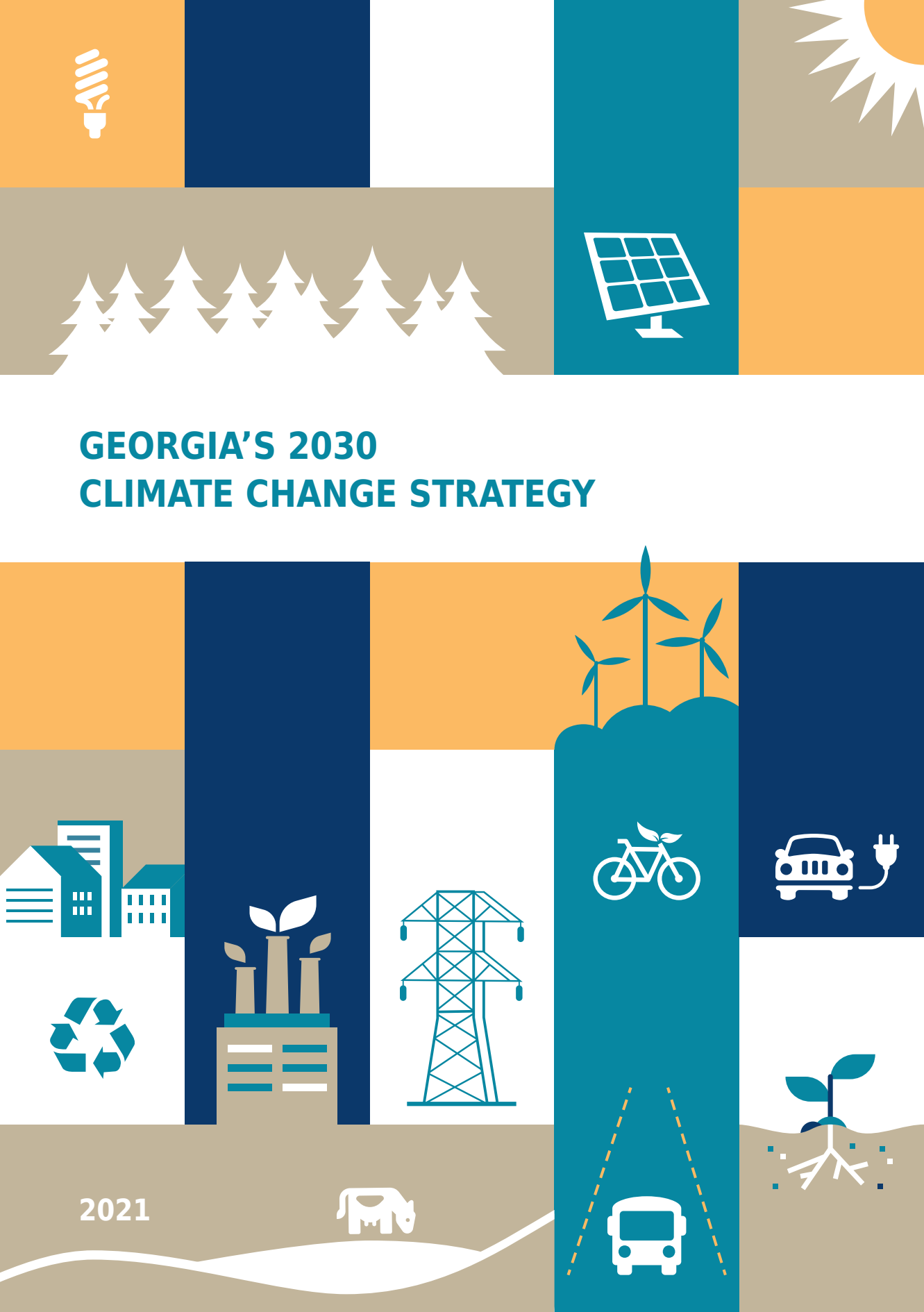
GEORGIA'S 2030
CLIMATE CHANGE STRATEGY



2021

GOVERNMENT OF GEORGIA

GEORGIA'S 2030 CLIMATE CHANGE STRATEGY

(MITIGATION)

2021

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1 INTRODUCTION

Georgia's 2030 Climate Change Strategy and Action Plan (Climate Change Strategy and Action Plan – CSAP, Climate Action Plan – CAP) are a planning and implementation mechanism for coordinated effort and planning towards meeting the nationally determined targets for climate change mitigation.

Climate Strategy and Action Plan identify the ways for reaching Georgia's 2030 greenhouse gas (GHG) emissions reduction targets for climate change mitigation, as set in Georgia's Updated Nationally Determined Contribution (NDC) to the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC). Climate Strategy and Action Plan identify a long-term vision of GHG emissions reduction by 2030 and specific planned actions. Upon approval of the Paris Agreement in 2017, Georgia joined 191 Parties and committed to contribute towards the goals of the Paris Agreement, among others, to hold the global average temperature increase well below 2°C, and pursuing efforts to limit to 1.5°C compared to the pre-industrial level. The NDC aims to reduce national GHG emissions to 35% below the emission levels in 1990 (excluding emissions from land-use, land-use change and forestry (LULUCF)), meaning GHG emissions should not exceed 29.25 $MtCO_2e$ in 2030.

Under the Paris Agreement, Georgia has a commitment to formulate an Updated NDC at least every five years. In addition, Georgia is expected to show a progression with regards to emission reduction targets or policies and measures with each update insofar as possible, and to strive for net-zero GHG emissions in the second half of the century. The Climate Strategy and Action Plan rely on the definition of Climate Neutrality by the Intergovernmental Panel on Climate Change (IPCC) as the "concept of a state in which human activities result in no net effect on the climate system" (IPCC, 2018), in other words: anthropogenic emissions of GHGs are balanced by their removals over a certain period, and GHG emissions are considered net-zero.

Georgia's Climate Strategy and Action Plan identify specific directions and actions for GHG reduction that support the development of the Georgian economy and infrastructure in a way that sets Georgia on a pathway to meet its international obligations and national ambitions for combating climate change. It serves as a vision and action plan for the implementation of climate change mitigation part of Georgia's Updated NDC. In order to

1. In accordance with the requirements of the UNFCCC, the commitment of GHG reduction shall exclude emissions from land-use, land-use change and forestry (LULUCF) sector.

explore the options for adapting to the adverse effects of climate change and plan the appropriate measures, Georgia is preparing National Adaptation Plan (NAP) on the basis of updated Nationally Determined Contribution.

Climate Strategy and Action Plan set out the national climate change mitigation policy in the following sectors:

Energy Generation and Transmission

Energy Consumption in Transport

Energy Consumption in Buildings

Energy Consumption in Industry and Industrial Processes

Agriculture

Waste Management

Forestry

The document was elaborated under the coordination of the Ministry of Environmental Protection and Agriculture of Georgia (MEPA) and with the participation of multiple stakeholders across various sectors and levels. The process involved the representatives of different sectors of the Georgian economy, including private and civil sectors. A broad range of the stakeholders is already playing a significant role, while others have an increasing role in ensuring and achieving the goals of Georgia's development agenda, climate change mitigation, and low-emission development. Drafting of the climate strategy and action plan involved all line ministries and several municipalities (the EU Initiative – Covenant of Mayors (CoM) Signatories), which are the entities responsible for the implementation of assigned activities set out under the climate action plan, within their competence. The Climate Strategy and Action Plan do not include direct guidelines for the representatives of private sector, however the document aims to strengthen and encourage their participation. Georgia's updated NDC and Climate Strategy and Action Plan are the first documents to be reviewed by the newly established Climate Change Council (CCC) of Georgia. The CCC involves six ministries and is mandated to coordinate the joint efforts towards climate

change adaptation and mitigation. Several ministries and institutions accountable to the Climate Change Council of Georgia are responsible for implementing the activities set out in the Action Plan. Such a strong foundation for national engagement and dialogue provides the opportunity to attract more support and broaden the engagement of different municipalities, initiative groups, non-governmental organizations, and the private sector in the future update process of the Climate Action Plan.

On September 18, 2018, the Ministry of Environmental Protection and Agriculture organized Georgia's First Climate Change Conference. The conference was held in an open dialogue format, with the participation of the Deputy Ministers from the Ministry of Environmental Protection and Agriculture, the Ministry of Economy and Sustainable Development and the Ministry of Regional Development and Infrastructure, as well as the Deputy Mayor of Kutaisi Municipality, the Director of the Energy Efficiency Centre – the official supporting organization of the Covenant of Mayors in Georgia, the representative of the Policy Planning and Coordination Department of the Administration of the Government of Georgia, and others. The event was dedicated to the development of Georgia's National Climate Policy, in particular, the conference officially initiated the Updated NDC and the Climate Action Plan development. The conference was attended by up to 100 participants, including representatives of the governmental and non-governmental sectors, international organizations and the private sector.

The next phase included intensive bilateral meetings with sectoral stakeholders and the technical working group meetings, where sectoral priorities, measures and indicators were identified and agreed upon.

After completion of work on the draft Climate Strategy and Action Plan, the document was sent out for feedback and validation to the members of the Technical Working Group and public institutions, including those from Georgia's Climate Change Council. Majority of the comments received were reflected in the document, while for those not reflected, feedback was provided to the commenters. Subsequently, the updated draft was published on the web and social media pages of the Ministry of Environmental Protection and Agriculture and the LEPL Environmental Information and Education Centre. Stakeholders were given 2 weeks to submit comments, some of which were reflected, while for those not reflected, feedback was provided to the commenters. The following phase included planning a final public consultation event. The updated documents and information about the public hearing events were published on the web and social media pages of the LEPL Environmental Information and Education Centre. Due to the COVID-19 pandemic, the public hearing event of December 24, 2020, was held via Zoom online video conferencing

platform. Representatives of the Ministry of Environmental Protection and Agriculture presented Georgia's Updated NDC and Climate Strategy and Action Plan drafts, including the comments received for both documents, reflected or not reflected, and the respective arguments. The public hearing lasted 3 hours and was attended by up to 96 participants.

Stakeholders engagement and public consultation process

Further details on the stakeholder engagement in the Climate Strategy and Action Plan development process can be found in the annexed document: Summary Report on Stakeholders Engagement and Public Consultation of Georgia's Updated Nationally Determined Contribution (NDC), Georgia's 2030 Climate Strategy and Action Plan.

The Climate Strategy and Action Plan provide a means of demonstrating to the international partners and investors that Georgia is committed to the implementation of its Updated NDC. At the same time, it clearly sets out the visions and ways for implementation of the NDC. The Government of Georgia expresses its willingness to actively cooperate in the implementation process of the Climate Strategy and Action Plan and to seek funding from international partners. In addition to the specific activities set out in the Action Plan, the document provides information on priority areas for each sector. Georgia explicitly requests support from the international community to advance in these priorities, leading to the identification of new activities for the next Action Plan and enabling enhanced climate change mitigation ambition. Georgia recognises the importance and role of technologies in improving climate change resilience and reducing GHG emissions and openly expresses its willingness to cooperate in development and transfer of the technology.

The Climate Strategy and Action Plan are directly derived from other objectives and international commitments of the country. It is in line with the European Union legal acts considered under the Association Agreement between the European Union (EU) and Georgia, of the one part, and EU and the European Atomic Energy Community and their Member States, of the other part (EU-AA). The ambitious reforms set out in the EU-AA involve the gradual approximation of Georgian legislation to EU legislation in the areas of climate change mitigation, energy efficiency, air pollution and renewable energy. Since 2017, Georgia is a member of the Energy Community, and as a member, it is preparing an integrated National Energy and Climate Plan (NECP) to identify 2030 targets. This, in turn, will require the elaboration of consistent policies and measures for reducing GHG emissions in all key energy-related sectors. The Climate Strategy and Action Plan contribute to the decarbonisation component of the NECP.

The Climate Strategy and Action Plan also support the implementation of Georgia's commitments under the Sustainable Development Goals (SDGs). The measures set out in the Action Plan will significantly contribute to the achievement of SDG goal 13, which is specific to climate action. Furthermore, Climate Action Plan measures, such as reducing emissions from the transport sector or transforming the energy sector, and increasing the share of renewable energy therein, are not directly connected to SDG 13, but they help improve air quality, increase energy security, create more jobs, etc. Consequently, this will have a positive impact on fulfilling other SDGs that are indirectly related to climate change.

Further information on the interrelation between the Climate Strategy and Action Plan and other strategies, action plans, and laws can be found in Annex 1 (see Annex 1), while the information on SDGs and EU-AA is available in Annexes 2 and 3 (see. Annex 2; Annex 3).

2 OVERVIEW OF THE CURRENT SITUATION ANALYSIS: THE SITUATION WITH GREENHOUSE GAS EMISSIONS

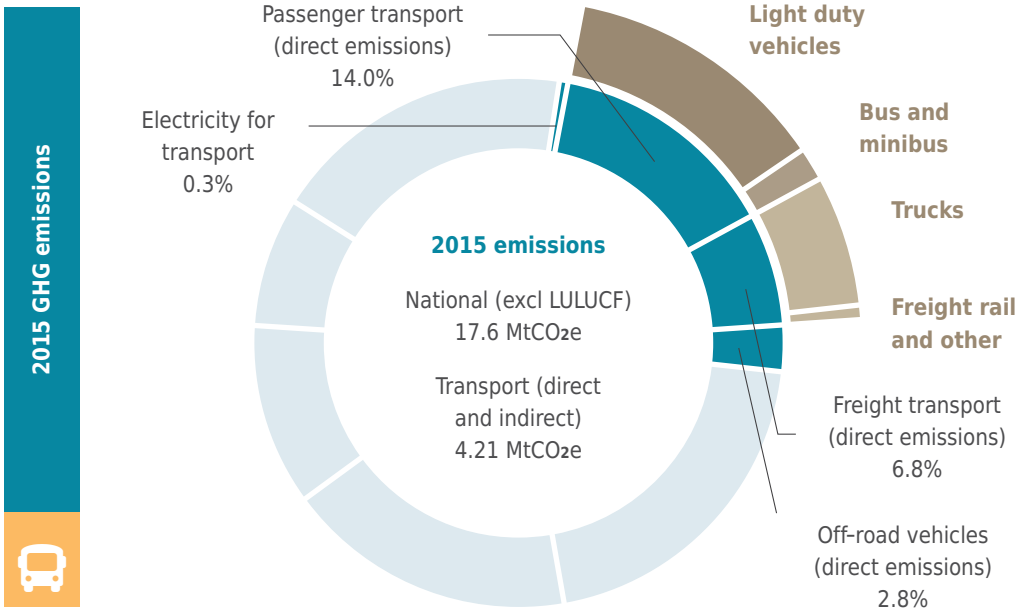
2.1 Overview of the Current Greenhouse Gas Emissions Situation Analysis

According to 2015 data, the GHG emissions in Georgia amounted to 17.6 $MtCO_2e$. GHG emissions are generated in seven sectors: energy generation and transmission, transport, buildings, industry, agriculture, waste management, and the forest. Therefore, the Climate Strategy and Action Plan are divided in accordance with these sectors. This division slightly differs from the categorization of emission sources identified by the National Greenhouse Gas Inventory, which puts all energy-related emissions in one group. Under the Climate Strategy and Action Plan, the energy sector is divided into several key subcategories, as most of the Climate Action Plan measures are aimed at rational energy use and, consequently, the structure is formulated according to the energy production and consumption sectors.

The assumptions and methodologies applied to calculate and process statistical data for each sector, together with the methodology of calculating the reference scenario, are described in Annex 4 (Annex 4).

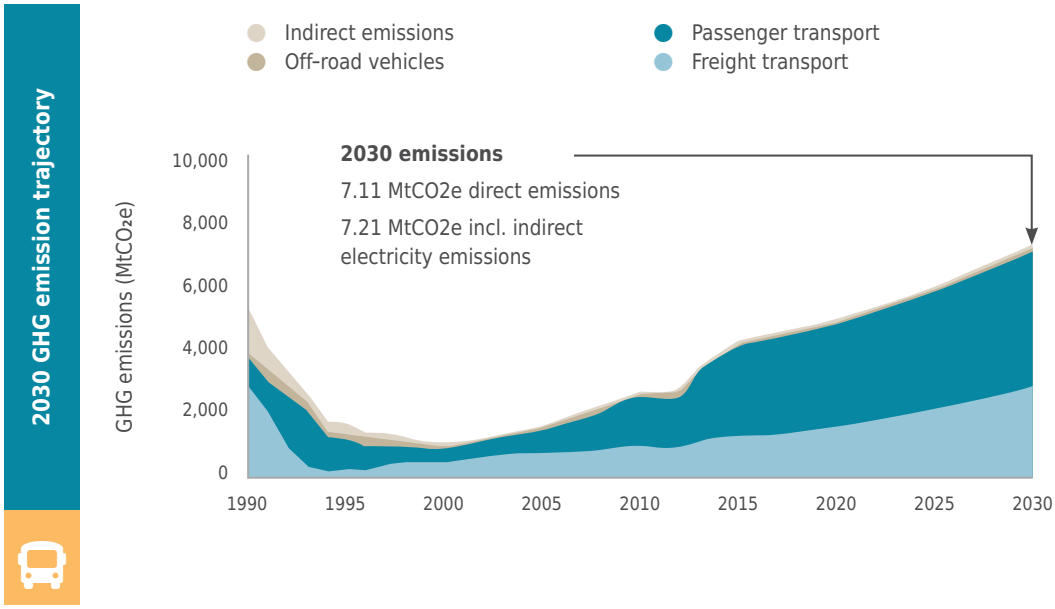
The transport sector is growing rapidly off the back of growing road-based passenger transportation. Private vehicles, most of which are old and environmentally inefficient models, made up nearly 70% of passenger transport activity in 2015, while the shares of buses, minibuses and rail (including Tbilisi metro) accounted for 13%, 14% and 4%, respectively. **In 2015 GHG emissions from the transport sector accounted for about 24% of total national GHG emissions** (see Figure 1) (MEPA, 2019). **Road passenger transport** emissions accounted for approximately 68% of the transport sector emissions in 2015, with light-duty vehicles (LDVs) accounting for 88%, buses for 5%, and minibuses for 6%. **Freight** transport, consisting of trucks, rail, and off-road vehicles (mainly for agriculture), accounted for the remaining 32% of the sector's emissions, with emissions from heavy trucks responsible for the majority (29%).

FIGURE 1: Transport sector GHG emissions breakdown in 2015 (PROSPECTS+, MEPA, 2019)



Transportation activity in Georgia generally remains low compared to other countries in the region and in Europe, however is projected to steadily increase in the coming years. **Emissions in the transport sector are projected to increase by approximately 71% (to 7.11 $MtCO_2e$) by 2030** under a reference scenario (see Figure 2), driven primarily by the continuing growth of passenger transport. From 2015 to 2030, passenger activity is expected to increase by almost 60% and freight activity by 240%.

FIGURE 2: Transport sector GHG emissions projections to 2030 (modelling conducted by sector experts and later integrated in LEAP model; see Annex 4 for further details and information on methodologies) (MEPA, 2019)



Use of electricity for transport in Georgia is limited to mainly **rail**, including Tbilisi **metro** services. In 2015, electricity use in the transport sector accounted for less than 1% of total electricity. **Total domestic passenger transportation activity is approximately 13 billion vehicle-kilometres (v-km) in 2020, which is equivalent to 3,900 v-km per capita** and approximately 50% lower than per capita transportation activity projected for the countries of the EU in 2020 (ICCT, 2017). The majority of passenger transport activity comes from LDVs, representing an estimated 70% of the passenger-kilometres in 2020. Public transport accounts for the remaining motorised passenger-kilometres (30%), with buses, minibuses, and rail accounting for 12%, 14%, and 4% of the share, respectively.

