						0	0	0	0
2.B.5 - Carbide Production	0	0							0	0	0	0
2.B.6 - Titanium Dioxide Production	0								0	0	0	0
2.B.7 - Soda Ash Production	0								0	0	0	0
2.B.8 - Petrochemical and Carbon Black Production	0	0							0	0	0	0
2.B.9 - Fluorochemical Production				0	0	0	0	0	0	0	0	0
2.B.10 - Other (Please specify)	0	0	0	0	0	0	0	0	0	0	0	0
2.C - Metal Industry	194,0176	0	0	0	359,903	0	0	0	0	0	0	0
2.C.1 - Iron and Steel Production	0	0							0	0	0	0
2.C.2 - Ferroalloys Production	0	0							0	0	0	0
2.C.3 - Aluminium production	194,0176				359,903			0	0	0	0	0
2.C.4 - Magnesium production	0					0		0	0	0	0	0
2.C.5 - Lead Production	0								0	0	0	0
2.C.6 - Zinc Production	0								0	0	0	0
2.C.7 - Other (please specify)	0	0	0	0	0	0	0	0	0	0	0	0
2.D - Non-Energy Products from Fuels and Solvent Use	0	0	0	0	0	0	0	0	0	0	0	0
2.D.1 - Lubricant Use	0								0	0	0	0
2.D.2 - Paraffin Wax Use	0								0	0	0	0
2.D.3 - Solvent Use									0	0	0	0
2.D.4 - Other (please specify)	0	0	0						0	0	0	0
2.E - Electronics Industry	0	0	0	0	0	0	0	0	0	0	0	0
2.E.1 - Integrated Circuit or Semiconductor				0	0	0	0	0	0	0	0	0
2.E.2 - TFT Flat Panel Display					0	0	0	0	0	0	0	0
2.E.3 - Photovoltaics					0			0	0	0	0	0
2.E.4 - Heat Transfer Fluid					0			0	0	0	0	0

	Emissions (Gg)			Emissions CO2 Equivalents (Gg)				Emissions (Gg)				
Categories	Net CO2 (1)(2)	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (3)	Other halogenated gases without CO2 equivalent conversion factors (4)	NOx	CO	NMVOCs	SO2
2.E.5 - Other (please specify)	0	0	0	0	0	0	0	0	0	0	0	0
2.F - Product Uses as Substitutes for Ozone Depleting Substances	0	0	0	0	0	0	0	0	0	0	0	0
2.F.1 - Refrigeration and Air Conditioning				0				0	0	0	0	0
2.F.2 - Foam Blowing Agents				0				0	0	0	0	0
2.F.3 - Fire Protection				0	0			0	0	0	0	0
2.F.4 - Aerosols				0				0	0	0	0	0
2.F.5 - Solvents				0	0			0	0	0	0	0
2.F.6 - Other Applications (please specify)				0	0			0	0	0	0	0
2.G - Other Product Manufacture and Use	0	0	0	0	0	0	0	0	0	0	0	0
2.G.1 - Electrical Equipment					0	0		0	0	0	0	0
2.G.2 - SF6 and PFCs from Other Product Uses					0	0		0	0	0	0	0
2.G.3 - N2O from Product Uses			0						0	0	0	0
2.G.4 - Other (Please specify)	0	0	0	0	0	0	0	0	0	0	0	0
2.H - Other	0	0	0	0	0	0	0	0	0	0	0	0
2.H.1 - Pulp and Paper Industry	0	0							0	0	0	0
2.H.2 - Food and Beverages Industry	0	0							0	0	0	0
2.H.3 - Other (please specify)	0	0	0						0	0	0	0
3 - Agriculture, Forestry, and Other Land Use	-1518,710715	189,94	1,644	0	0	0	0	0	0	0	0	0
3.A - Livestock	0	181,914	0	0	0	0	0	0	0	0	0	0
3.A.1 - Enteric Fermentation		151,274							0	0	0	0
3.A.2 - Manure Management		30,64	0						0	0	0	0
3.B - Land	-1576,597848	0	0	0	0	0	0	0	0	0	0	0
3.B.1 - Forest land	-1576,396181								0	0	0	0
3.B.2 - Cropland	0								0	0	0	0
3.B.3 - Grassland	-0,201666667								0	0	0	0
3.B.4 - Wetlands	0		0						0	0	0	0
3.B.5 - Settlements	0								0	0	0	0
3.B.6 - Other Land	0								0	0	0	0
3.C - Aggregate sources and non-CO2 emissions sources on land	57,88713333	8,02603	1,644	0	0	0	0	0	0	0	0	0
3.C.1 - Emissions from biomass burning		0	0						0	0	0	0
3.C.2 - Liming	0								0	0	0	0