The projected average emissions intensity for non-electric private LDVs in Georgia is 189 gCO_2e/v-km. By comparison, the EU Emissions Standards will require a fleet average for new cars in the EU to be 96 gCO2e/v–km emissions in 2020 (European Commission, 2018). High–level emissions intensity in Georgia is caused by an aging car fleet primarily consisting of **second-hand models.** As of 2019, over 87% of car fleet registered in Georgia were over 10 years old. For **internal combustion engine** vehicles, **gasoline** accounts for 68% of energy demand, while **diesel** supplies the majority of buses, minibuses, trucks, and light trucks. The share of **electric vehicles** (EVs) on market is still negligible (less than 1% of all LDVs), but the number of low emissions vehicles is on the rise, mainly on account of **hybrid vehicles. Rail transport** is mostly electrified (78%), and certain plans are being implemented to integrate **electric buses** into the bus fleet in the coming years.

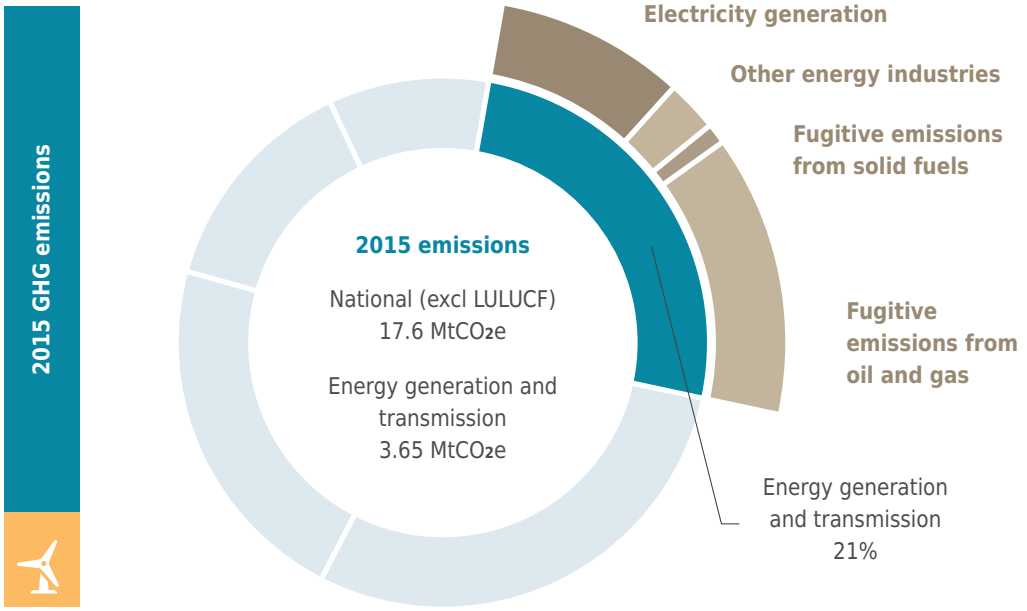
Freight transport activity reached 9 billion v–km in 2020 on average, with rail accounting for 45% of activity, heavy trucks for 49%, and light trucks for 6%.

Activity for both passenger and freight transport has been gradually increasing in Georgia, following a large fall in transport activity in 1991, and is projected to continue increasing in the future. Passenger transport, including LDVs, buses, minibuses, rail, metro, and two–wheelers, will increase from 3,900 to 4,000 v–km per capita, still three times lower than per capita transportation activity projected for the EU in 2020 (ICCT, 2017).

Georgia's freight activity is being pushed by international drivers as international travel and trade between Central Asia and Europe. Due to Georgia's geographical location as a transit country, international transit represents a considerable commercial opportunity. Infrastructure development for international transit is a key priority for the country (Government of Georgia, 2020). **The energy generation and transmission sector** is the second largest contributor to greenhouse gas emissions, after the transport sector. **It accounted for roughly 21% of total national GHG emissions (3.65 $MtCO_2e$) in 2015** (MEPA, 2019).

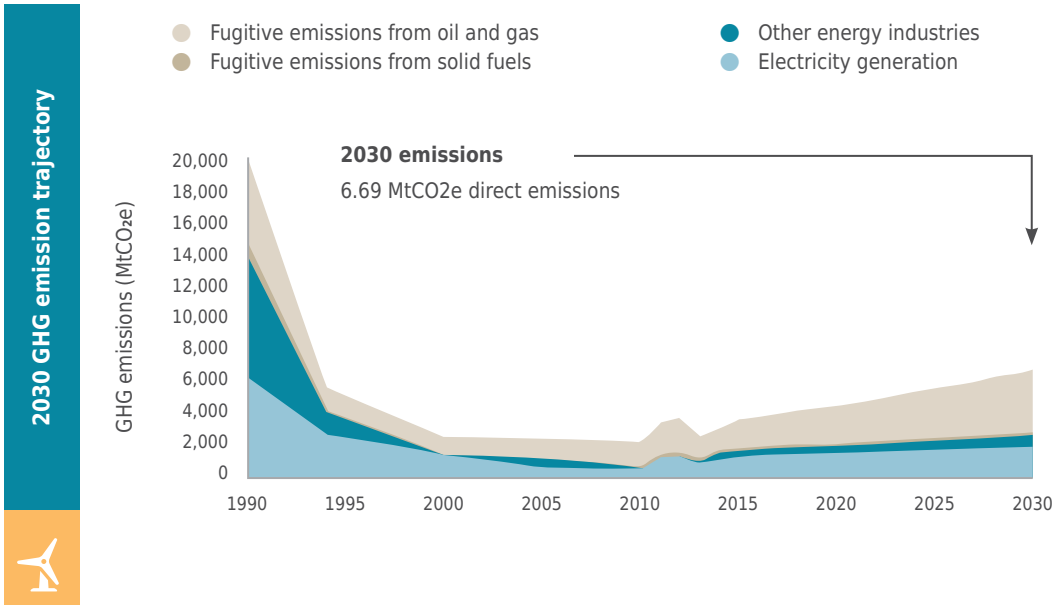
In 2015, the energy generation and transmission sector emissions were predominantly **CO_2 from fuel combustion and CH_4 fugitive emissions** with a small share of **nitrous oxides from incomplete combustion.** Fugitive emissions from the transmission and distribution of **oil and gas** accounted for approximately 56% of total emissions in the sector, while fuel combustion for **electricity generation** accounted for approximately 44% (see Figure 3).

FIGURE 3: Energy generation and transmission sector GHG emissions breakdown for 2015 (MEPA, 2019)



Electricity consumption in Georgia is significantly lower compared to other countries in Europe but is projected to steadily increase in the coming years. In Georgia, per-capita electricity consumption was 2,870 kWh in 2018, which is approximately half that of the EU countries' average, but slightly higher than that of neighbouring countries Armenia and Azerbaijan. Over the past decade, electricity consumption was increasing at a rate of approximately 4.8% per year (GNERC, 2019). **Emissions in the sector are expected to increase by approximately 77% from 2015 levels to 6.69 MtCO2e in 2030** under a reference scenario (see Figure 4).

FIGURE 4: Energy generation and transmission sector GHG emissions projections to 2030 (projections conducted using LEAP model), (MEPA, 2019)



The electricity generation sector consists of hydro power, wind power and thermal power plants, with a **total installed capacity of 4,179 MW.** In 2018 **renewable energy** accounted for 83% of Georgian electricity production, including 82.3% from all types of **hydro power plants** and 0.7% from **wind power plants** (GNERC, 2019). The other 17% was generated by **thermal power plants.** The high share of hydropower in the total electricity generation mix leads to a **seasonal supply** in which surplus electricity can be exported in summer, while in winter, there is a need for **electricity import.** Decrease in **hydropower generation** due to a weakened water inflow has led to a significant increase in electricity imports in recent years. Developing the ability to deliver an uninterruptible supply of electricity generated with national resources and thus, improving energy security is an objective of national importance (Government of Georgia, 2020).

In 2018, total **losses** in the electricity transmission and distribution network amounted to 6.5% of electricity received in the network. Compared to 2017, transmission losses have decreased by 2.5%, whereas distribution losses have increased by 1.2%. Losses in gas supply equalled 6.1% of total final gas consumption (GeoStat, 2019). Increase of emissions

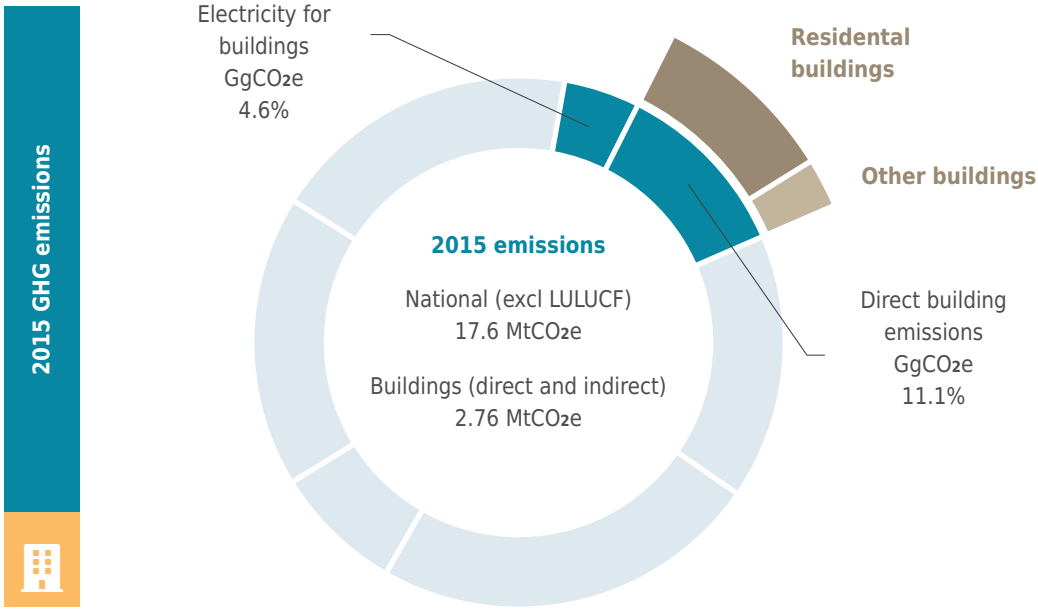
in this sector is driven primarily by extraction of solid fuels, fugitive emissions from **oil and gas. Increased electricity demand** is driven by growing GDP, tourism, cryptocurrency mining activities, and **higher temperatures in summer,** which lead to increased electricity consumption due to frequent use of air conditioners. It should be noted that the latter factor is partially evened out with warmer temperatures in winter (TBC Capital, 2019).

The dominant role of imported energy resources in winter months, as well as the low energy efficiency in thermal power plants and losses in the power distribution system, pose considerable barriers for development of the low carbon approaches in the sector.

Another source of GHG emissions is **buildings.** The poor energy efficiency performance of the existing building stock is a considerable economic, social and environmental issue in Georgia.

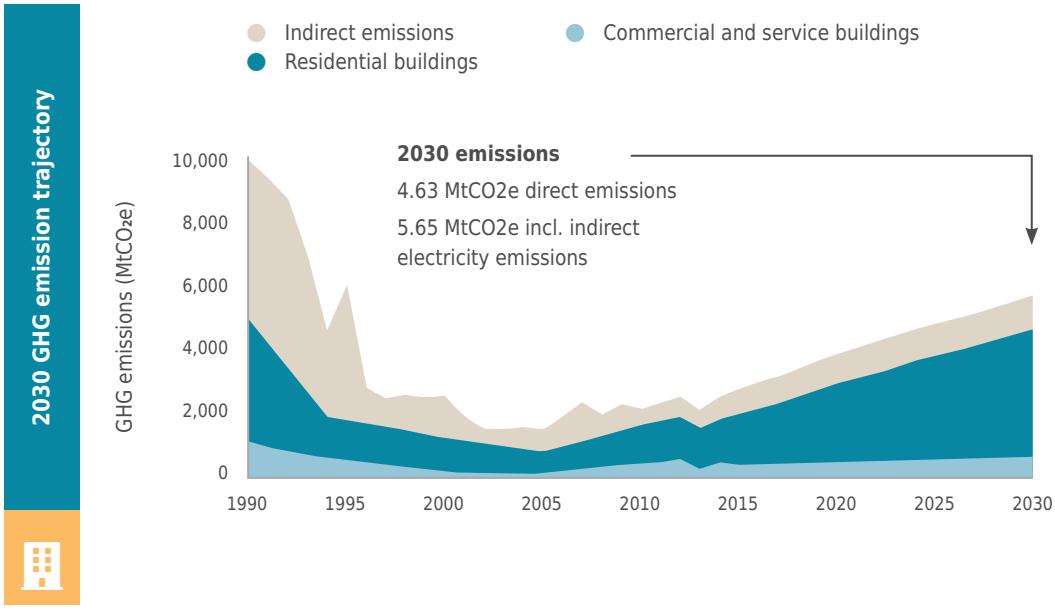
Energy demand in the buildings sector accounted for approximately 18% of all energy-related emissions and 11% of the country's total national GHG emissions in 2015. Of this, 79% was from residential buildings (see Figure 5) (MEPA, 2019).

FIGURE 5: Buildings sector GHG emissions breakdown for 2015 (MEPA, 2019)



Energy demand in buildings is expected to increase considerably by 2030, leading to a large increase in GHG emissions, according to the reference scenario. **Emissions from energy demand in the buildings sector in 2030 may be twice as high as the 2015 levels,** under the reference scenario. This trend is in stark contrast to the projected figures for the EU and other European countries, where energy demand in the buildings sector is expected to plateau, and in many cases, decrease, under a reference scenario between 2015 and 2030 (see Figure 6) (IEA, 2019).

FIGURE 6: Building sector GHG emissions projection to 2030 (modelling conducted using LEAP), (MEPA, 2019)



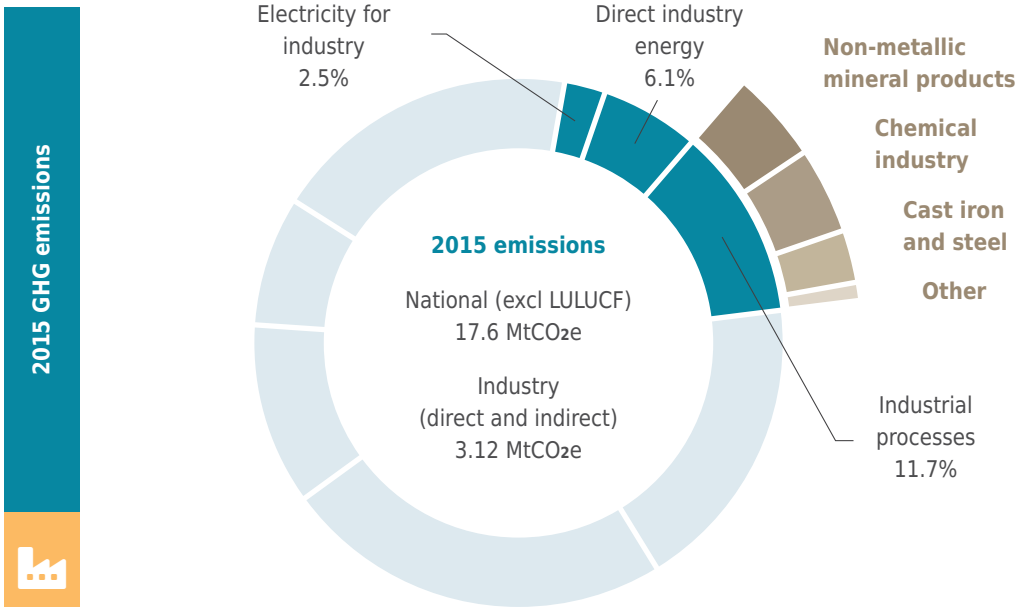
The energy consumption of the existing buildings is high in Georgia, as majority of them were constructed in the Soviet period when low-cost constructions were prioritised over energy efficiency and comfort. The amount of fuel consumed for heating would be even higher in Georgia, if not poverty. The average urban household spent the equivalent of USD 45 per month on utility bills in 2015, approximately 25% of the average monthly income (GEOSTAT, 2016).

Energy demand in buildings will increase considerably up to 2030, leading to a large increase in GHG emissions. **In this part of the sector, direct and indirect energy emissions are expected to increase by 150%**. The major driver of this increase is the fact that current energy demand in the residential sector is suppressed due to economic situation of the consumers, as the **building structures are inefficient** and **spatial heating is expensive**. Currently, many houses and apartments heat only one room, however the **heated area of residential buildings is expected to increase** as a result of GDP growth in the coming decade. The energy demand in **commercial and public buildings** is expected to increase at a lower rate, though still significantly, by approximately 50% between 2015 and 2030 (See Figure 6).

The industry sector is another contributor to GHG emissions that accounted for 24.8% of Georgia's GDP and 23.6% of Georgia's final energy consumption in 2018 (GeoStat, 2018, 2019). Emissions attributable to the industry sector are divided into two groups: **direct industrial emissions**, including energy use-related emissions and non-energy emissions, and **indirect emissions from electricity consumption**, representing about 11% of the sector emissions.

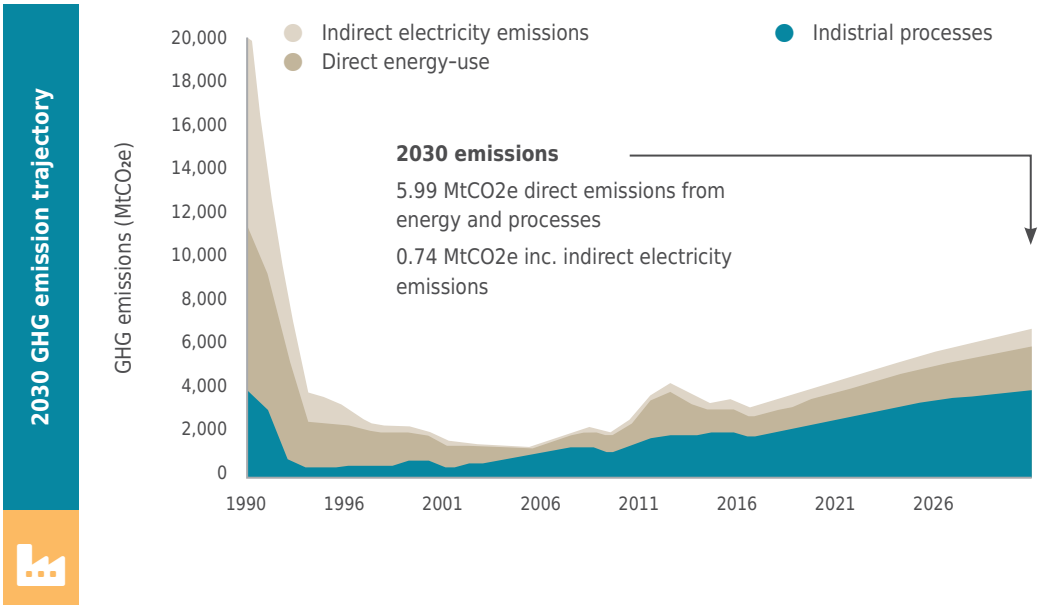
In 2015 the industry sector accounted for about 18% of national GHG emissions (3.12 MtCO$_2$e) (MEPA, 2019). Electricity-related emissions represented close to 35% of the total industrial emissions, and emissions from industrial processes accounted for the remaining 65%. Production of non-metallic mineral products, chemical industry, and cast iron and steel production accounted for 24%, 23% and 14% of the sector's emissions, respectively (see Figure 7) (MEPA, 2019).