	Emissions (Gg)			Emissions CO2 Equivalents (Gg)				Emissions (Gg)				
Categories	Net CO2 (1)(2)	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (3)	Other halogenated gases without CO2 equivalent conversion factors (4)	NOx	CO	NMVOCs	SO2
3.C.3 - Urea application	57,88713333								0	0	0	0
3.C.4 - Direct N2O Emissions from managed soils			1,24						0	0	0	0
3.C.5 - Indirect N2O Emissions from managed soils			0,403						0	0	0	0
3.C.6 - Indirect N2O Emissions from manure management			0						0	0	0	0
3.C.7 - Rice cultivations		8,02603							0	0	0	0
3.C.8 - Other (please specify)		0	0						0	0	0	0
3.D - Other	0	0	0	0	0	0	0	0	0	0	0	0
3.D.1 - Harvested Wood Products	0								0	0	0	0
3.D.2 - Other (please specify)	0	0	0						0	0	0	0
4 - Waste	0	37,6298	0,266	0	0	0	0	0	0	0	0	0
4.A - Solid Waste Disposal	0	36,3705	0	0	0	0	0	0	0	0	0	0
4.B - Biological Treatment of Solid Waste	0	0	0	0	0	0	0	0	0	0	0	0
4.C - Incineration and Open Burning of Waste	0	0	0	0	0	0	0	0	0	0	0	0
4.D - Wastewater Treatment and Discharge	0	1,2593	0,266	0	0	0	0	0	0	0	0	0
4.E - Other (please specify)	0	0	0	0	0	0	0	0	0	0	0	0
5 - Other	0	0	0	0	0	0	0	0	0	0	0	0
5.A - Indirect N2O emissions from the atmospheric deposition of nitrogen in NOx and NH3	0	0	0	0	0	0	0	0	0	0	0	0
5.B - Other (please specify)	0	0	0	0	0	0	0	0	0	0	0	0
Memo Items (5)												
International Bunkers	181,9178361	0,00127	0,005	0	0	0	0	0	0	0	0	0
1.A.3.a.i - International Aviation (International Bunkers)	181,9178361	0,00127	0,005						0	0	0	0
1.A.3.d.i - International water-borne navigation (International bunkers)	0	0	0						0	0	0	0
1.A.5.c - Multilateral Operations	0	0	0	0	0	0	0	0	0	0	0	0

Sectoral reports of GHG emission inventory

Table A2.1. Sectoral report for energy

Inventory Year: 2014

	Emissions (Gg)						
Categories	CO2	CH4	N2O	NOx	CO	NMVOCs	SO2
1 - Energy	2475,4562	2,667	0,039	0	0	0	0
1.A - Fuel Combustion Activities	2473,2617	0,428	0,039	0	0	0	0
1.A.1 - Energy Industries	756,35622	0,021	0,007	0	0	0	0
1.A.1.a - Main Activity Electricity and Heat Production	401,27441	0,008	0,005	0	0	0	0
1.A.1.a.i - Electricity Generation	103,05298	0,003	6E-04	0	0	0	0
1.A.1.a.ii - Combined Heat and Power Generation (CHP)				0	0	0	0
1.A.1.a.iii - Heat Plants	298,22143	0,004	0,004	0	0	0	0
1.A.1.b - Petroleum Refining	355,08181	0,013	0,003	0	0	0	0
1.A.1.c - Manufacture of Solid Fuels and Other Energy Industries	0	0	0	0	0	0	0
1.A.1.c.i - Manufacture of Solid Fuels	0	0	0	0	0	0	0
1.A.1.c.ii - Other Energy Industries				0	0	0	0
1.A.2 - Manufacturing Industries and Construction	258,37014	0,009	0,002	0	0	0	0
1.A.2.a - Iron and Steel				0	0	0	0
1.A.2.b - Non-Ferrous Metals				0	0	0	0
1.A.2.c - Chemicals				0	0	0	0
1.A.2.d - Pulp, Paper and Print				0	0	0	0
1.A.2.e - Food Processing, Beverages and Tobacco				0	0	0	0
1.A.2.f - Non-Metallic Minerals				0	0	0	0
1.A.2.g - Transport Equipment				0	0	0	0
1.A.2.h - Machinery				0	0	0	0
1.A.2.i - Mining (excluding fuels) and Quarrying				0	0	0	0
1.A.2.j - Wood and wood products				0	0	0	0
1.A.2.k - Construction				0	0	0	0
1.A.2.l - Textile and Leather				0	0	0	0
1.A.2.m - Non-specified Industry				0	0	0	0
1.A.3 - Transport	217,608	0,121	0,015	0	0	0	0

Categories	Emissions (Gg)						
	CO2	CH4	N2O	NOx	CO	NMVOCs	SO2
1.A.3.a - Civil Aviation	0	0	0	0	0	0	0
1.A.3.a.i - International Aviation (International Bunkers) (1)							
1.A.3.a.ii - Domestic Aviation	0	0	0	0	0	0	0
1.A.3.b - Road Transportation	193,35685	0,12	0,006	0	0	0	0
1.A.3.b.i - Cars				0	0	0	0
1.A.3.b.i.1 - Passenger cars with 3-way catalysts				0	0	0	0
1.A.3.b.i.2 - Passenger cars without 3-way catalysts				0	0	0	0
1.A.3.b.ii - Light-duty trucks				0	0	0	0
1.A.3.b.ii.1 - Light-duty trucks with 3-way catalysts				0	0	0	0
1.A.3.b.ii.2 - Light-duty trucks without 3-way catalysts				0	0	0	0
1.A.3.b.iii - Heavy-duty trucks and buses				0	0	0	0
1.A.3.b.iv - Motorcycles				0	0	0	0
1.A.3.b.v - Evaporative emissions from vehicles				0	0	0	0
1.A.3.b.vi - Urea-based catalysts	0			0	0	0	0
1.A.3.c - Railways	24,25115	0,001	0,009	0	0	0	0
1.A.3.d - Water-borne Navigation				0	0	0	0
1.A.3.d.i - International water-borne navigation (International bunkers) (1)							
1.A.3.d.ii - Domestic Water-borne Navigation				0	0	0	0
1.A.3.e - Other Transportation				0	0	0	0
1.A.3.e.i - Pipeline Transport				0	0	0	0
1.A.3.e.ii - Off-road				0	0	0	0
1.A.4 - Other Sectors	1240,9274	0,277	0,015	0	0	0	0
1.A.4.a - Commercial/Institutional	959,91442	0,166	0,013	0	0	0	0
1.A.4.b - Residential	38,765094	0,08	5E-04	0	0	0	0
1.A.4.c - Agriculture/Forestry/Fishing/Fish Farms	242,24786	0,031	9E-04	0	0	0	0
1.A.4.c.i - Stationary	0,5913246	0,008	1E-04	0	0	0	0
1.A.4.c.ii - Off-road Vehicles and Other Machinery	241,65654	0,023	8E-04	0	0	0	0
1.A.4.c.iii - Fishing (mobile combustion)				0	0	0	0
1.A.5 - Non-Specified				0	0	0	0
1.A.5.a - Stationary				0	0	0	0
1.A.5.b - Mobile				0	0	0	0