FIGURE 7: Industry sector GHG emissions breakdown for 2015 (MEPA, 2019)



Emissions in the industry sector could increase by about 90% compared to 2015 levels, reaching almost 6.00 $MtCO_2e$ in 2030. Two-thirds of the projected emissions would be generated from industrial processes, and one-third would be from energy consumption. The non-metallic mineral and chemical industries are expected to account for the majority of this growth in emissions. By 2030, cast iron and steel industry emissions are expected to increase by 40%, given the increasing demand for metal and ferroalloy products (see Figure 8).

FIGURE 8: Industry sector GHG emissions projections to 2030 (conducted by sector experts and later integrated in LEAP, see Annex 4 for further details on methodologies) (MEPA, 2019)



As mentioned above, **energy-related emissions** represented close to 35% of the total industrial emissions and **non-energy emissions** accounted for approximately 65% in 2015. The main contributors to non-energy emissions were: **production of cement, ammonia and nitric acid, cast iron and steel, and ferroalloys. Production of non-metallic mineral products, chemical industry and cast iron and steel production** accounted for 24%, 23% and 14% of the sector's emissions, respectively (MEPA, 2019). Other industrial processes include emissions from products used as substitutes for Ozone Depleting Substances (ODS), non-energy products from **fuels and solvent** use, and other product manufacture and use. In 2015, the total domestic **cement production** activity was approximately 1.75 million tonnes, equivalent to 472 kg cement per capita and about 21% lower than average world demand (IEA, 2018). All three major cement manufacturing factories operating in Georgia belong to Heidelberg Cement. Looking at chemical production, the Rustavi Azot plant is the centre for ammonia and nitric acid (used

in the production of fertilizers) production in Georgia. Its current production capacity is 5 to 7 times lower than some of Europe's top ammonia producers (e.g., Germany, Poland and the Netherlands). Finally, the domestic **cast iron and steel** industry activity was approximately 0.3 million tonnes in 2016, equivalent to 77 kg per capita and approximately 44% higher than average world crude metal production intensity via electric arc furnace (EAF) (IEA, 2019).

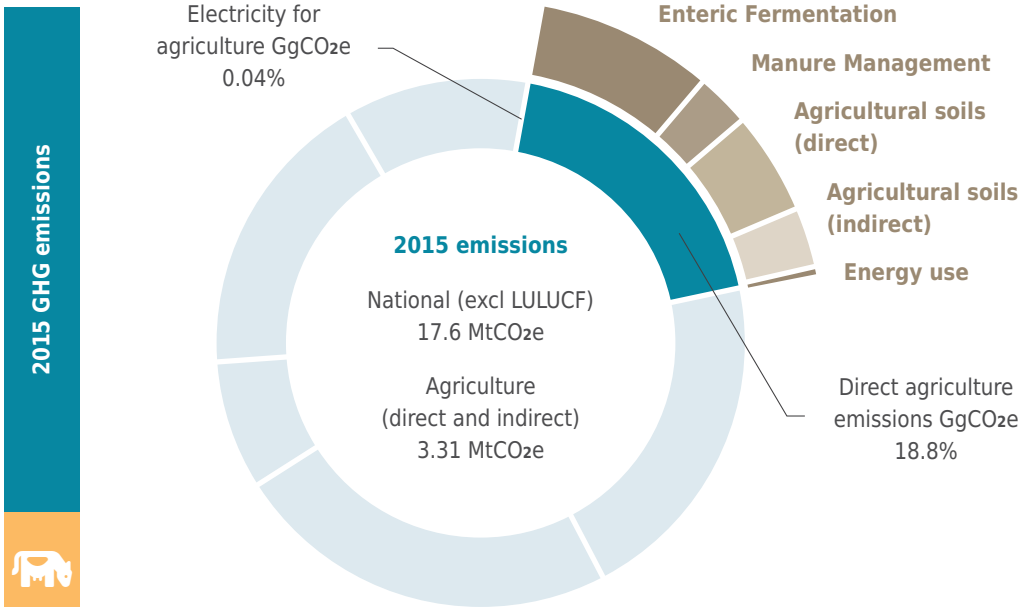
Activity and associated emissions from the industrial sector fell drastically between 1990 and 1994 after the restitution of independence in Georgia and continued to decline until 2002, when activity in the sector started to pick up once more. **By 2015, industry emissions tripled those reported in 2001. Old technology lines and gears** still account for the majority of industry activity, with limited penetration of modern and more efficient technologies.

In 2015, the production level of the **non-metallic mineral and chemical industries** in Georgia nearly reached that of 1990 (MoENRP, 2016). The growing levels of production in these industries indicate the increase dynamics in the coming years.

The agriculture sector employs up to 40% of the Georgian working population, however, most of them are categorized as "self-employed," which means that they are small-scale subsistence farmers (MESD, 2019). Despite the high employment rate, the sector's contribution to GDP has been on a declining trend. For example, it went from 25% in 1999 to 7.2% in 2019 (World Bank, 2020). 43% of Georgia's total land area is agricultural land, including 324,000 ha of arable land, 120,800 ha of perennial plants and more than 2 million ha of pasture and meadows (FAOStat, 2020).

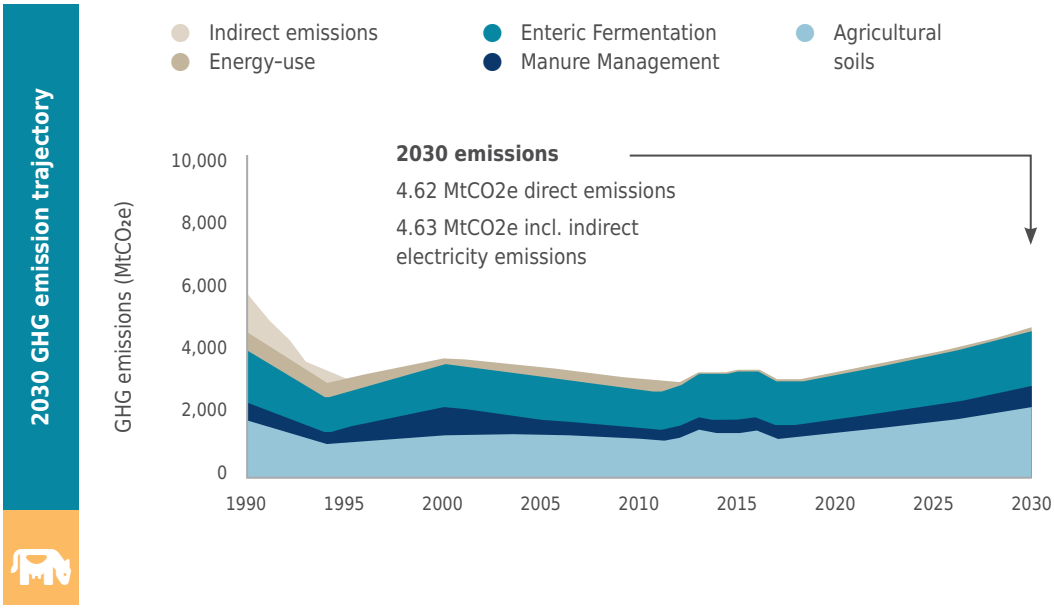
According to the National GHG Inventory report, the agriculture sector accounted for approximately 19% of national GHG emissions (3.31 $MtCO_2e$) in 2015. (MEPA, 2019). The emissions are related to manure management, enteric fermentation, agricultural soils and energy use in agriculture, fishing and forestry. Since the agriculture sector experiences steady growth, agricultural soil emissions include direct emissions from synthetic and organic nitrogen fertilizer use, agricultural residue decomposition, pastures and paddocks (see Figure 9).

FIGURE 9: Agriculture sector GHG emissions breakdown for 2015 (MEPA, 2019)



Emissions in the agricultural sector are projected to increase by approximately 40% compared to baseline to 4.62 $MtCO_2e$ in 2030, under the reference scenario (See Figure 10). Cattle was the source of 92% of emissions from enteric fermentation and 82% of emissions from manure management in 2015 and would remain the major source of these emissions up to 2030.

FIGURE 10: Agriculture sector GHG emissions projections to 2030 (modelling conducted by sector experts and later integrated in LEAP model. See Annex 4 for further details on methodologies), (MEPA, 2019)



Agricultural development is one of the priorities of the Georgian Government, as outlined in the Agriculture and Rural Development Strategy of Georgia 2021–2027. The strategy puts a special focus on the implementation of **climate-smart agriculture practices** (MEPA, 2019). Considering the expected rise in production levels and the development of large-scale commercial agriculture, embedding **sustainable business practices** from the beginning onwards will have an impact on emissions levels. Various projects are in place to make the Georgian agriculture sector more **productive**. Enhanced activity, on the one hand, will increase GHG but, on the other, will decrease future emissions through **high productive livestock farming.**

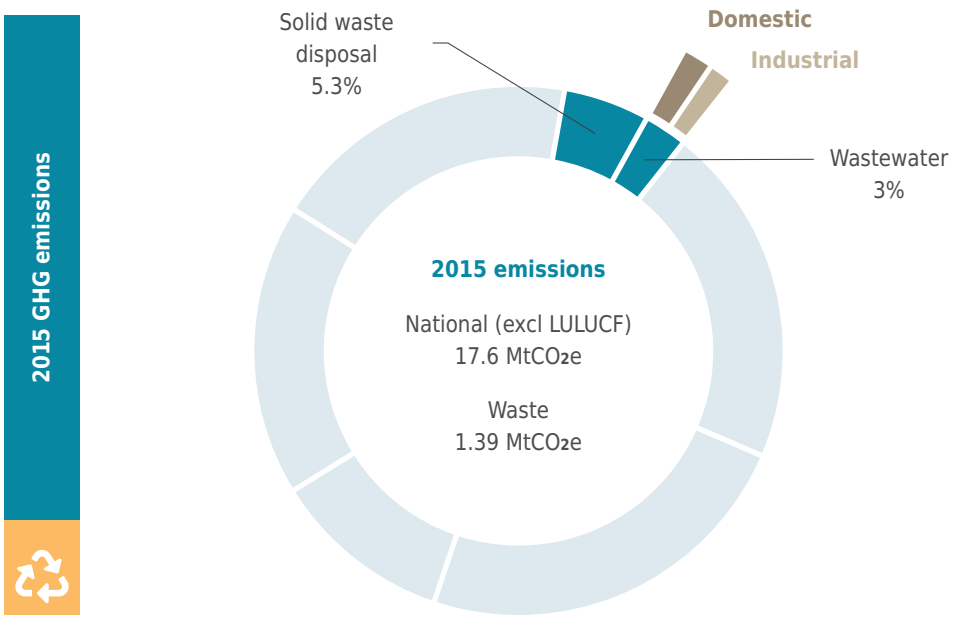
In 2015, emissions from **enteric fermentation** accounted for the majority of the sector's GHG emissions (44%), followed by emissions from application of **organic fertilizers (manure)** and **agricultural soils**, accounting for 41% and 14% of emissions, respectively (Figure 9) (MEPA, 2019). **Energy-related emissions** represented about 1% of the sector emissions. This does not include emissions from agricultural vehicles (tractors and others). Emissions from these vehicles are included in the transport sector under "off-road vehicles" since more detailed information is required to attribute specific emissions to the transport sector or agricultural sector.

Emissions from **agricultural soils** are projected to account for the majority of the overall projected growth in emissions and increase by 60% between 2015–2030 (MEPA, 2019; Georgia's Low Emission Development Strategy Coordination Committee, 2017). The main source of agriculture soil emissions projected for 2030 are **pastures and livestock stalls** with 32% (2015: 29%), **nitrogen leaching and runoff** with 26% (2015: 31%), and the **use of synthetic fertilizers** with 19% (2015: 23%). (MEPA, 2019; Georgia's Low Emission Development Strategy Coordination Committee, 2017).

The anticipated **industrialisation** of livestock farming is a major driver in the increase of emissions from the **livestock sector**. Cattle livestock is projected to increase by 18%, swine livestock by 250%, and poultry livestock by 133% as industrialized livestock farming is assumed to grow steadily. Enteric fermentation emissions may increase by 17% between 2015 and 2030, while emissions from use of organic fertilizers (manure) increase by 47%.

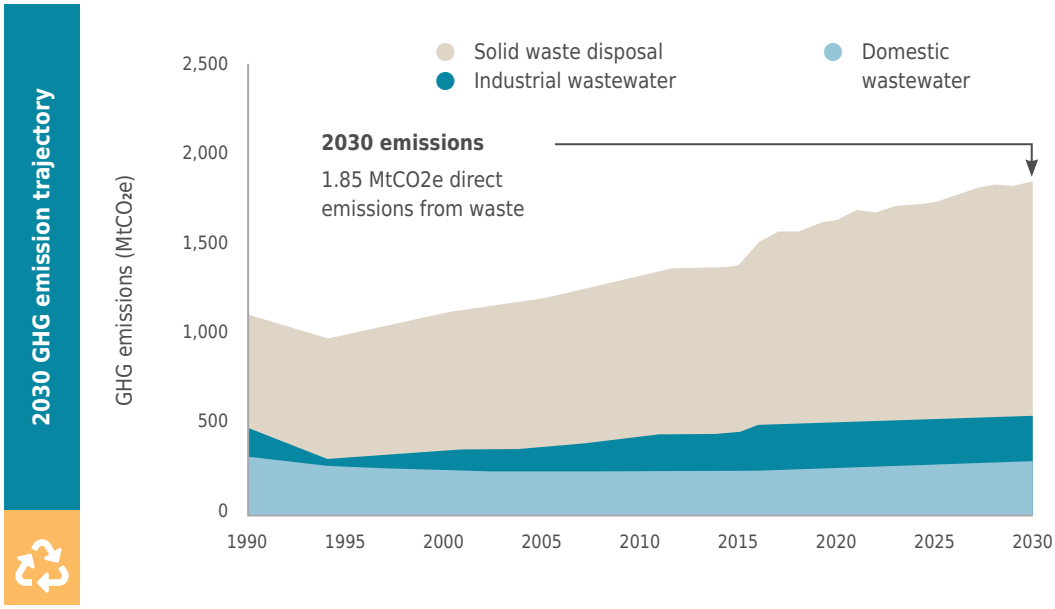
The **waste management** sector is another contributor of GHG emissions. **This sector accounted for approximately 8% (1.39 $MtCO_2e$) of total national GHG emissions in 2015** (MEPA, 2019). In 2015, emissions from solid waste disposal accounted for 67% of the sector's GHG emissions, while emissions from wastewater management represented 33% of the sector's emissions, split almost evenly between domestic and industrial wastewater (see Figure 11).

FIGURE 11: Waste management sector GHG emissions breakdown for 2015 (MEPA, 2019)



Over the years, the waste management sector in Georgia has experienced slow but steady growth, and it is expected to continue this trend in the future. **Emissions in the sector are expected to increase by approximately 33% to up to 1.85 $MtCO_2e$ in 2030, under a reference scenario** (see Figure 12).

FIGURE 12: Waste sector GHG emissions projections to 2030 (modelling conducted by sector experts and later integrated in LEAP model, see Annex 4 for further details on methodologies), (MEPA, 2019)



In recent years, adequate waste management has become one of the priorities of the country. In 2016, Georgia approved the National Waste Management Strategy and its Action Plan in accordance with the Waste Management Code. Relevant directives are also set out under the Georgia–EU Association Agreement. However, waste management remains a significant challenge for Georgia. The amount of waste produced grows alongside the country's economic development. Problems with waste management in Georgia include disposal of **household** and **hazardous waste** without proper regulations and landfills that do not meet quality standards and therefore pollute the environment. A significant part of the country's municipal waste is disposed at **dumpsites** and improperly arranged landfills. Many landfills were built in the past century with **outdated technologies** (e.g., they do not use geomembranes to ensure **waste containment**; most landfills do not have **gas collection systems** in place).

Emissions sources in the waste management sector include **non-hazardous waste landfills** and domestic and industrial **wastewater**. Waste incineration and composting emissions have not been recorded in the national inventory yet, although these activities are actually carried out in the country.

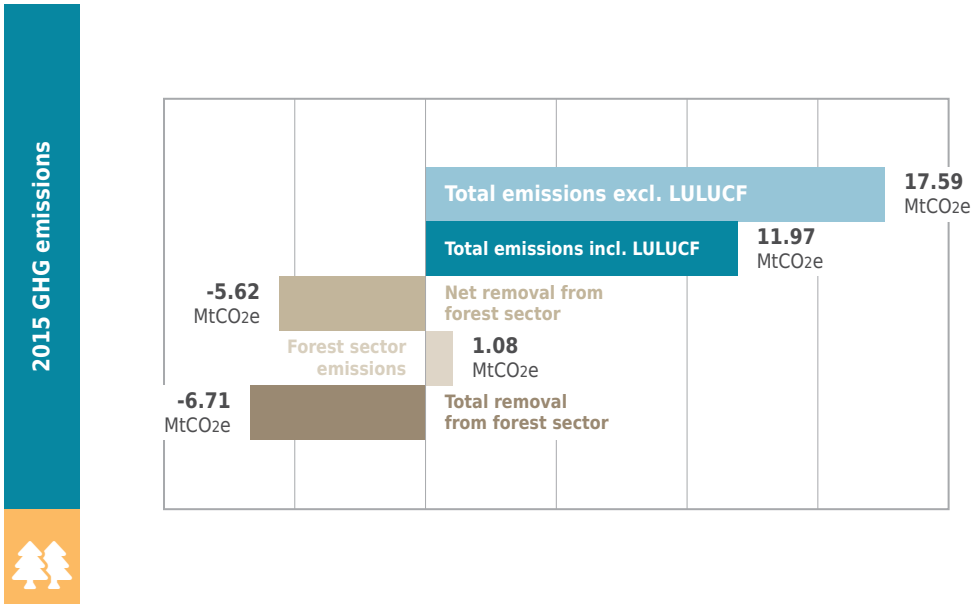
There are 57 non-hazardous waste landfills in the country (34 of them active, 23 closed and non-operational). Only two of them have passed an environmental impact assessment process and will be built in line with international standards. In accordance with the national waste management legislation, the Solid Waste Management Company of Georgia is in charge of closing the existing regional landfills and constructing new regional landfills. Construction of 8–9 regional landfills includes installation of gas collection systems. At present, a gas collection system is already installed at the Rustavi Non-hazardous Waste Landfill, including gas flare, where gases released from the landfill are burned, thus reducing GHG emissions.