	Emissions (Gg)						
Categories	CO2	CH4	N2O	NOx	CO	NMVOCs	SO2
1.A.5.b.i - Mobile (aviation component)				0	0	0	0
1.A.5.b.ii - Mobile (water-borne component)				0	0	0	0
1.A.5.b.iii - Mobile (Other)				0	0	0	0
1.A.5.c - Multilateral Operations (1)(2)							
1.B - Fugitive emissions from fuels	2,1945035	2,239	0	0	0	0	0
1.B.1 - Solid Fuels	2,0889999	0,765		0	0	0	0
1.B.1.a - Coal mining and handling	2,0889999	0,765		0	0	0	0
1.B.1.a.i - Underground mines	0	0		0	0	0	0
1.B.1.a.i.1 - Mining	0	0		0	0	0	0
1.B.1.a.i.2 - Post-mining seam gas emissions	0	0		0	0	0	0
1.B.1.a.i.3 - Abandoned underground mines				0	0	0	0
1.B.1.a.i.4 - Flaring of drained methane or conversion of methane to CO2	0	0		0	0	0	0
1.B.1.a.ii - Surface mines	2,0889999	0,765		0	0	0	0
1.B.1.a.ii.1 - Mining	1,9283076	0,706		0	0	0	0
1.B.1.a.ii.2 - Post-mining seam gas emissions	0,1606923	0,059		0	0	0	0
1.B.1.b - Uncontrolled combustion and burning coal dumps				0	0	0	0
1.B.1.c - Solid fuel transformation				0	0	0	0
1.B.2 - Oil and Natural Gas	0,1055036	1,474	0	0	0	0	0
1.B.2.a - Oil	0,10535	1,47	0	0	0	0	0
1.B.2.a.i - Venting				0	0	0	0
1.B.2.a.ii - Flaring	0	0	0	0	0	0	0
1.B.2.a.iii - All Other	0,10535	1,47	0	0	0	0	0
1.B.2.a.iii.1 - Exploration				0	0	0	0
1.B.2.a.iii.2 - Production and Upgrading	0,10535	1,47	NE	0	0	0	0
1.B.2.a.iii.3 - Transport	0	0	0	0	0	0	0
1.B.2.a.iii.4 - Refining				0	0	0	0
1.B.2.a.iii.5 - Distribution of oil products				0	0	0	0
1.B.2.a.iii.6 - Other				0	0	0	0
1.B.2.b - Natural Gas	0,0001536	0,004	0	0	0	0	0
1.B.2.b.i - Venting				0	0	0	0
1.B.2.b.ii - Flaring				0	0	0	0

Categories	Emissions (Gg)						
	CO2	CH4	N2O	NOx	CO	NMVOCs	SO2
1.B.2.b.iii - All Other	0,0001536	0,004	0	0	0	0	0
1.B.2.b.iii.1 - Exploration				0	0	0	0
1.B.2.b.iii.2 - Production	0,0001536	0,004		0	0	0	0
1.B.2.b.iii.3 - Processing				0	0	0	0
1.B.2.b.iii.4 - Transmission and Storage				0	0	0	0
1.B.2.b.iii.5 - Distribution				0	0	0	0
1.B.2.b.iii.6 - Other				0	0	0	0
1.B.3 - Other emissions from Energy Production				0	0	0	0
1.C - Carbon dioxide Transport and Storage	0			0	0	0	0
1.C.1 - Transport of CO2	0			0	0	0	0
1.C.1.a - Pipelines	0			0	0	0	0
1.C.1.b - Ships	0			0	0	0	0
1.C.1.c - Other (please specify)	0			0	0	0	0
1.C.2 - Injection and Storage	0			0	0	0	0
1.C.2.a - Injection	0			0	0	0	0
1.C.2.b - Storage	0			0	0	0	0
1.C.3 - Other	0			0	0	0	0

Categories	Emissions (Gg)						
	CO2	CH4	N2O	NOx	CO	NMVOCs	SO2
Memo Items (3)							
International Bunkers	181,91784	0,001	0,005	0	0	0	0
1.A.3.a.i - International Aviation (International Bunkers) (1)	181,91784	0,001	0,005	0	0	0	0
1.A.3.d.i - International water-borne navigation (International bunkers) (1)				0	0	0	0
1.A.5.c - Multilateral Operations (1)(2)				0	0	0	0
Information Items							
CO2 from Biomass Combustion for Energy Production	24,81024						