Around **900,000 tonnes of municipal waste** are generated every year in Georgia, of which about 700,000 tonnes are disposed at official landfills and the remaining 200,000 tonnes are disposed in dumpsites (dumped in ravines, riverbeds) or burnt in open spaces (Government of Georgia, 2016). Apart from polluting adjacent areas and the environment in general, dumpsites pose a significant threat to human health. According to the National Waste Management Strategy and Action Plan, all existing dumpsites in the country should be closed by the end of 2020 (Government of Georgia, 2016). The process has already started on a municipal level. There is no complete data on the share of the population with access to **waste collection** services, however according to the National Waste Management Strategy and Action Plan, the waste collection rate should be at 90% by 2020 and at 100% by 2025, with all municipal waste being collected, part of it recycled and part of it disposed at non-hazardous waste landfills.

49% of the population is connected to sewerage systems (GeoStat, 2019), however, these systems were built between 25–40 years ago and are outdated, most of them do not provide proper treatment. Majority of the cleaning facilities are not capable of efficient sewage cleaning and none is providing **biological treatment** since the technical facilities are out of order (MEPA, 2019). LLC United Water Supply Company of Georgia is constructing wastewater treatment plants in several cities of Georgia with biological treatment. The company is also implementing projects to improve water supply and sewerage systems in several cities.

As for the **forestry sector, the net removal from the forest sector accounted to approximately 32% (-5.62 $MtCO_2e$) of total national GHG emissions in 2015** (MEPA, 2019). **In 2015, emissions from the forestry sector amounted to 1.08 $MtCO_2e$,** while total removal was 6.71 $MtCO_2$ (see Figure 13, MEPA, 2019).

FIGURE 13: Forestry sector GHG emissions and removals breakdown for 2015 (MEPA, 2019)



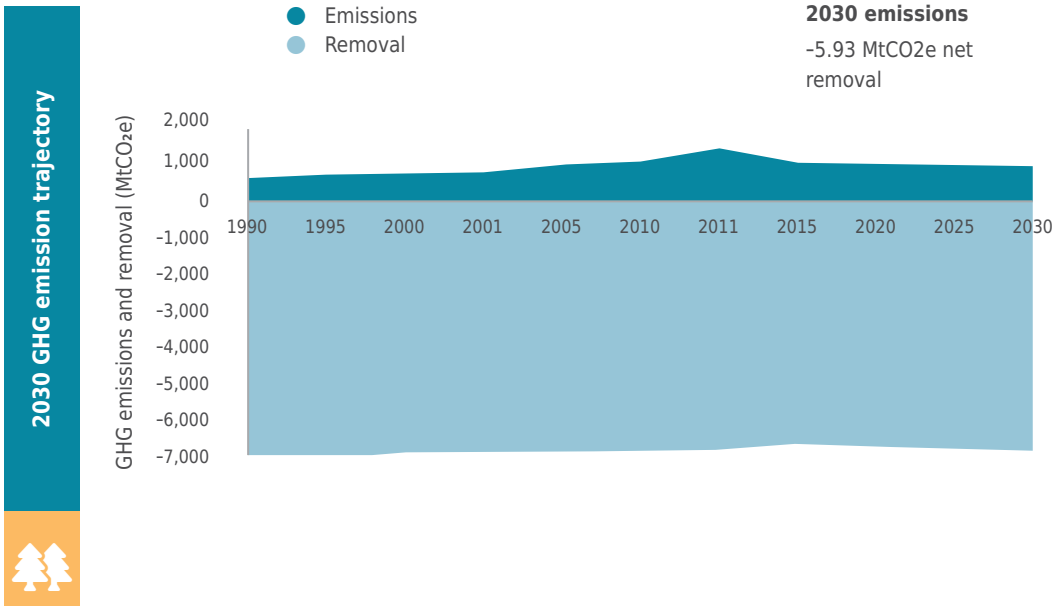
Nearly 43.5% of Georgia's total territory is covered with forests, of which 95-98% are natural forests. The total area of the Forest Fund of Georgia is 3,023,261 ha with approximately 500,000 ha of so-called 'primary forests', the last of their kind in the temperate climate zone (GeoStat, 2019). Forests of Georgia provide the population and national economy with wood, firewood, timber and non-timber products, including medicinal plants. Moreover, they carry soil-protecting, water-preserving and water-regulating functions.

During the last decades, processes in the forestry sector were marked by frequent institutional and legislative changes. In the absence of a clear strategy and action plan, processes were not developing coherently. In May 2020, the Parliament of Georgia adopted the new Forest Code which sets the solid legal basis for sustainable forest management in the future (Parliament of Georgia, 2020).

While adoption of the new Forest Code relieves some pressure on deforestation and forest degradation, and the general sector development trend is positive, the forestry sector in Georgia continues to face several challenges and would not use its full potential for emissions removal under a reference scenario. Figure 14 shows the projected GHG emissions and removals in the forestry sector of Georgia up to 2030. **Emissions in the sector are expected to decrease by approximately 8% to 0.98 $MtCO_2e$ in 2030, while net removal is projected to increase by approximately 3% to 6.91 $MtCO_2e$** under a reference scenario.

Degradation is the major challenge for Georgia's forests, which is reflected in the decrease of their quality and volume, ultimately leading to **reduced emission removal potential** of Georgian forests. Key drivers for degradation are the **population's dependence on firewood** due to **limited access to alternative energy resources,** as well as **draught** and **forest fires** accelerated by the impacts of **climate change.**

FIGURE 14: Forestry sector GHG removals and emissions up to 2030 (modelling conducted using EX-ACT)



One of the reasons for the growing trend of GHG emissions is the lack of adequate institutional capacity for effective, efficient and evidence-based policy analysis and development. The consultation processes revealed that almost all sectors lack technical capacity, human resources, climate change mitigation awareness, data necessary for climate change mitigation, country-specific research and analysis, monitoring, modelling and technological capabilities.

2.2 Environmental Impacts of Climate Change in Georgia

According to the Intergovernmental Panel on Climate Change, "Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history". Furthermore, it is stated that climate change will significantly increase the current risks for both environmental and human systems, and the amount of damage caused by climate change depends on the scope and quality of global response. (IPCC, 2014). Therefore, according to the IPCC, climate change mitigation (GHG reduction) measures are urgent and necessary to halt climate change as far as possible and reduce existing risks for the environment and society (IPCC, 2018).

It should be noted that the climate change processes have significantly intensified in Georgia, with a wide range of adverse impacts (MEPA, 2020). In particular:

AVERAGE TEMPERATURE

Between 1986 and 2015, as compared to 1956–1985, average annual air temperatures have increased almost throughout the country within the range of up to 1°C with average increase of 0.5°C.

PRECIPITATION

Between 1986 and 2015, as compared to 1956–1985, annual precipitation has increased in most parts of western Georgia, while it decreased in some areas of eastern Georgia. More specifically, 5 to 15% increase in precipitation was recorded for a significant part of western Georgia. The upward trend in precipitation in western Georgia seems to be caused by the increase in rainfall. In contrast to western Georgia, precipitation has decreased by 5 to 15% in most parts of eastern Georgia over the last 30 years. In the south and east of the country (especially in Kakheti and Mtskheta-Mtianeti), precipitation indices reflect a decrease in precipitation due to the increase in the duration of the dry periods.

HUMIDITY

Relative humidity has increased throughout the country, with fluctuations between (–1%) – (5%). High humidity is observed in winter months in western Georgia and should be driven by extremely humid days (10–12 days/year), with decreasing trends most intensely observed in early summer–autumn.

AVERAGE WIND SPEED

Average wind speed has decreased throughout the country during all seasons by about 1–2 m/s. It should be noted that observations show the most significant decline in the areas (Mount Sabueti, Poti), which are considered in the Wind Atlas as the most prospective sites for wind energy development. While average wind speed is decreasing, the number of days with strong winds is increasing in some areas, which should be attributed to the increasing frequency of such days over the last 15 years and is most frequently observed in River Mtkvari Valley (Gori, Tbilisi).

The expected adverse effects will amplify even more in the future. Without the development of climate-resilient practices, climate change mitigation measures, and the improvement of the country's preparedness and capabilities, the most climate-sensitive sectors will become more vulnerable, and other negative impacts of climate change will also increase, in particular:

- Increase of the frequency and intensity of extreme hydrometeorological events in the context of climate change, a trend already observed in Georgia;
- Increase of the scales and frequencies of landslide/gravity and mudflow processes, a trend already observed in Georgia;
- Intensive melting of glaciers, a trend already observed in Georgia;
- Accelerated processes of flooding and loss of coastal areas due to anthropogenic impacts. Sea level rise – the major adverse effect of global warming for coastal areas – makes Georgia's coastline particularly vulnerable;

Soil erosion, one of the main causes of degradation of agricultural, forest and alpine lands.

Temperature rise affects livestock farming and its productivity, as well as perennial and grain crops and biodiversity;

Rising temperatures are contributing to the reduction of water resources, a trend already observed in Georgia;

The adverse climate impact on forests is evident in terms of both the progression of existing pests and diseases, as well as the emergence of new harmful insects and diseases.

According to the quantitative survey conducted by the Regional Environmental Centre for the Caucasus (REC Caucasus) on behalf of the EU and United Nations Development Programme (UNDP) in 2020, more than 91% of Georgia's population believes that climate change is a real process that poses a danger for life on Earth. Among the adverse impacts of climate change, the people are most concerned about global warming and droughts (96.11%), natural disasters (92.84%), melting of glaciers, and shrinking of ice layers in the oceans (91.83%).

2.3 Climate Change Impacts on Human Health

Climate change has a significant impact on human health, healthcare, and social security systems. According to the data from the National Center for Disease Control and Public Health of Georgia, cardiovascular diseases remained the leading cause of death in Georgia in 2017. Respiratory diseases were the second leading cause of death in 2005 but moved to fifth place in 2017. However, number of diseases (chronic obstructive pulmonary disease, asthma) that may be associated with climate change and high emissions steadily remain at the leading positions. Cases of infectious and parasitic diseases doubled between 2008 and 2017 (MEPA, 2020).

3 LONG-TERM VISION AND GOALS OF LOW-EMISSION DEVELOPMENT

3.1 Vision of the Climate Change Strategy and Action Plan

Long-term vision of the Climate Strategy and Action Plan involves **reducing the total GHG emissions to 35% below 1990 levels by 2030 for all the key sectors of the economy relevant to climate change mitigation.** This vision derives from Georgia's updated NDC, prepared for submission to the UNFCCC Secretariat in 2021. The document communicates Georgia's pledge to reduce GHG emissions across all the key sectors of the economy. It includes one unconditional commitment and two additional conditional scenarios for further emission reductions, implementation of which would be dependent on international support:

> *Georgia undertakes an unconditional commitment to reduce its national greenhouse gas emissions to 35 % below the 1990 level by 2030.* This target does not include emissions from land-use, land-use change and forestry (LULUCF). This would imply that total national emissions, excluding LULUCF, should be limited to no more than 29.25 $MtCO_2e$ in 2030.

> *Georgia undertakes a conditional commitment to reduce its total national greenhouse gas emissions by 50-57% compared to the 1990 level by 2030.* In the case, if the world follows the scenario of limiting the average global temperature increase to 2°C or 1.5°C, respectively, with international support.

As opposed to continuing with the current situation, the measures identified in this Climate Strategy and Action Plan will have an impact on greenhouse gas emissions reduction at the national level. The GHG emissions projection exercise was conducted with different models, while aggregation was performed in the LEAP model (see Figure 15).

Further details on the methodology can be found in Annex 4 (Annex 4).

According to the modelling results, **emissions from all the key sectors of the economy (excluding LULUCF) are projected to increase on average 4% per year between 2020 and 2030, if measures to reduce emissions would not be implemented, i.e., under the reference scenario. Emissions would reach 30.8 $MtCO_2e$ in 2030, 75% more compared to 2015 level (17.6 $MtCO_2e$). The measures listed in the Climate Action Plan (assumptions made during calculation of measures to be noted) would reduce the emissions in 2030 by approximately 11%, compared to the reference scenario, resulting in emissions of 27.5 $MtCO_2e$ in 2030.**

Achievement of the NDC, which sets the target to reduce the emissions growth by 35% in 2030, would require the implementation of relevant measures to limit the emissions to a maximum of 29.25 $MtCO_2e$ by that time (see Figure 16).

In addition to the activities already funded by the government and included in the Climate Action Plan, identification and implementation of additional climate change mitigation measures not included in 2021–2023 Climate Action Plan, with support from the international community, could help Georgia to strengthen the ambition set by the NDC.

FIGURE 15: GHG emissions trajectory in all the major sectors of the Georgian economy (2015–2030). Note that some assumptions have been made when calculating the measures. See Annex 4 for additional information on projection methodologies. The figure compiles emissions from all the major sectors of the economy, excluding carbon sinks from LULUCF.

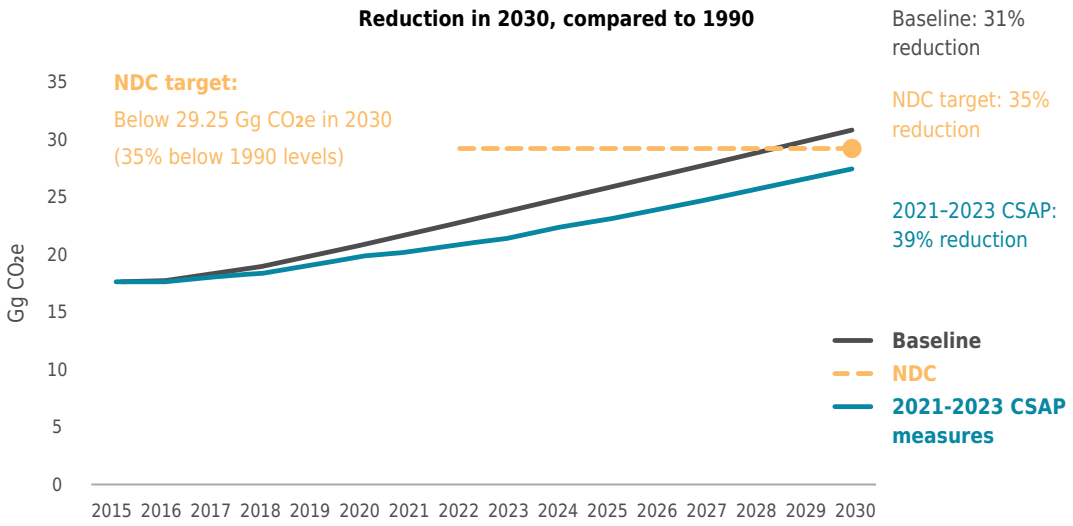
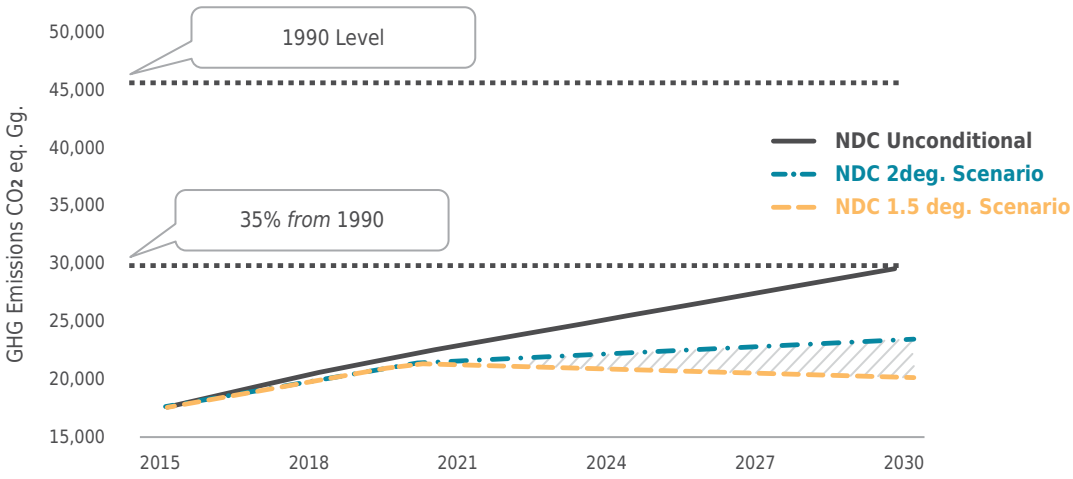


FIGURE 16: Updated NDC Targets, submitted to the UNFCCC Seceretariat (2021)



3.2 Goals of the Climate Strategy and Action Plan

To achieve the long-term vision declared for 2030, which means reducing GHG emissions to 35% below 1990 levels by 2030 for all sectors of the economy, the Climate Strategy and Action Plan set the following **goals** for **each sector:**[2]

GOAL 1: *Reduce greenhouse gas emissions in the energy generation and transmission sector to 15% below the reference scenario projections by 2030;*

GOAL 2: *Reduce greenhouse gas emissions in the transport sector to 15% below the reference scenario projections by 2030;*

2. An internal analysis of further potential and ambition, and negotiations with potential partners on the declared conditional commitment target are in progress

GOAL 3: *Support development of low-carbon approaches in the buildings sector by promoting climate-smart and energy-efficient technologies and services;*

GOAL 4: *Support development of the low-carbon approaches in the industry sector by promoting climate-smart and energy-efficient technologies and services to reduce greenhouse gas emissions to 5% below the reference scenario projections by 2030;*

GOAL 5: *Support the low carbon development of the agriculture sector by encouraging the climate-smart and energy-efficient technologies and services;*

GOAL 6: *Support the low carbon development of the waste sector by promoting climate-smart and energy-efficient technologies and services;*

GOAL 7: *Increase the carbon capturing capacity of the forestry sector by 10% for 2030 compared to 2015.*

It should be noted that according to the results of the CAP mitigation measures modelled with SCAN Tool and various international studies, the fulfilment of the goals and objectives set out in the document will improve following in the long run: economic condition and development, air and water quality, public health, availability and quality of jobs, quantitative and qualitative aspects of biodiversity, and number of the new and clean technologies integrated into everyday life.

4 SECTORAL PRIORITIES, GOALS AND OBJECTIVES

The goals, objectives and activities set for the **priority sectors** of the Climate Strategy and Action Plan have been identified with participation of various stakeholders.

The selection of priority sectors for the Climate Strategy and Action Plan was based on the Kyoto Protocol Annex A and the IPCC 2006 National Greenhouse Gas Inventory Methodology. According to these documents, greenhouse gas emissions and their inventory take place in the following sectors: energy, industrial processes, and product consumption, waste, agriculture, land use, changes in land use and forestry.

All GHG emission sectors were **prioritized** for the Climate Change Strategy and Action Plan, however, considering the country's context, the energy sector was broken down into sub-sectors (energy generation and transmission, transport, buildings) due to high levels of emissions and high emission reduction potential of actions in these sub-sectors.

The priorities were agreed upon by the technical working groups set up specifically for this process, and then by the coordinating consultative body – the Interagency Council on Climate Change (see Chapter 6). The coordination mechanism involves the governing institution of the coordinating body (MEPA) and all responsible and partner institutions.

The results of meetings of the technical working groups and meetings with stakeholders organized by the Secretariat of the Climate Change Council identified the sectoral priorities, goals, objectives, relevant targets and the logical framework. Given the potential for greenhouse gas reductions, the working groups were set up for the following sectors: energy generation and transmission, transport, buildings, waste management and forestry. The MEPA's Climate-smart Agriculture Working Group covered the agricultural sector. The drafts of the sector-relevant chapters were validated by the working groups.

Identification of alternative solutions to the problems/challenges in the sectors and selection of the optimal alternatives took account of the GHG reduction potential, best international practices, and national capacities. The document identifies two general alternatives for interventions in each sector: 1) an existing/ongoing policy, program, or measure (alternative); and 2) a new, most realistic, financially and technically feasible policy, program, or measure (alternative). Consequently, the strategy reflects both interventions planned by various sectoral ministries and/or organizations (unconditional and conditional actions that require additional funding) and interventions with potential

to reduce emissions but were not included in the Climate Action Plan due to high financial deficit/needs. These interventions are described in the subsections titled "Other Priority Directions for the Future" under each sector.

The sectoral alternatives, as well as their respective activities, were approved by both the working groups and the Climate Change Council.

4.1 SECTORAL PRIORITY: Energy Generation and Transmission

This section of the Climate Strategy and Action Plan describes emissions from the energy industries, including electricity production and other energy industries (e.g., consumption of coke in the cast iron and steel plants), as well as fugitive emissions, including those from solid fuel exploitation, oil, and gas.

4.1.1 GOALS AND OBJECTIVES

To implement the vision from the NDC, the goal of the energy generation and transmission sector is **to reduce GHG emissions to 15% below the reference scenario projection by 2030.**

This goal is implemented through the following **objectives:**

OBJECTIVE 1.1. Support renewable energy (wind, solar, hydro, biomass) generation

This objective will be achieved by increasing the share of renewable energy (wind, solar, hydro) in Georgia's electricity production by up to 87% by 2030. In cooperation with the private sector, the government will support the generation of renewable energy. The government will provide continuous technical and procedural support for energy production in all three directions, with a view to promote a balanced generation of renewable energy. Installed capacity and power generation of wind plants will be increased. The JSC Georgian Energy Development Fund under the Ministry of Economy and Sustainable Development will be responsible for this objective. The Energy Development Fund supports development of renewable energy capacities in the country through the following activities: conducting preliminary research work, preliminary project feasibility and environmental impact assessments, finding investors, and promoting the projects among potential investors. In particular, a plan is to support construction of the following wind power plants: Imereti (104 MW), Rikoti–Phona (20 MW), Kartli–2 (250 MW), Tbilisi (54 MW), Zestaponi (50 MW),

Nigoza (50 MW), Kaspi (54 MW), Didebula (21 MW) and Ruisi (8 MW). Following solar power plants are planned to be built by 2023: Udabno (5 MW), Phlavi (7 MW), Gardabani (50 MW), Marneuli (20 MW), Geosolar (9 MW), and Sagarejo (25 MW).

A plan is also to increase the installed capacities and production potential of hydropower plants by 2023 and to construct the following hydropower plants with capacities of more than 13 MW: Kirnati (51.25 MW), Khobi (46.7 MW), Mtkvari (53 MW), Mestiachala 1 (20 MW), Stori (20.03 MW), Samkuristskali 2 (26.28 MW), Metekhi 1 (36.73 MW), Ghebi (14.34 MW), Chiora (14.15 MW) and Zoti (44.31 MW).

Consequently, through the production of wind, solar and hydro power, emissions will be reduced by 399 ktCO2e, 5 ktCO2e and 146 ktCO2e compared to the reference scenario.

OBJECTIVE 1.2. Improve average efficiency of thermal power plants

The strategy also involves improvement of the average efficiency of thermal power plants. The objective will be measured by increase in the efficiency of electricity generation in thermal power plants with more than 50% by 2030. It is planned to carry out technical works on thermal power plants, strengthen the infrastructure of national transmission systems, and equip the new, combined-cycle thermal power plants with up-to-date technologies to double their energy efficiency. Gardabani 3 combined cycle gas thermal power plant will be built by 2023.

OBJECTIVE 1.3. Strengthen the capacities of renewable energy integration in the transmission network of Georgia

This objective includes implementation of a ten-year plan of Georgia's transmission network development for power transmission companies, strengthening the infrastructure of national transmission systems, solving existing problems, responding to future challenges, and utilising the network capacities, including integration of renewable energy sources (wind and solar) into the network. Fulfilment of this objective will increase the share of renewable energy (wind and solar power plants) in the installed capacity of the Georgian energy system, reaching 18.2% by 2030.

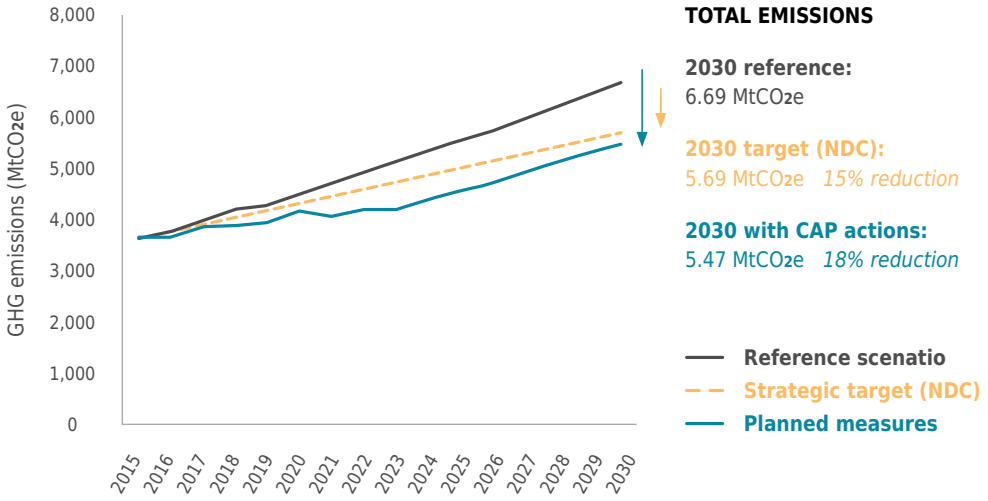
OBJECTIVE 1.4. Develop new policy documents and legislation for the energy sector

This objective includes development of a long-term vision for the energy sector by the government institutions and initiation of new policy documents, laws and secondary legal acts based on this vision. Beyond development of a long-term vision for Georgia's energy policy, a long-term, comprehensive state vision will be formulated, which will later serve as the basis for short-, medium- and long-term strategies focusing on Georgia's use of renewable energy resources and minimizing the losses. This objective will not directly affect reduction of emissions, but it is important for building institutional and policy development capacities. Table 1 provides an overview of the base year (2015) GHG emissions in the energy generation and transmission sector and reference and target scenarios and indicators for their reduction (by 2030, according to NDC and CSAP). Figure 17 shows that the GHG emissions target can be exceeded through the implementation of the Action Plan and taking account of the modelling assumptions.

TABLE 1: Emission reduction targets and trajectories in the energy generation and transmission sector

2030 strategic goal for emission reduction	**2015**	**2030**		
Energy generation and transmission sector		Reference scenario	**with CSAP measures**	**NDC target**
15% reduction in GHG emissions below the reference scenario by 2030	3.65 $MtCO_2e$	6.69 $MtCO_2e$	5.62-5.47 $MtCO_2e$	5.69 $MtCO_2e$

FIGURE 17: Energy generation and transmission sector GHG emissions reduction to 2030 under different scenarios



The sectoral emissions reduction target of the NDC could be successfully achieved through the implementation of the Climate Strategy and Action Plan activities by the relevant central and municipal government institutions.

4.1.2 OTHER PRIORITY DIRECTIONS FOR THE FUTURE

In addition to the above objectives, Georgia is interested in exploring other potential areas for reducing emissions that will eventually enhance the country's progress in complying with the Paris Agreement temperature target of "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels" (Article 2. 1. a).

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The section titled Other Priority Directions for the Future under each sector describes the areas that will potentially be included in the Climate Strategy and Action Plan in the future. Georgia seeks international support with these priority directions in parallel to the measures already identified in the Climate Action Plan. The priority directions have been elaborated by the relevant sector stakeholders during the consultation process carried out in the framework of the Climate Strategy and Action Plan.

For the energy generation and transmission sector, these directions include:

Further promotion of renewable energy: The main energy policy direction of the Government of Georgia is to increase energy security and independence of the country, gradually reduce the dependence on imported energy resources through the utilization of national energy resources, diversification of supply sources and routes (Government of Georgia, 2020). To that end, utilization of renewable energy sources could further improve energy security of the country and decrease the dependence on imports. Future measures should therefore include exploring geothermal and solar energy potential in Georgia as well as further utilization of water and wind energy and exploring incentives to attract further investments in renewable energy.

Hydro: Only 20–22% of the technical potential of the water resources in Georgia is utilized to date and the total assumed potential is 1,450 MW (TBC Capital, 2019).

Solar: Due to its geographical location, solar radiation in Georgia is quite high. The total solar energy potential is on average 108 MW per year, with 1,900 – 2,200 sunlight-hours (Invest in Georgia, 2020).

Wind: Annual wind power generation potential is estimated at 4 TWh (Invest in Georgia, 2020). Wind power is a valuable addition to hydro power as its generation is higher during winter months when hydro generation is typically lower.

Feasibility study for a biogas power station: The Georgian Energy Development Fund has been actively developing wind, solar, and biomass projects in recent years. The Fund is also interested in construction of a power station operating on biogas that will use amaranth[3] as fuel. As this technology is not yet developed in Georgia, the initial work will involve assessment of the project feasibility by international experts.

4.2 SECTORAL PRIORITY: Transport

This section of the Climate Strategy and Action Plan cover the emissions from the energy consumption in the transport sector. The main sources of emissions are passenger and freight transport over road, rail and off-road vehicle (e.g., agricultural) use. This section includes the direct emissions (direct combustion of fuels in transport) as well as indirect emissions (electricity consumption).

4.2.1 GOALS AND OBJECTIVES

To implement the vision from the NDC, the identified **goal is to reduce the greenhouse gas emissions in the transport sector by 15% below the reference scenario projection by 2030.**

This goal can be achieved through the fulfilment of the following **objectives:**

OBJECTIVE 2.1. Increase the share of low- and zero-emission and roadworthy private vehicles in the vehicle fleet

This objective includes increasing the share of electric and hybrid vehicles in the total registered vehicles in Georgia with 5% and 20%, respectively, by 2030, since the vehicles with this type of engine do not consume or consume less gasoline and diesel, resulting

3. *Amaranthus, a plant*

in zero or low emissions. The objective also involves increasing the share of roadworthy vehicles to reduce greenhouse gas emissions, including in terms of exhaust fumes. This will be measured by reduction of the share of vehicles failing the first technical inspection, from the current 55% to 30% by 2030. The strategy includes making amendments to the normative acts on technical inspection of transport and the Administrative Offences Code to reduce the tendency of avoiding inspections and making one-time manipulations. The objective also includes more effective enforcement of fines and road control of vehicle exhausts using modern technologies. These activities serve to remove non-roadworthy and environmentally inefficient vehicles from operation and reduce emission intensities.

The strategy also aims to encourage the use of low- and zero-emission vehicles and electric transport and reduce the activity of gasoline and diesel engine vehicles and imports of older, environmentally inefficient vehicles. In order to encourage the use of electric vehicles, the government will identify additional optimal tax incentive alternatives based on cost-benefit analysis, improve infrastructure for electric vehicles in Tbilisi, examine the option of increasing the import tax on old light-duty vehicles on the basis of an economic feasibility study and will introduce an emission standard for imported vehicles based on cost-effectiveness analysis (Engine EUR4 / EUR5).

Removing the least efficient vehicles from the vehicle market and upgrading the vehicle fleet will increase not only its average efficiency but also the air quality in general. An increase in the incoming electric vehicles (as well as improvement of the infrastructure for electric vehicles) and the gradual replacement of the existing fleet will be ensured. In parallel to the reduction of vehicle activity, part of the drivers will switch to using public transport as their main means of transportation.

OBJECTIVE 2.2. Encourage the reduced demand on fossil fuel and the use of biofuels

Since fossil fuel use in transport has a negative impact on greenhouse gas emissions, this objective aims to reduce its consumption, promote the use of environmentally friendly fuels and increase the share of energy from renewable sources, including biofuels in the total consumed fuel in transport with up to 10% by 2030. The option of increasing the fuel tax will be examined and biodiesel production will be supported and encouraged to that end.

OBJECTIVE 2.3. Promote non-motorized means of mobility and public transport

The objective includes encouraging alternative forms of transportation/mobility – walking, cycling and public transport (bus, metro, and minibus) – instead of using private cars. The high rate of private vehicles use is associated with the high intensity of greenhouse gas emissions. The strategy uses the percentages of transportation by non-motorized transport (cycling and walking) and by public transport (metro, bus, minibus) as the outcome indicators for this objective. The identified 2030 targets for these indicators are the respective average values for Europe – 35% and 45%, respectively. This will automatically reduce the use of private vehicles by up to 20%.

In addition to the activities focusing on private vehicles, the strategy encourages the increased use of public and non-motorized transport. By increasing the efficiency and capacity of public transport and developing infrastructure for non-motorized transport, the share of private vehicles will be taken over by public and non-motorized transport. To achieve this, it is important to increase the capacity of metro trains and buses, effectively improve bus routes, reduce the traffic of private vehicles in central districts, improve the parking system, arrange bike lanes, and more.

The strategy includes development of a Sustainable Urban Mobility Plan (SUMP) for Tbilisi, Tbilisi bus reform (bus fleet upgrade, introducing a new route network), modernization and capacity increase of the metro, construction of cable lines, the introduction of a smart transport system, the introduction of zonal hourly parking and rehabilitation of the streets in line with the multimodal planning principles in Tbilisi. Similarly, in Batumi, improving the efficiency of bus routes, increasing bus capacity and number of passengers, introducing zonal hourly parking in central districts, planning and implementing reduced vehicle activity, upgrading/enhancing the municipal transport company vehicle fleet, including purchasing fully electric buses, which will contribute to environmental protection and the proper functioning of the municipal transport system.

OBJECTIVE 2.4. Implement innovative, evidence-based initiatives in the transport sector

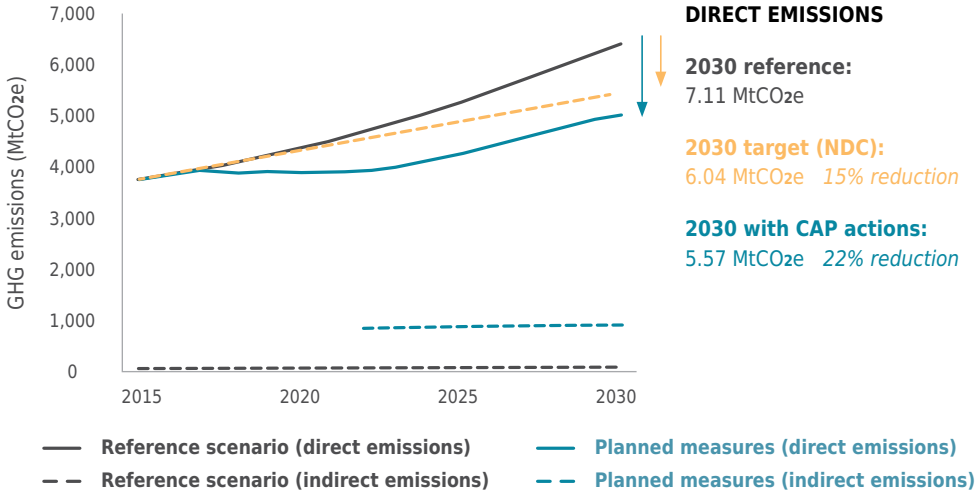
This objective includes conducting analysis and studies and raising financial resources to implement additional, evidence-based initiatives for reducing greenhouse gas emissions in the transport sector. This will help to identify new measures for the next version of the Climate Action Plan, based on a cost-benefit analysis of existing alternatives.

Table 2 shows the baseline greenhouse gas emissions in the transport sector (2015) and reference and target scenarios and indicators for their reduction. With implementation of the Action Plan, the effect of 22% reduction in sectoral emissions will be visible by 2030. Figure 18 illustrates the emission trajectory to achieve the sectoral targets by 2030. While the reference scenario projects the increase of emissions, implementation of the Climate Strategy and Action Plan measures will significantly contribute to successful achievement of the targets set out in the updated NDC for the transport sector in Georgia.

TABLE 2: Emission reduction targets and trajectories in the transport sector

2030 strategic target for emission reduction	**2015**	**2030**		
Transport sector		Reference scenario	**with CAP measures**	**NDC target**
15% reduction in GHG emissions below the reference scenario in 2030	4.16 $MtCO_2e$	7.11 $MtCO_2e$	5.57 $MtCO_2e$	6.04 $MtCO_2e$

FIGURE 18: Transport sector GHG emissions reduction to 2030 under different scenarios



The NDC target of sector emissions reduction could be successfully achieved with implementation of CSAP actions by the relevant central and municipal government institutions.

4.2.2 OTHER PRIORITY DIRECTIONS FOR THE FUTURE

More research and data collection can help identify new directions and the best policy for climate change mitigation in the transport sector in the future. Georgia seeks additional international support for the priority measures identified for the 2021–2023 Climate Action Plan.

Replacing urban passenger transport with public and non-motorised transport: Several plans are currently being implemented in major cities (particularly Tbilisi and Batumi) to renew and upgrade public transport infrastructure and services, as well as the infrastructure for non-motorised transport, including bicycle; however there is more potential for climate change mitigation in this area. The Climate Action Plan includes an activity for development of project proposals to attract funding from various financial institutions or funds. This activity is in line with the Green Climate Fund (GCF) Country Program of Georgia and its priorities.

Replacing inter-city passenger transport with public transport: Improvements are being made to passenger rail services, including purchasing of new and modern trains. Improvement of inter-city passenger transport quality and railway system is a national priority for climate change mitigation, as indicated in Georgia's Country Programme with the GCF.

Improving energy efficiency of private light-duty vehicles: The energy efficiency of private light-duty vehicles will be improved with several actions from the Climate Action Plan, but due to old age and low efficiency of the current vehicle fleet, improvement will remain a priority in the future. The 2021–2023 Climate Action Plan includes conducting of a cost–benefit analysis and (technical and economic) feasibility study in order to identify the most suitable policy options in this area.

Shifting freight from road to rail transport: Several potential plans and strategies have been developed that would have a positive impact for shifting freight from road to railroad, but there remains a lack of clarity on what would be the most effective option to pursue. The 2021–2023 Climate Action Plan includes conducting of the cost–benefit analysis and the (technical and economic) feasibility study in order to assess what would be the most suitable policy options in this area.

4.3 SECTORAL PRIORITY: Buildings

This section of the Climate Strategy and Action Plan addresses the energy demand in residential, commercial and public buildings. The objectives set by the state for this sector are related to both direct emissions, such as direct combustion of fuel in buildings for energy supply, as well as indirect emissions – consumption of electricity in buildings and other related issues.

A comprehensive inventory of buildings has never been carried out in Georgia. There is no aggregated, structured database in place with engineering-technical information about the building stock. Thus, the information provided in the Climate Action Plan is based on the data compiled from the reports issued by various research projects and by the government.

4.3.1 GOALS AND OBJECTIVES

To implement the vision from the NDC, one of the identified **goals is to support development of the low carbon approaches in the building sector through encouraging the climate-smart and energy efficient technologies and services.**

This goal will be achieved through the following objectives:

OBJECTIVE 3.1. Develop a system for energy efficiency certification of buildings

The strategy includes certification of buildings for energy efficiency by developing, approving, and ensuring implementation of the necessary methodology, relevant standard and secondary normative acts.