Table A2.2. Sectoral report for industrial processes and product use

Inventory Year: 2014

Categories	(Gg)			CO2 Equivalents(Gg)				(Gg)				
	CO2	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (1)	Other halogenated gases without CO2 equivalent conversion factors (2)	NOx	CO	NMVOCs	SO2
2 - Industrial Processes and Product Use	798,750308	0	0	0	359,902648	0	0	0	0	0	0	0
2.A - Mineral Industry	604,732708	0	0	0	0	0	0	0	0	0	0	0
2.A.1 - Cement production	562,3362								0	0	0	0
2.A.2 - Lime production	9,15								0	0	0	0
2.A.3 - Glass Production	0,3366								0	0	0	0
2.A.4 - Other Process Uses of Carbonates	32,909908	0	0	0	0	0	0	0	0	0	0	0
2.A.4.a - Ceramics	32,53648								0	0	0	0
2.A.4.b - Other Uses of Soda Ash	0,373428								0	0	0	0
2.A.4.c - Non Metallurgical Magnesia Production	0								0	0	0	0
2.A.4.d - Other (please specify) (3)	0								0	0	0	0
2.A.5 - Other (please specify) (3)									0	0	0	0
2.B - Chemical Industry	0	0	0	0	0	0	0	0	0	0	0	0
2.B.1 - Ammonia Production	0								0	0	0	0
2.B.2 - Nitric Acid Production			0						0	0	0	0
2.B.3 - Adipic Acid Production			0						0	0	0	0
2.B.4 - Caprolactam, Glyoxal and Glyoxylic Acid Production			0						0	0	0	0
2.B.5 - Carbide Production	0	0							0	0	0	0
2.B.6 - Titanium Dioxide Production	0								0	0	0	0
2.B.7 - Soda Ash Production	0								0	0	0	0
2.B.8 - Petrochemical and Carbon Black Production	0	0	0	0	0	0	0	0	0	0	0	0
2.B.8.a - Methanol	0	0							0	0	0	0
2.B.8.b - Ethylene	0	0							0	0	0	0
2.B.8.c - Ethylene Dichloride and Vinyl Chloride Monomer	0	0							0	0	0	0

Categories	(Gg)			CO2 Equivalents(Gg)				(Gg)				
	CO2	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (1)	Other halogenated gases without CO2 equivalent conversion factors (2)	NOx	CO	NMVOCs	SO2
2.B.8.d - Ethylene Oxide	0	0							0	0	0	0
2.B.8.e - Acrylonitrile	0	0							0	0	0	0
2.B.8.f - Carbon Black	0	0							0	0	0	0
2.B.9 - Fluorochemical Production	0	0	0	0	0	0	0	0	0	0	0	0
2.B.9.a - By-product emissions (4)				0					0	0	0	0
2.B.9.b - Fugitive Emissions (4)									0	0	0	0
2.B.10 - Other (Please specify) (3)									0	0	0	0
2.C - Metal Industry	194,0176	0	0	0	359,902648	0	0	0	0	0	0	0
2.C.1 - Iron and Steel Production	0	0							0	0	0	0
2.C.2 - Ferroalloys Production	0	0							0	0	0	0
2.C.3 - Aluminium production	194,0176				359,902648				0	0	0	0
2.C.4 - Magnesium production (5)	0					0			0	0	0	0
2.C.5 - Lead Production	0								0	0	0	0
2.C.6 - Zinc Production	0								0	0	0	0
2.C.7 - Other (please specify) (3)									0	0	0	0
2.D - Non-Energy Products from Fuels and Solvent Use (6)	0	0	0	0	0	0	0	0	0	0	0	0
2.D.1 - Lubricant Use	0								0	0	0	0
2.D.2 - Paraffin Wax Use	0								0	0	0	0
2.D.3 - Solvent Use (7)									0	0	0	0
2.D.4 - Other (please specify) (3), (8)									0	0	0	0
2.E - Electronics Industry	0	0	0	0	0	0	0	0	0	0	0	0
2.E.1 - Integrated Circuit or Semiconductor (9)				0	0	0		0	0	0	0	0
2.E.2 - TFT Flat Panel Display (9)					0	0		0	0	0	0	0
2.E.3 - Photovoltaics (9)					0				0	0	0	0
2.E.4 - Heat Transfer Fluid (10)					0				0	0	0	0