The certification methodology developed by the government will allow it to prepare reference construction projects for thermal insulation of external layering structures of buildings, for different climatic conditions and regions, in accordance with the energy efficiency standards, and to develop and approve relevant secondary normative acts. The outcome indicator for this objective is 100% of newly constructed buildings subject to certification being certified for energy efficiency by 2030, in accordance with the Law of Georgia on Energy Performance of Buildings.

OBJECTIVE 3.2. Raising consumer awareness about energy efficiency

The strategy includes standardization and labelling of energy-efficient appliances and providing more information to the customers in order to increase the share of energy-efficient appliances on the market. This objective involves creating standards, norms, and labelling for the schemes needed for the appliances, as well as informing consumers about the importance of energy efficiency through an awareness-raising campaign and shifting their choices towards energy-efficient products. In addition, this objective also includes implementation of information campaigns on incandescent light bulbs and solar-powered water heating. As a result, society will be informed about cost-effective and easily applicable changes and energy efficiency measures in the process of energy use. According to the strategy, the percentage of consumers who identify the energy efficiency of buildings and household appliances as an important factor in consumer decision-making will reach 80% by 2030.

OBJECTIVE 3.3. Encourage energy-efficient approaches and installation of energy-efficient lighting in residential, commercial and public buildings

In addition to conducting an information campaign on incandescent light bulbs, the government will introduce tax regulations, which will result in 100% replacement of such light bulbs with energy–efficient light bulbs in residential and commercial buildings by 2023.

The strategy also includes installation of energy–efficient lighting in buildings owned/used by public institutions. With the exception of schools and kindergartens, light bulbs in all public buildings will be gradually replaced by energy–efficient light bulbs. For the energy efficiency of school buildings, it is important to improve the external layering structures, install energy–efficient light bulbs and upgrade/replace solid fuel heaters. As for other national and municipal public sector buildings, it is planned to create information systems on the features and energy consumption of buildings. Outcome indicators for this objective are the number of buildings of more than 500 m2, occupied and owned by central and municipal governments, with 1% of the total area annually upgraded according to energy efficiency standards, and the percentage of public buildings, including public schools that use energy–efficient light bulbs.

OBJECTIVE 3.4. Support use of solar energy for water heating and use of energy-efficient stoves

Solar–powered heating systems and energy–efficient stoves have a positive impact in reducing greenhouse gas emissions. The government plans to introduce incentives for individuals and legal entities for purchasing solar–powered water heating systems in individual residential and commercial buildings for replacing non–energy efficient stoves with energy–efficient stoves.

OBJECTIVE 3.5. Train high professional standard personnel in energy efficiency

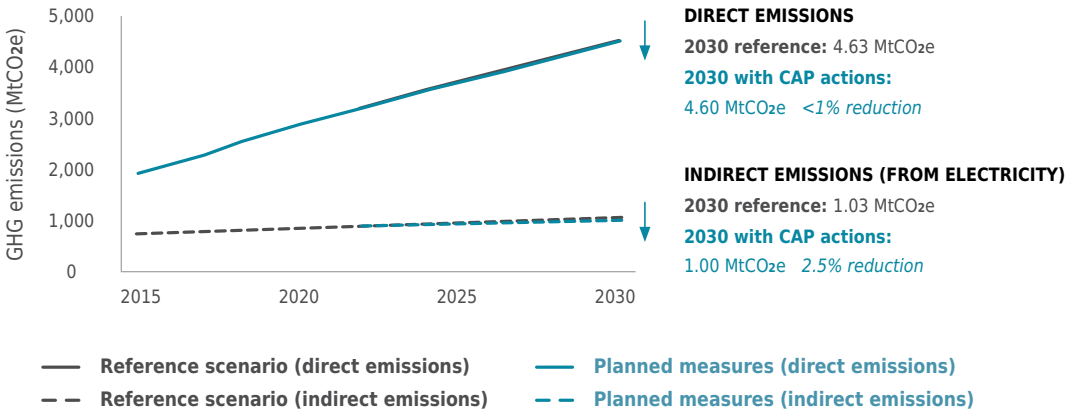
In terms of human resources, it is planned to systematize certification (create a system) of energy service providers working on installation of energy appliances in the buildings sector (e.g., auditors, managers and developers). The government will develop a system for certification of energy service providers, auditors, managers and developers working in installation of energy appliances in the buildings sector. The qualification, accreditation, and certification schemes developed and approved by the government will be fully in line with the Directive 2009/28 /EC. Moreover, it is important to develop education and training programs for energy consultants. Achievement of the objective will be measured by the total percentage of certified and degree–holding specialists in energy efficiency of heating, cooling and ventilation systems of buildings and electrical appliances.

Table 3 provides an overview of the reference and target scenarios and figures for the buildings sector. It shows that by implementing the Climate Action Plan, emissions directly attributed to the buildings sector will be reduced at limited extent. The goal of some measures given in Figure 19 is to create an enabling environment for improvements in the future without direct and immediate impact. The majority of measures with direct impact are associated with energy savings in the electricity supply sector, however their total effect would only be approximately 2.5% reduction of emissions associated with energy in the buildings sector.

TABLE 3: Emission reduction targets and trajectories in the buildings sector

2030 strategic target for emission reduction	**2015**	**2030**		
Buildings sector		Reference scenario	**with CAP measures**	**NDC target**
Support the low carbon development of the buildings sector	1.95 $MtCO_2e$	4.63 $MtCO_2e$	4.60 $MtCO_2e$	No quantitative target

FIGURE 19: Buildings sector GHG emissions reduction to 2030 with implementation of CAP



4.3.2 OTHER PRIORITY DIRECTIONS FOR THE FUTURE

More detailed consultations, research and analysis, will enable the directions listed below to become an integral part of the buildings sector-related mitigation activities in the future. Georgia seeks international support for the above-mentioned priority directions, in parallel to the measures already identified in the Climate Action Plan. These directions include:

Creating information system for energy efficiency of buildings: Comprehensive residential building inventory records would allow for a better evaluation of the climate change mitigation potential and designing of an efficient and targeted policy.

Improving energy efficiency of residential buildings: The biggest potential for energy saving and climate change mitigation in the buildings sector lies in improving the energy efficiency of the residential buildings sector. More developments, national programmes and financing instruments are needed in this area for the future.

Heating supply in residential buildings: It would be useful to conduct a (technical and economic) feasibility study for identification of economic and climate change potential for autonomous heating systems in existing multi-apartment buildings. Waste-to-energy technology was identified in the ongoing programme financed by the GCF in Georgia as a potentially attractive technology option to examine further.

Updating climate-specific standards of construction: Updating technical regulations in the construction sector, including climatic standards of construction, and their harmonization with the Eurocodes, which is an important and necessary tool for engineering/thermal-technical calculations and reliable evaluation of energy consumption in buildings, and improvement of energy efficiency in the buildings sector.

Introduction of energy-efficient approaches in the tourism sector: Supporting the tourism sector, being on a growing trend for recent years, is one of the priorities of the Government of Georgia. The sector should grow further with the introduction and encouragement of sustainable development and energy-efficient approaches. Priority direction is carbon-free buildings in the resorts of Georgia. This direction aims at supporting the development of ecotourism in Georgia by providing alternative energy resources and improving the energy efficiency of residential houses. To that end, the introduction of relevant financial instruments will enable access to the climate-friendly technologies available on the market. This direction is in line with Georgia's Country Programme submitted to the GCF.

4.4 SECTORAL PRIORITY: Industry

This section of the Climate Strategy and Action Plan covers emissions generated in the industry sector from industrial energy use and industrial processes. In this context, energy use includes emissions from the direct combustion of fuels on industrial sites, as well as indirect emissions from consumption of electricity generated off-site. Although the provided information and emission trajectories cover all major industrial sectors, the industry part of the 2021–2023 Action Plan itself includes only few sub-sectors of industry. It is being planned to add other areas of industry and identify relevant activities in the next update of the Climate Action Plan.

4.4.1 GOALS AND OBJECTIVES

To implement the vision from the NDC, the identified **goal is to support the low carbon development of the industry sector by promoting climate-friendly, smart and innovative technologies and services** to achieve a 5% emissions reduction compared to emissions projected under a reference scenario.

This goal can be achieved through the **following objectives:**

OBJECTIVE 4.1. Reduce the level of greenhouse gas emissions from industrial processes and from energy consumption of industrial facilities by introducing modern technologies

This objective includes reduction of emissions from industrial processes and from energy consumption by industrial facilities by replacing the current method of cement production with the energy-saving dry method of production and equipping the nitric acid producing enterprise with modern technologies. The latter removes about 95% of N_2O emissions from their production cycle. The emissions reduction from cement and nitric acid production will amount to 571 $ktCO_2e$ by 2030, of which 352 $ktCO_2e$ accounted for cement and 416 $ktCO_2e$ to nitric acid.

OBJECTIVE 4.2. Develop a system for studying the emission factors in the industry sector and for data management

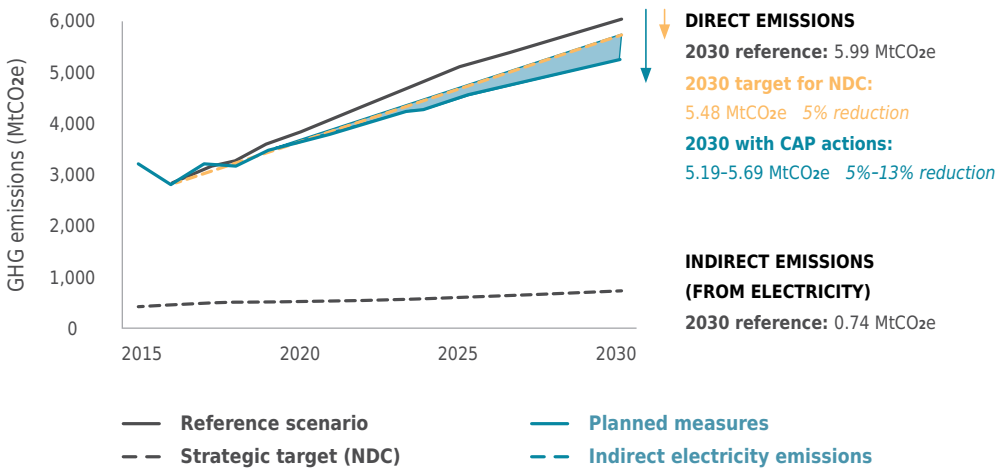
Designing the sector-specific emission factors in the industrial sector is important in terms of institutional and policy development capacity building. Moreover, in order to identify the emissions and mitigation potential of the sector, it was deemed important to create a data management system that includes individual emission factors for production.

The greenhouse gas emissions reduction targets and trajectories by 2030 in the industry sector are given in Table 4 and Figure 20.

TABLE 4: Emission reduction targets and trajectories in the industry sector, reference and target reduction scenarios

2030 strategic target for emission reduction	**2015**	**2030**		
Industry sector		Reference scenario	**with CAP measures**	**NDC target**
Support the low carbon development of the industry sector	3.12 $MtCO_2e$	5.99 $MtCO_2e$	5.19-5.69 $MtCO_2e$	5.69 $MtCO_2e$

FIGURE 20: Industry sector GHG emissions reduction to 2030 with implementation of CAP



4.4.2 OTHER PRIORITY DIRECTIONS FOR THE FUTURE

Georgia seeks international support for the mentioned priority directions, in parallel to the measures already identified in the Climate Action Plan. These directions include:

In addition to the actions related to reducing energy consumption in cement production and reducing emissions from nitric acid production that are listed in the CAP, future priorities include **actions related to reducing emissions from steel production or supporting measures for the introduction of energy audits and certification schemes.** These directions are in line with the national priorities identified under Georgia's Country Programme with the GCF and are not considered in the Action Plan.

Consultations carried out in the framework of the Climate Strategy and Action Plan have formulated the direction of **shifting cement manufacturing industry towards the efficient use of waste (for heat production).**

4.5 SECTORAL PRIORITY: Agriculture

This section of the Climate Strategy and Action Plan covers emissions from livestock and crop production sectors, including manure management, enteric fermentation, agricultural soils, and energy use in agriculture, fishing, and forestry. Emissions from agricultural soils include direct emissions from synthetic and organic nitrogenous fertilizer use, decomposition of crop residues and emissions from pastures and paddocks, as well as indirect emissions from atmospheric deposition and nitrogen leaching and run off. Energy use in off-road vehicles, including the use of agricultural machinery, is not accounted in this section but rather within the transport chapter.

4.5.1 GOALS AND OBJECTIVES

In order to implement the vision from the NDC, the identified **goal is to support the low carbon development of the agriculture sector through encouraging climate-smart agriculture technologies and services.**

This goal is accomplished through the following **objectives:**

OBJECTIVE 5.1. Implement sustainable management of soil and pastures and support the introduction of sustainable domestic animal feeding practices

The Government's objective is to reduce greenhouse gas emissions from the agriculture sector and, to that end, improve as much as possible the cattle nutritional quality for its 20%, which will lead to reduced greenhouse gas emissions from the enteric fermentation. Furthermore, in order to preserve the biodiversity of pastures and reduce the costs of cattle maintenance for the beneficiaries, they will be provided with intensive grass production equipment through a project. A climate-resilient multifunctional windbreak and agroforestry ecosystem (mWAE) will be established, which will reduce soil degradation, increase soil and agricultural productivity and diversification.

OBJECTIVE 5.2. Build capacities of generating scientific evidence for development of climate-smart approaches in the agriculture sector

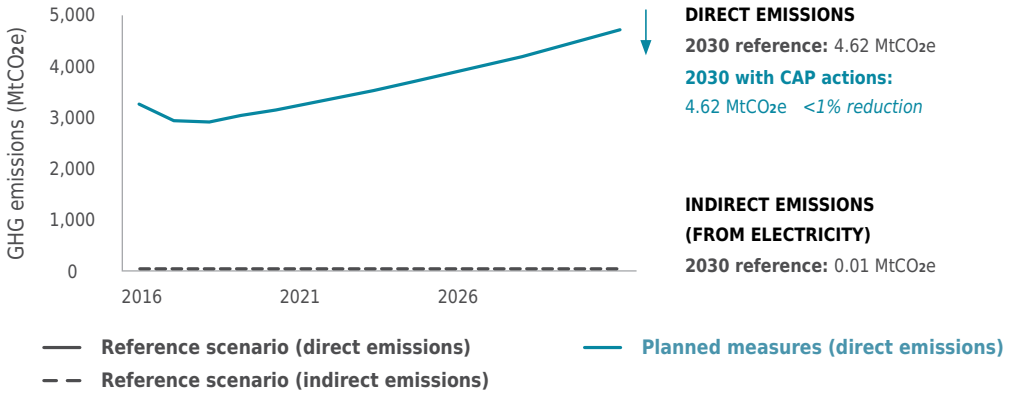
The objective includes conducting of a cost-benefit analysis and a feasibility study, which will reveal the most suitable measures in terms of improving domestic animal feeding. These studies will also identify the most suitable measures for manure management, which are likely to be planned and implemented under the following Climate Action Plan. It also includes providing support to the existing and emerging cooperatives in implementing sustainable practices in pasture and hay-land management and replicating the success factors of the successful cooperatives in others of their kind. It is planned to conduct research and consultations to identify climate-smart agricultural activities (CSA) economically and socially relevant for Georgia and to support implementation of CSA practices through extension and awareness-raising campaigns. Fulfilment of the objective will increase the share of climate-smart technologies, and/or initiatives developed on the grounds of the cost-benefit analysis and other evidence, in governmental and donor agricultural programs.

Table 5 and Figure 21 provide an overview of the emission reduction targets and trajectories in the agricultural sector by 2030.

TABLE 5: Emission reduction targets and trajectories the agriculture sector, reference and target reduction scenarios

2030 strategic goal for emission reduction	**2015**	**2030**		
Agriculture sector		Reference scenario	**with CAP measures**	**NDC target**
Support the low carbon development of the agriculture sector	3.31 $MtCO_2e$	4.62 $MtCO_2e$	4.62 $MtCO_2e$	No quantitative target

FIGURE 21: Agriculture sector GHG emissions reduction to 2030 with CAP measures



4.5.2 OTHER PRIORITY DIRECTIONS FOR THE FUTURE

Georgia seeks international support in the priority directions, in parallel to the measures already included in the Climate Action Plan. These directions include:

Improved data collection system: Further improvement of data collection in the agriculture sector of Georgia will allow for more accurate and reliable calculations of current and future emissions of the sector (e.g., related to livestock growth or future fertilizer use). This would make the calculations less dependent on assumptions and outside sources.

Regulating the burning practices and replanting the windbreaks: Field burning is a common practice in Georgia, particularly in the Kakheti region. The farmers use to burn fields after harvesting, as this is the cheapest way to get rid of plant residues, rodents, and pests before the next tillage. This adversely affects windbreaks which have been reduced significantly due to the burning practices (Gönner, Weigel, Kodiashvili, Kolbin, & Muzafarova, 2019). Further negative effects of burning practices include desertification and wind erosion. Future action, therefore, includes replanting of windbreaks, regulation of burning practices, as well as incentives for farmers to start processing residues and straw instead.

Regulating the irrigation practices: In the Eastern regions of Georgia, irrigation water is needed mainly from April to September. Irrigation practices can have negative effects because of waterlogging and water erosion, as well as the salination (treatment) of fields with dissolving salts and carbonates. Raising groundwater levels increases the risk of water contamination with mineral fertilizers and pesticide residues. To date, there are no quality requirements for irrigation water in Georgia. Further, a significant amount of irrigation water is lost during transportation via old or malfunctioning ditches and channels. Future action, therefore, focuses on the improvement of transportation channels, as well as regulating the use of irrigation water.

Regulating the overgrazing and the unsustainable use of soils: Overgrazing/trampling is induced by intensive use of pastures over the years that negatively affects plants, soil and biodiversity. In Georgia, overgrazing by livestock causes deterioration of winter pastures in particular. Limited regulation, a lack of opportunities, as well as low awareness of livestock owners are the main causes of this problem. Future actions, therefore, focus on the regulation of overgrazing/trampling.

Agroforestry direction: Agroforestry is a land-use management system in which trees or bushes are grown around crops or pastures. This combination of two systems can have a great benefit for increasing biodiversity or reducing erosion. Research is needed to identify how these practices could be applied in Georgia. This low-emission agriculture approach, as well as climate-smart agriculture practices, are highlighted in Georgia's Country Programme with the GCF as a national mitigation priority.

4.6 SECTORAL PRIORITY: Waste Management

This section of the Climate Strategy and Action Plan covers GHG emissions from solid waste disposal and wastewater treatment, including wastewater from domestic and industrial sources.

4.6.1 GOALS AND OBJECTIVES

To implement the vision from the NDC, the **identified goal is to support the low carbon development of the waste sector through the improvement of solid municipal waste management and wastewater treatment systems.**

This goal will be achieved through the following **objectives:**

OBJECTIVE 6.1. Reduce GHG emissions from existing unauthorized dumpsites and non-hazardous landfills

The objective involves replacing a number of unauthorized dumpsites in Tbilisi and in the regions with non-hazardous waste landfills and equipping existing landfills with modern technologies, which will reduce emissions from landfills from approximately 1,091 $GgCO_2e$ in 2020 to 840 $GgCO_2e$ in 2030. The existing landfills and dumpsites will be gradually closed by 2024. Furthermore, regional non-hazardous waste landfills will be constructed, and gas collection and recycling systems will be installed at landfills in Tbilisi, Kutaisi, and Batumi.