Categories	(Gg)			CO2 Equivalents(Gg)				(Gg)				
	CO2	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (1)	Other halogenated gases without CO2 equivalent conversion factors (2)	NOx	CO	NMVOCs	SO2
2.E.5 - Other (please specify) (3)									0	0	0	0
2.F - Product Uses as Substitutes for Ozone Depleting Substances	0	0	0	0	0	0	0	0	0	0	0	0
2.F.1 - Refrigeration and Air Conditioning	0	0	0	0	0	0	0	0	0	0	0	0
2.F.1.a - Refrigeration and Stationary Air Conditioning				0					0	0	0	0
2.F.1.b - Mobile Air Conditioning				0					0	0	0	0
2.F.2 - Foam Blowing Agents				0				0	0	0	0	0
2.F.3 - Fire Protection				0	0				0	0	0	0
2.F.4 - Aerosols				0				0	0	0	0	0
2.F.5 - Solvents				0	0			0	0	0	0	0
2.F.6 - Other Applications (please specify) (3)				0	0			0	0	0	0	0
2.G - Other Product Manufacture and Use	0	0	0	0	0	0	0	0	0	0	0	0
2.G.1 - Electrical Equipment	0	0	0	0	0	0	0	0	0	0	0	0
2.G.1.a - Manufacture of Electrical Equipment					0	0			0	0	0	0
2.G.1.b - Use of Electrical Equipment					0	0			0	0	0	0
2.G.1.c - Disposal of Electrical Equipment					0	0			0	0	0	0
2.G.2 - SF6 and PFCs from Other Product Uses	0	0	0	0	0	0	0	0	0	0	0	0
2.G.2.a - Military Applications					0	0			0	0	0	0
2.G.2.b - Accelerators					0	0			0	0	0	0
2.G.2.c - Other (please specify) (3)					0	0			0	0	0	0
2.G.3 - N2O from Product Uses	0	0	0	0	0	0	0	0	0	0	0	0
2.G.3.a - Medical Applications			0						0	0	0	0
2.G.3.b - Propellant for pressure and aerosol products			0						0	0	0	0
2.G.3.c - Other (Please specify) (3)			0						0	0	0	0
2.G.4 - Other (Please specify) (3)									0	0	0	0
2.H - Other	0	0	0	0	0	0	0	0	0	0	0	0

Categories	(Gg)			CO2 Equivalents(Gg)				(Gg)				
	CO2	CH4	N2O	HFCs	PFCs	SF6	Other halogenated gases with CO2 equivalent conversion factors (1)	Other halogenated gases without CO2 equivalent conversion factors (2)	NOx	CO	NMVOCs	SO2
2.H.1 - Pulp and Paper Industry									0	0	0	0
2.H.2 - Food and Beverages Industry									0	0	0	0
2.H.3 - Other (please specify) (3)									0	0	0	0

Table A2.3. Sectoral report for agriculture, forestry and other land uses (AFOLU)

Inventory Year: 2014

Categories	(Gg)					
	Net CO2 emissions / removals	Emissions				
		CH4	N2O	NOx	CO	NMVOCs
3 - Agriculture, Forestry, and Other Land Use	-1518,710715	189,9403636	1,643590164	0	0	0
3.A - Livestock	0	181,9143353	0	0	0	0
3.A.1 - Enteric Fermentation	0	151,274371	0	0	0	0
3.A.1.a - Cattle	0	122,987514	0	0	0	0
3.A.1.a.i - Dairy Cows		74,356708		0	0	0
3.A.1.a.ii - Other Cattle		48,630806		0	0	0
3.A.1.b - Buffalo		0		0	0	0
3.A.1.c - Sheep		16,1346		0	0	0
3.A.1.d - Goats		9,14826		0	0	0
3.A.1.e - Camels		0,001886		0	0	0
3.A.1.f - Horses		1,39608		0	0	0
3.A.1.g - Mules and Asses		1,60554		0	0	0
3.A.1.h - Swine		0,000491		0	0	0
3.A.1.j - Other (please specify)		0		0	0	0
3.A.2 - Manure Management (1)	0	30,63996428	0	0	0	0
3.A.2.a - Cattle	0	29,465204	0	0	0	0
3.A.2.a.i - Dairy cows		28,430506	0	0	0	0
3.A.2.a.ii - Other cattle		1,034698	0	0	0	0
3.A.2.b - Buffalo		0	0	0	0	0
3.A.2.c - Sheep		0,484038	0	0	0	0
3.A.2.d - Goats		0,31104084	0	0	0	0
3.A.2.e - Camels		0,00007872	0	0	0	0
3.A.2.f - Horses		0,1271984	0	0	0	0
3.A.2.g - Mules and Asses		0,1444986	0	0	0	0
3.A.2.h - Swine		0,002946	0	0	0	0
3.A.2.i - Poultry		0,10495972	0	0	0	0

Categories	(Gg)					
	Net CO2 emissions / removals	Emissions				
		CH4	N2O	NOx	CO	NMVOCs
3.A.2.j - Other (please specify)		0	0	0	0	0
3.B - Land	-1576,597848	0	0	0	0	0
3.B.1 - Forest land	-1576,396181	0	0	0	0	0
3.B.1.a - Forest land Remaining Forest land	-1576,396181			0	0	0
3.B.1.b - Land Converted to Forest land	0	0	0	0	0	0
3.B.1.b.i - Cropland converted to Forest Land	0			0	0	0
3.B.1.b.ii - Grassland converted to Forest Land	0			0	0	0
3.B.1.b.iii - Wetlands converted to Forest Land	0			0	0	0
3.B.1.b.iv - Settlements converted to Forest Land	0			0	0	0
3.B.1.b.v - Other Land converted to Forest Land	0			0	0	0
3.B.2 - Cropland	0	0	0	0	0	0
3.B.2.a - Cropland Remaining Cropland	0			0	0	0
3.B.2.b - Land Converted to Cropland	0	0	0	0	0	0
3.B.2.b.i - Forest Land converted to Cropland	0			0	0	0
3.B.2.b.ii - Grassland converted to Cropland	0			0	0	0
3.B.2.b.iii - Wetlands converted to Cropland	0			0	0	0
3.B.2.b.iv - Settlements converted to Cropland	0			0	0	0
3.B.2.b.v - Other Land converted to Cropland	0			0	0	0
3.B.3 - Grassland	-0,201666667	0	0	0	0	0
3.B.3.a - Grassland Remaining Grassland	0			0	0	0
3.B.3.b - Land Converted to Grassland	-0,201666667	0	0	0	0	0
3.B.3.b.i - Forest Land converted to Grassland	-0,201666667			0	0	0
3.B.3.b.ii - Cropland converted to Grassland	0			0	0	0
3.B.3.b.iii - Wetlands converted to Grassland	0			0	0	0
3.B.3.b.iv - Settlements converted to Grassland	0			0	0	0
3.B.3.b.v - Other Land converted to Grassland	0			0	0	0
3.B.4 - Wetlands	0	0	0	0	0	0
3.B.4.a - Wetlands Remaining Wetlands	0	0	0	0	0	0
3.B.4.a.i - Peatlands remaining peatlands	0		0	0	0	0