OBJECTIVE 6.2. Support waste recycling

Supporting of waste recycling will significantly reduce emissions. Paper recycling, recycling and composting of biodegradable waste (green waste) is of particular importance. The Climate Strategy includes the introduction of the paper waste separation practices and encouraging paper recycling by the municipalities in order to increase the capacities of paper recycling and composting; recycling of biodegradable (organic and orchards) waste, and raising knowledge and awareness on waste management, implemented by the municipalities. Encouraging and supporting recycling of waste, such as paper and biodegradable (organic and of orchards) waste, as well as raising public awareness, will reduce the amount of greenhouse gas emissions. As a result of waste recycling, emissions will be reduced with approximately 150 $GgCO_2e$ by 2030.

OBJECTIVE 6.3. Reduce greenhouse gas emissions from wastewater

The objective of reducing greenhouse gas emissions from wastewater involves construction of urban wastewater treatment plants. This objective also includes arranging gas collection and treatment systems at several plants, including Tbilisi, Batumi, and Kobuleti wastewater treatment plants.

OBJECTIVE 6.4. Develop a data-based waste management system

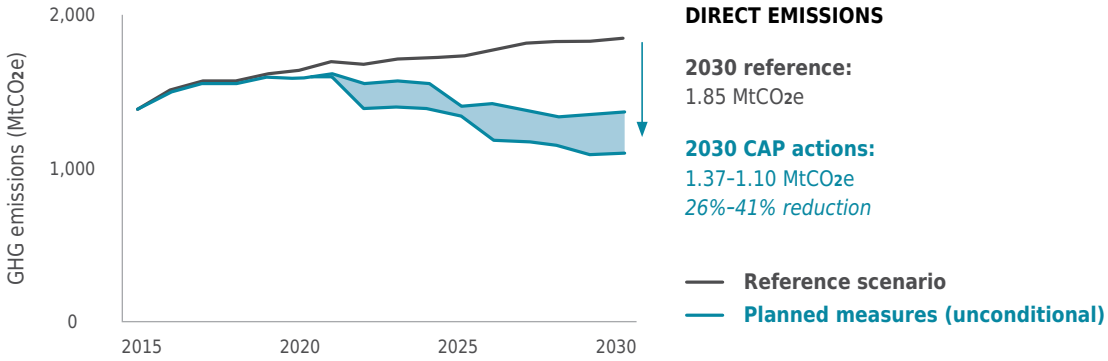
In order to monitor waste policy and make more reliable calculations, it is important to improve the systematic methodology of the existing waste management database and the National Statistics Office of Georgia to start producing the waste statistics.

Table 6 and Figure 22 show the greenhouse gas emissions reduction targets and trajectories in the waste management sector by 2030.

TABLE 6: Emission reduction targets and trajectories in the waste management sector, reference and target reduction scenarios

2030 strategic goal for emission reduction	2015	2030		
♻ Waste management sector		Reference scenario	with CAP measures	NDC target
Support the low carbon development of the waste management sector	1.38 $MtCO_2e$	1.85 $MtCO_2e$	1.37–1.10 $MtCO_2e$	No quantitative target

FIGURE 22: Waste management sector GHG emissions reduction to 2030 with CAP measures



4.6.2 OTHER PRIORITY DIRECTIONS FOR THE FUTURE

Georgia seeks international support for these priority directions in parallel to the measures already included in the Climate Action Plan. The following directions are being discussed with relevant stakeholders in the waste sector as potential areas to be integrated into the future Climate Action Plan:

Improved data collection system: Improvement of data collection capacities in the waste sector of Georgia could allow for more accurate and reliable calculations of current and future emissions of the sector, including through the addition of emissions from medical waste management, waste incineration, and composting. Activity indicators could include:

- Operationalizing waste collection services at the municipal level;
- Amount of municipal waste being generated at the source;
- Identifying the shares of waste disposed at existing landfills, waste discarded in dumpsites, and incinerated waste;
- Locations and sizes of all landfills (official and unofficial) and dumpsites;
- Share of waste that goes into composting.

Biodegradable waste management: By implementation of the action (awareness-raising) from the Climate Action Plan, more companies and stakeholders should have an official permit on composting (by July 2020, only two companies in Georgia held one). In terms of climate change mitigation, it may be helpful to implement a pilot project for composting biodegradable waste from wine production and agriculture.

Establishing Maximum Permissible Limits (MPL): The Law of Georgia on Environmental Protection establishes the rules for determining the permitted threshold values of harmful substances in the environment. A useful next step in this field would be to determine Maximum Permissible Limits (e.g., atmospheric air; surface water) for each specific source of pollution, in line with the guidelines of environmental protection legislation.

Moving towards reducing and recycling: Georgia's long-term vision for the waste sector strongly focuses on waste reduction and recycling. National legislation introduces a five-step hierarchy system: a) waste prevention; b) preparation for re-use; c) recycling; d) other recovery; and e) disposal. It would be beneficial in the context of climate change mitigation in the future to consolidate strategies to raise awareness on these five steps among citizens and companies, with clear dates for entering into force.

4.7 SECTORAL PRIORITY: Forestry

This section of the Climate Strategy and Action Plan covers GHG emissions and removals from Georgia's forestry sector.

4.7.1 GOALS AND OBJECTIVES

To implement the vision from the NDC, the **identified goal is to increase carbon capture capacity of forests by 10% compared to 2015.**

This goal will be achieved through the following **objectives:**

OBJECTIVE 7.1. Restore degraded forests

This objective includes both, restoration of the areas damaged by fire and supporting the natural regeneration of forest. The government will ensure restoration of 625 ha of degraded forest through reforestation, as well as restoration of areas damaged by fire – through reforestation, and restoration of 2,411 ha of degraded forest by supporting their natural regeneration. Sustainable forest management practices will be introduced by covering 402,109 ha of forest area with Sustainable Forest Management Plans, which will be developed and approved by 11 municipalities. This includes activities such as arranging the necessary infrastructure, maintenance, logging, reforestation, sanitary cuts, etc.

OBJECTIVE 7.2. Support sustainable forest management

The objective involves the introduction of sustainable forest management practices by implementation of sustainable forest management plans and supervision and capacity development, supporting sustainable forest management by promoting multifunctional forestry, public awareness-raising and supporting community involvement in the forest reform processes, development of Emerald Network management plans for the forest areas falling within the designated Emerald sites in Georgia. As a result of this objective, 450,000 ha will be managed according to sustainable management principles by 2030, compared to 0 in 2020.

OBJECTIVE 7.3. Develop a forest management system adequate to climate change challenges

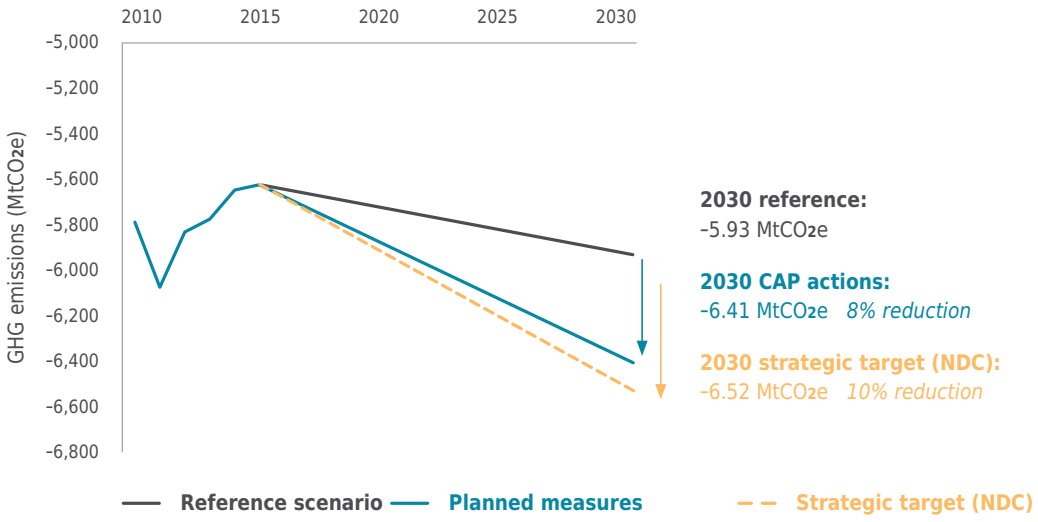
The objective involves discussing, developing, and gradually integrating climate change issues, including mitigation, into protected area management plans. As a result of this objective, climate change mitigation measures will be integrated in 100% of the Sustainable Forest Management Plans of protected areas by 2030, compared to 0 in 2020. Furthermore, more than 50% of sustainable forest management plans will be gender-sensitive by 2030.

The reference level of greenhouse gas emission removals in the forestry sector by 2030, as well as reference and target figures and trajectories, are shown in Table 7 and Figure 23.

TABLE 7: Emission reduction targets and trajectories in the forestry sector

2030 strategic goal for emission reduction	**2015**	**2030**		
Forestry sector		Reference scenario	**with CAP measures**	**NDC target**
By 10% in 2030 compared to 2015 level	-5.62 $MtCO_2e$	-5.93 $MtCO_2e$	-6.40 $MtCO_2e$	-6.18 $MtCO_2e$

FIGURE 23: Forestry sector GHG emissions reduction to 2030 with CAP measure



4.7.2 OTHER PRIORITY DIRECTIONS FOR THE FUTURE

Georgia seeks international support for the priority directions in parallel to the measures already included in the Climate Action Plan. These priority directions are:

Improved data collection system: The absence of comprehensive data on the condition of the forest sector in Georgian puts an obstacle for developing long-term forest management plans. This complicates the planning and implementation of measures, including their identification and prioritisation, and consequently the effective and sustainable long-term use of forests.

Reduce illegal logging: Due to limited access to alternative energy options, firewood is the main source of energy for the population. This increases the risk of unsustainable and illegal logging of forests. Since the cuttings are carried out by unqualified and inexperienced people without relevant equipment, the forest ecosystems experience substantial damage. Reducing the practice of illegal logging is identified as one of the priorities in Georgia's Country Programme with the GCF. This process may also have a positive effect in terms of safety and tax revenues.

Access to alternative energy resources and technologies: Energy-efficient technologies and energy-efficient fuel (briquettes and pellets) have a quite high potential in terms of saving firewood in Georgia. This could be achieved through financial support mechanisms, informing the users about the advantages of energy-efficient alternatives, and other policy incentives.

Energy-efficient building envelopes: There remains a significant dependence on firewood as an energy source. Approximately 78% of harvested firewood is used for heating residential houses (CENN, 2016). Addressing the energy efficiency of residential building envelopes could lead to reduced firewood use.

Forest fires: Future actions could also involve the measures for reducing forest fires and responding to forest fires. Current trends indicate that forest fires are becoming more frequent and intense due to climate change impacts.

5 LOGICAL FRAMEWORK

logical framework of the Climate Strategy and Action Plan outlines the vision, goals, objectives, and impact and objective outcome indicators.

VISION		Reduce GHG emissions to 35% below 1990 levels in 2030 (as per updated NDC 2021)				
GOAL 1		Reduce greenhouse gas emissions in the energy generation and transmission sector to 15% below the reference scenario projections by 2030				
Link to SDGs		SDGs 1 2 3 7 9 11				
IMPACT INDICATOR 1.1		GHG emissions from the energy generation and transmission sector ($ktCO_2e$)				
	Historical	Baseline	Medium-term target		Reference scenario projection	Final target
Year	1990	2015	2024	2028	2030	2030
Value	19,855	3,654	4,425	5,212	6,691	5,687 (-15%)
Sources of verification		2030 National GHG inventory				
IMPACT INDICATOR 1.2		Proportion of the population that predominantly uses clean energy sources and technologies				
	Historical	Baseline	Medium-term target		Reference scenario projection	Final target
Year	2018	2022	2026	2028	2030	
Value	92,1%	93%	96%	97%	98%	
Sources of verification		Multiple Indicator Cluster Survey of Georgia (MICS)				

OBJECTIVE 1.1	Support renewable energy (wind, solar, hydro, biomass) production					
OBJECTIVE OUTCOME INDICATOR 1.1.1	Share of renewable energies in Georgia's electricity generation					
	Baseline	Medium-term target				Final target
Year	2018	2022	2024	2026	2028	2030
Value	78%	72%	76%	82%	85%	87%
Sources of verification	Ten-year network development plan of Georgia					
Risk	Delay/cancellation of works by construction companies/investors due to community protests; Delay in research required for projects (including mobilization of a group of foreign experts) due to pandemic					
OBJECTIVE 1.2	Improve average efficiency of thermal power plants					
OBJECTIVE OUTCOME INDICATOR 1.2.1	Efficiency of electricity generation in thermal power stations					
	Baseline	Medium-term target				Final target
Year	2018	2022	2024	2026	2028	2030
Value	44%	45%	48%	48%	49%	More than 50%
Sources of verification	National Statistics Office of Georgia (Energy Balance of Georgia)					
Risk	Lack of financial resources					
OBJECTIVE 1.3	Strengthen the capacities of renewable energy integration in the transmission network of Georgia					
OBJECTIVE OUTCOME INDICATOR 1.3.1	Share of renewable energy (wind and solar power plants) in the installed capacity of the Georgia's energy system					

	Baseline	Medium-term target				Final target
Year	2019	2022	2024	2026	2028	2030
Value	0.5%	0.6%	7.1%	12.2%	10.6%	18.2%
Sources of verification		Ten-year network development plan of Georgia				
Risk	Delay/cancellation of works by construction companies/investors due to community protests; Delay in research required for projects (including mobilization of a group of foreign experts) due to pandemic					
OBJECTIVE 1.4		Develop new policies and legislation in the energy sector				
OBJECTIVE OUTCOME INDICATOR 1.4.1		Number of new policy documents, laws and secondary legal acts developed, discussed and agreed with stakeholders in the energy sector				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	7	9	12	20	26	More than 30
Sources of verification		Annual Report of the Ministry of Economy and Sustainable Development of Georgia				
Risk	Lack of human resources, non-adoption of documents due to political or other external factors					
GOAL 2		Reduce greenhouse gas emissions in the transport sector to 15% below the reference scenario projections sector by 2030				
Link to SDGs		SDGs 3 8 11				
IMPACT INDICATOR 2.1		GHG emissions from the transport sector ($GgCO_2e$)				

	Historical	Baseline	Medium-term target		Reference scenario projection	Final target
Year	1990	2015	2024	2028	2030	2030
Value	3,823	4,139	4,563	5,257	7,110	< 6,044 (-15%)
Sources of verification		2030 National GHG Inventory				
OBJECTIVE 2.1		Increase the share of low- and zero-emission and roadworthy private vehicles in the vehicle fleet				
OBJECTIVE OUTCOME INDICATOR 2.1.1		Share of electric vehicles in the registered vehicles fleet in Georgia				
	Baseline	Medium-term target				Final target
Year	2019	2022	2024	2026	2028	2030
Value	0.14%	0.5%	1%	2%	3%	5%
Sources of verification		Registered vehicle fleet database of the Ministry of Internal Affairs				
OBJECTIVE OUTCOME INDICATOR 2.1.2		Share of hybrid vehicles in the registered vehicles fleet in Georgia				
	Baseline	Medium-term target				Final target
Year	2019	2022	2024	2026	2028	2030
Value	4.91%	5.5%	6.7%	9.8%	15%	20%
Sources of verification		Registered vehicle fleet database of the Ministry of Internal Affairs				
OBJECTIVE OUTCOME INDICATOR 2.1.3		Percentage of vehicles failing first technical inspection				

	Baseline	Medium-term target				Final target
Year	2019	2022	2024	2026	2028	2030
Value	55%	54%	50%	45%	40%	30%
Sources of verification		Database of Periodic Technical Inspection (PTI) Centres				
Risk	Non-implementation of incentive measures for electric vehicles due to reduced public funds inflicted by the pandemic; Failure to develop a market for affordable and high-coverage used electric vehicles; Declined affordability of vehicle maintenance/purchase of new vehicles due to reduction of incomes among population					
OBJECTIVE 2.2	Encourage the reduced demand on fossil fuel and the use of biofuels					
OBJECTIVE OUTCOME INDICATOR 2.2.1	Share of renewable energy consumed by all types of transport in the final energy consumption on the territory of Georgia					
	Baseline	Medium-term target				Final target
Year	2018	2022	2024	2026	2028	2030
Value	2%	3%	4%	6%	8%	10%
Sources of verification		National Statistics Office of Georgia (Energy Balance of Georgia); Annual Progress Report and Climate Action Plan Evaluation Report				
Risk	Low interest of the private sector; Non-implementation of incentive measures for electric vehicles due to reduced public funds inflicted by the Coronavirus pandemic; Failure to develop a market for affordable and high-coverage used electric vehicles;					
OBJECTIVE 2.3	Promote non-motorized means of mobility and public transport					
OBJECTIVE OUTCOME INDICATOR 2.3.1	Percentage of transportation with non-motorized transport (bicycle and pedestrian) in Tbilisi					

	Baseline	Medium-term target				Final target
Year	2016	2022	2024	2026	2028	2030
Value	27.15%	30%	32%	33%	34%	35%
Sources of verification		Tbilisi Sustainable Transport Survey				
OBJECTIVE OUTCOME INDICATOR 2.3.2		Percentage of transportation with public transport (metro, bus, minibus) in Tbilisi				
	Baseline	Medium-term target				Final target
Year	2016	2022	2024	2026	2028	2030
Value	39%	40%	41%	42%	43%	45%
Sources of verification		Tbilisi Sustainable Transport Survey				
Risk	Reduced public investment in public transport and planned infrastructural works due to reduced public funds inflicted by the pandemic					
OBJECTIVE 2.4		Implement innovative evidence-based initiatives in the transport sector				
OBJECTIVE OUTCOME INDICATOR 2.4.1		Number of additional evidence-based initiatives for reducing GHG emissions in the transport sector				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0	1	2	3	4	5
Sources of verification		Climate Strategy and Action Plan Progress Report				
Risk	Non-implementation of cost-benefit analysis of proposals on reducing emissions from the transport sector due to lack of human and research resources					

GOAL 3		Support development of low-carbon approaches in the buildings sector by promoting climate-smart and energy-efficient technologies and services				
Link to SDGs		SDGs 7 9 11				
IMPACT INDICATOR 3.1		Amount of GHG emissions from the buildings sector ($ktCO_2e$)				
	Historical	Baseline	Medium-term target		Reference scenario projection	Final target
Year	1990	2015	2024	2028	2030	2030
Value	N/A	1,954	3,635	4,277	4,625	Less than 4,625
Sources of verification		2030 National GHG Inventory				
OBJECTIVE 3.1		Develop a system for energy efficiency certification of buildings				
OBJECTIVE OUTCOME INDICATOR 3.1.1		Percentage of newly constructed buildings subject by law to certification that are certified for energy efficiency				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0%	0%	100%	100%	100%	100%
Sources of verification		Annual Progress Report and Climate Action Plan Evaluation Report				
Risk	Shifting of time periods defined by law for entry into force of secondary legal acts on certification					