Categories	(Gg)					
	Net CO2 emissions / removals	Emissions				
		CH4	N2O	NOx	CO	NMVOCs
3.B.4.a.ii - Flooded land remaining flooded land				0	0	0
3.B.4.b - Land Converted to Wetlands	0	0	0	0	0	0
3.B.4.b.i - Land converted for peat extraction			0	0	0	0
3.B.4.b.ii - Land converted to flooded land	0			0	0	0
3.B.4.b.iii - Land converted to other wetlands				0	0	0
3.B.5 - Settlements	0	0	0	0	0	0
3.B.5.a - Settlements Remaining Settlements	0			0	0	0
3.B.5.b - Land Converted to Settlements	0	0	0	0	0	0
3.B.5.b.i - Forest Land converted to Settlements	0			0	0	0
3.B.5.b.ii - Cropland converted to Settlements	0			0	0	0
3.B.5.b.iii - Grassland converted to Settlements	0			0	0	0
3.B.5.b.iv - Wetlands converted to Settlements	0			0	0	0
3.B.5.b.v - Other Land converted to Settlements	0			0	0	0
3.B.6 - Other Land	0	0	0	0	0	0
3.B.6.a - Other land Remaining Other land				0	0	0
3.B.6.b - Land Converted to Other land	0	0	0	0	0	0
3.B.6.b.i - Forest Land converted to Other Land	0			0	0	0
3.B.6.b.ii - Cropland converted to Other Land	0			0	0	0
3.B.6.b.iii - Grassland converted to Other Land	0			0	0	0
3.B.6.b.iv - Wetlands converted to Other Land	0			0	0	0
3.B.6.b.v - Settlements converted to Other Land	0			0	0	0
3.C - Aggregate sources and non-CO2 emissions sources on land (2)	57,88713333	8,026028328	1,643590164	0	0	0
3.C.1 - Emissions from biomass burning	0	0	0	0	0	0
3.C.1.a - Biomass burning in forest lands		0	0	0	0	0
3.C.1.b - Biomass burning in croplands		0	0	0	0	0
3.C.1.c - Biomass burning in grasslands		0	0	0	0	0
3.C.1.d - Biomass burning in all other land		0	0	0	0	0
3.C.2 - Liming	0			0	0	0
3.C.3 - Urea application	57,88713333			0	0	0

Categories	(Gg)					
	Net CO2 emissions / removals	Emissions				
		CH4	N2O	NOx	CO	NMVOCs
3.C.4 - Direct N2O Emissions from managed soils (3)			1,240445407	0	0	0
3.C.5 - Indirect N2O Emissions from managed soils			0,403144757	0	0	0
3.C.6 - Indirect N2O Emissions from manure management			0	0	0	0
3.C.7 - Rice cultivations		8,026028328		0	0	0
3.C.8 - Other (please specify)				0	0	0
3.D - Other	0	0	0	0	0	0
3.D.1 - Harvested Wood Products	0			0	0	0
3.D.2 - Other (please specify)				0	0	0

Table A2.4. Sectoral report for waste

Inventory Year: 2014

Categories	Emissions [Gg]						
	CO2	CH4	N2O	NOx	CO	NMVOCs	SO2
4 - Waste	0	37,62975244	0,265785696	0	0	0	0
4.A - Solid Waste Disposal	0	36,37045662	0	0	0	0	0
4.A.1 - Managed Waste Disposal Sites				0	0	0	0
4.A.2 - Unmanaged Waste Disposal Sites				0	0	0	0
4.A.3 - Uncategorised Waste Disposal Sites				0	0	0	0
4.B - Biological Treatment of Solid Waste		0	0	0	0	0	0
4.C - Incineration and Open Burning of Waste	0	0	0	0	0	0	0
4.C.1 - Waste Incineration	0	0	0	0	0	0	0
4.C.2 - Open Burning of Waste	0	0	0	0	0	0	0
4.D - Wastewater Treatment and Discharge	0	1,259295815	0,265785696	0	0	0	0
4.D.1 - Domestic Wastewaster Treatment and Discharge		1,090183752	0,265785696	0	0	0	0
4.D.2 - Industrial Wastewater Treatment and Discharge		0,169112063		0	0	0	0
4.E - Other (please specify)				0	0	0	0