OBJECTIVE 3.2		Raising consumer awareness about energy efficiency				
OBJECTIVE OUTCOME INDICATOR 3.2.1		Percentage of consumers who identify the energy efficiency of buildings and household appliances as an important factor in consumer decision making				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	N/A	40%	55%	60%	70%	80%
		of the target contingent				
Sources of verification		Household Consumption Survey of the National Statistics Office				
Risk	Non-implementation / postponing of information campaigns due to lack of financial resources and pandemic restrictions					
OBJECTIVE 3.3		Promote energy-efficient approaches and installation of energy-efficient lighting in residential, commercial and public buildings				
OBJECTIVE OUTCOME INDICATOR 3.3.1		Number of buildings of more than 500 m², occupied and owned by central and municipal governments, which have 1% of their total area annually upgraded according to energy efficiency standards				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0%	10%	30%	50%	70%	More than 90%
Sources of verification		Annual Report of the Ministry of Economy and Sustainable Development				
OBJECTIVE OUTCOME INDICATOR 3.3.2		Percentage of public buildings that use energy-efficient light bulbs				

	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	N/A	20%	30%	40%	60%	More than 70%
Sources of verification		Annual Report of the Ministry of Economy and Sustainable Development				
Risk	Non-implementation of projects depending on donor funding					
OBJECTIVE 3.4		Support use of solar energy for water heating and use of energy-efficient stoves				
OBJECTIVE OUTCOME INDICATOR 3.4.1		Percentage of solar water heating systems in the systems purchased by individuals / legal entities for water heating in individual residential and commercial buildings after implementation of the incentive measures				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	N/A	10%	20%	30%	50%	60%
Sources of verification		Residential Sector Survey of the National Statistics Office National Energy Balance				
Risk	Postponement of the incentive measures					
OBJECTIVE 3.5		Train high professional standard personnel in energy efficiency				
OBJECTIVE OUTCOME INDICATOR 3.5.1		Total percentage of certified and degree-holding specialists in energy efficiency of heating, cooling and ventilation systems of buildings and electrical appliances				

	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0%	0%	30%	60%	80%	100%
	of the target contingent					
Sources of verification	Database of independent experts on the website of the Ministry of Economy and Sustainable Development					
Risk	Postponed enactment of the secondary legal acts					
GOAL 4	Support development of the low-carbon approaches in the industry sector by promoting climate-smart and energy-efficient technologies and services, to reduce greenhouse gas emissions to 5% below the reference scenario projections by 2030					
Link to SDGs	SDGs 8 9 11 12					
IMPACT INDICATOR 4.1	GHG emissions from the industry sector ($ktCO_2e$)					
	Historical	Baseline	Medium-term target		Reference scenario projection	Final target
Year	1990	2015	2024	2028	2030	2030
Value	11,445	3,123	4,474	5,289	5,986	< 5,690 (–5%)
Sources of verification	2030 National GHG Inventory					
OBJECTIVE 4.1	Reduce the level of greenhouse gas emissions from industrial processes and from energy consumption of industrial facilities, by introducing modern technologies					
OBJECTIVE OUTCOME INDICATOR 4.1.1	Amount of emissions from cement production ($ktCO_2e$)					

	Baseline		Medium-term target		Final target	
Year	2020		2022		2023	
Value	968		1083		1139	
Sources of verification	Annual Progress Report and Climate Action Plan Evaluation Report					
OBJECTIVE OUTCOME INDICATOR 4.1.2	The amount of emissions from chemical industry ($ktCO_2e$)					
	Baseline		Medium-term target		Final target	
Year	2020		2022		2023	
Value	2547		2919		3105	
Sources of verification	Annual Progress Report and Climate Action Plan Evaluation Report					
Risk	Low interest from the private sector; Delay in conducting necessary research within the project (including mobilization of a group of foreign experts) and introduction of technologies due to the Corona virus pandemic					
OBJECTIVE 4.2	Develop a system for studying the emission factors in the industry sector and for data management					
OBJECTIVE OUTCOME INDICATOR 4.2.1	The number of industries in which specific emission factors are studied					
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0	1	2	3	4	5
Sources of verification	Annual Progress Report and Climate Action Plan Evaluation Report					
Risk	Lack of sectorial expertise; Low interest from the private sector; Provision of confidential information for setting up a data management system and determining the individual emission factors					

GOAL 5		Support the low carbon development of the agriculture sector by encouraging the climate-smart and energy-efficient technologies and services				
	Link to SDGs		SDGs			
IMPACT INDICATOR 5.1		The amount of greenhouse gas emissions from the agriculture sector ($GgCO_2e$)				
	Historical	Baseline	Medium-term target		Reference scenario projection	Final target
Year	1990	2015	2024	2028	2030	2030
Value	4,102	3,326	3,635	4,203	4,533	Less than 4,533
Sources of verification		National Greenhouse Gas Inventory				
OBJECTIVE 5.1		Implement sustainable management of soil and pastures and support the introduction of sustainable domestic animal feeding practices				
OBJECTIVE OUTCOME INDICATOR 5.1.1		Percentage of farmers who have improved information on sustainable domestic animal feeding practices and sustainable soil management out of the farmers informed by the extension centres and the National Food Agency				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0%	50%	50%	50%	50%	50%
	of the target farmer contingent					
Sources of verification		Annual Progress Report and Climate Action Plan Evaluation Report				
Risk	Low interest from farmers					

OBJECTIVE 5.2	Build capacities of generating scientific evidence for development of climate-smart approaches in the agriculture sector					
OBJECTIVE OUTCOME INDICATOR 5.2.1	Share of climate-smart technologies and/or initiatives based on cost-benefit analysis and other evidence in governmental and donor agricultural programs					
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	Unknown	10%	30%	40%	50%	60%
Sources of verification	Annual Progress Report and Climate Action Plan Evaluation Report					
Risk	Delays in obtaining funding and resources; Quality of documents prepared by implementing entities and donors					
GOAL 6	Support the low carbon development of the waste sector by promoting climate-smart and energy-efficient technologies and services					
Link to SDGs	SDGs 8 11 12					
IMPACT INDICATOR 6.1	The amount of GHG emissions from the waste sector ($GgCO_2e$)					
	Historical	Baseline	Medium-term target		Reference scenario projection	Final target
Year	1990	2015	2024	2028	2030	2030
Value	1,105	1,389	1,556	1,339	1,850	Less than 1,850
Sources of verification	2030 National GHG Inventory					

OBJECTIVE 6.1		Reduce greenhouse gas emissions from the existing unauthorized, non-hazardous waste dumpsites				
OBJECTIVE OUTCOME INDICATOR 6.1.1		The amount of GHG emissions from landfills/dumpsites ($GgCO_2e$)				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	1,091	1,063	1,056	908	822	840
Sources of verification		Annual Progress Report and Climate Action Plan Evaluation Report				
Risk	Delays in arranging new landfills due to site selection process					

OBJECTIVE 6.2		Support waste recycling				
OBJECTIVE OUTCOME INDICATOR 6.2.1		The amount of emissions reduced through waste recycling ($GgCO_2e$)				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0	10	40	100	130	More than 150
Sources of verification		Annual Progress Report and Climate Action Plan Evaluation Report				
Risk	Low interest from the waste processing companies					

OBJECTIVE 6.3		Reduce greenhouse gas emissions from wastewater				
OBJECTIVE OUTCOME INDICATOR 6.3.1		The amount of reduced emissions from wastewater ($GgCO_2e$)				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0	More than 150	More than 200	More than 300	More than 400	More than 500
Sources of verification		Report of the United Water Supply Company of Georgia				
Risk	Failure to find the financial resources needed to implement the action					
OBJECTIVE 6.4		Develop a data-based waste management system				
OBJECTIVE OUTCOME INDICATOR 6.4.1		Percentage of data-based waste management reports				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0%	50%	70%	80%	90%	100%
Sources of verification		Reports of the National Statistics Office of Georgia				
Risk	Defective waste management system					

GOAL 7 	Increase the carbon capturing capacity of the forestry sector by 10% for 2030 compared to 2015					
 Link to SDGs		SDGs 6 11 15				
გავლენის მაჩვენებელი 7.1	Carbon capture potential of forests ($GgCO_2e$)					
	Historical	Baseline	Medium-term target		Reference scenario projection	Final target
Year	1990	2015	2024	2028	2030	2030
Value	-6,353	-5,621	-5,950	6,000	-5,931	More than -6,183 (+10%)
Sources of verification	2030 National GHG Inventory					
OBJECTIVE 7.1	Restore degraded forests					
OBJECTIVE OUTCOME INDICATOR 7.1.1	Area of forests where restoration works have been carried out, in ha					
	Baseline	Medium-term target				Final target
Year	2019	2022	2024	2026	2028	2030
Value	190 ha	890 ha	2090 ha	2690 ha	3290 ha	More than 4000 ha
Sources of verification	Annual report of the Ministry of Environmental Protection and Agriculture					
Risk	Reduced state budget and/or other revenues; Delay in the adoption of the Forest Code's secondary legal act – Rule of Forest Maintenance and Restoration					

OBJECTIVE 7.2		Support sustainable forest management				
OBJECTIVE OUTCOME INDICATOR 7.2.1		Area of forests managed with sustainable management principles, in ha				
	Baseline	Medium-term target				Final target
Year	2019	2022	2024	2026	2028	2030
Value	0	150,807 ha	300,000 ha	350,000 ha	402,000 ha	450,000 ha
Sources of verification		Annual report of the Ministry of Environmental Protection and Agriculture				
Risk	Reduced state budget and/or other revenues; Non-allocation of funds for newly created protected areas; Postponement of launching of the GCF project – Enabling Implementation of Forest Sector Reform in Georgia to Reduce GHG Emissions from Forest Degradation; Extension of procedures for approval of the secondary legal acts of the Forest Code.					
OBJECTIVE 7.3		Develop a forest management system adequate to climate change challenges				
OBJECTIVE OUTCOME INDICATOR 7.3.1		The number of forest related projects developed through inter-agency coordination and cross-sectoral projects				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	10	20	25	28	30	More than 30
Sources of verification		Annual report of the Ministry of Environmental Protection and Agriculture; National Forest Program Plenary Report				

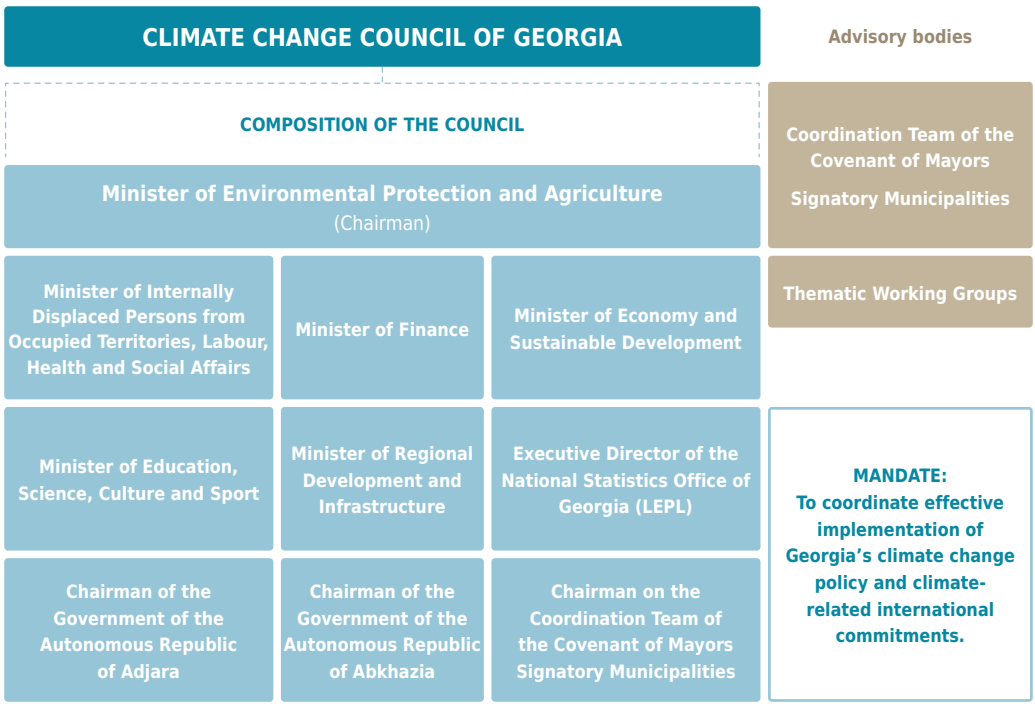
OBJECTIVE OUTCOME INDICATOR 7.3.2		The percentage of protected area management plans that integrate climate change mitigation measures				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0	More than 65%	More than 80%	More than 85%	More than 90%	100%
Sources of verification		Protected Areas Management Plans				
OBJECTIVE OUTCOME INDICATOR 7.3.3		The number of gender-sensitive sustainable forest management plans				
	Baseline	Medium-term target				Final target
Year	2020	2022	2024	2026	2028	2030
Value	0	15%	30%	40%	50%	More than 50%
Sources of verification		Implementation report of the project – Enabling Implementation of Forest Sector Reform in Georgia to Reduce GHG Emissions from Forest Degradation				
Risk	Reduced state budget and/or other revenues					

6 IMPLEMENTATION AND COORDINATION OF THE CLIMATE STRATEGY AND ACTION PLAN

6.1 Organizational Structure

Inter-Agency Climate Change Council (CCC) – a consultative body established in January 2020 by the Government of Georgia – will oversee and coordinate the implementation of the Climate Strategy and Action Plan. The CCC is in charge of coordinating the effective implementation of the national climate policy, Paris Agreement and other international commitments. It has nine members and two advisory bodies: the Coordination Team of the Covenant of Mayors (CoM) signatory municipalities and Thematic Working Groups (See Figure 24). The Minister of Environmental Protection and Agriculture of Georgia is the chairperson of the council. The CCC meetings are held at least once in 6 months or as needed (see Figure 3).

FIGURE 24: Composition of the Climate Change Council of Georgia (approved with Decree #54 of Government of Georgia, from January 15, 2020, On Establishing the Climate Change Council of Georgia)



The CCC is responsible for overseeing all the national strategies and plans, as well as the development, implementation and evaluation of the Climate Strategy and Action Plan and the NDC. In addition, the CCC reviews climate-related projects to be submitted to relevant funds and financial institutions and recommends MEPA whether to support these projects.

Considering the cross-sectoral nature of climate change mitigation and GHG emissions reduction, several ministries and agencies have a role in the identification and implementation of sectoral mitigation measures. MEPA's competence lies with the issues related to environmental protection, agriculture and rural development, waste and chemicals, forest, atmospheric air, water and land resources management and protection. The Climate Change Division (CCD) of the Environment and Climate Change Department of MEPA, which also acts as the Secretariat of the CCC, is the structural unit responsible for the preparation and periodical update of the NDC, preparation and coordination of the implementation of national climate change policy and action plans, and participation in the fulfilment of climate change-related international commitments.

The exclusive competencies of the CCC member autonomous republics of Adjara and Abkhazia include the management of land, forest, and water resources. The autonomous republics may exercise authority in various areas, including economy, agriculture, and environmental protection.

Out of 69 municipalities in the territory of Georgia, including five self-governing cities and 64 self-governing communities, 24 municipalities are signatories of the Covenant of Mayors, which commits them to the development of municipal action plans for sustainable energy development and climate change impact mitigation. In the context of the latter, municipalities are responsible for municipal waste management and municipal transport services, amongst other responsibilities and competencies imposed by law. The 24 CoM signatory municipalities are represented in the CCC by the coordination team of the Covenant of Mayors.

There are realistic, positive and pessimistic implementation scenarios considered for the strategy implementation period. More specifically, the realistic scenario implies implementation of non-deficit activities without delay. The positive scenario implies the implementation of a deficit activity together with all non-deficient activities. To this end, the Ministry of Environmental Protection and Agriculture, together with partner agencies, is already working with potential donors to attract international funding and support for implementation of the specific deficit activities. As for the pessimistic scenario, it implies that the identified risks will delay and/or obstruct the process of implementation of non-deficit activities.

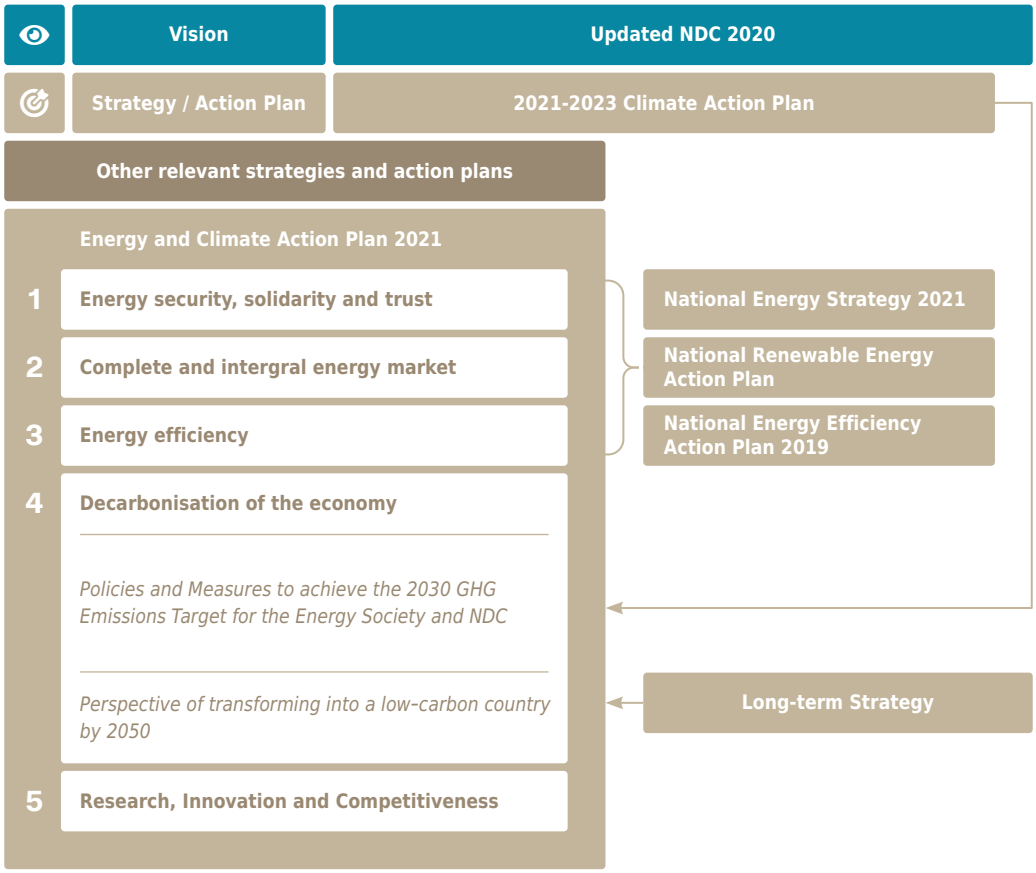
The Climate Change Council – the Council itself and its advisory bodies: the Coordination Team of the CoM signatory municipalities and the Working Groups will serve as one of the tools for stakeholder engagement in the implementation process. (See Figure 24). The Coordination Team is a mechanism for coordination between the government and self-governing bodies in the field of climate change, consisting of the mayors of CoM signatory municipalities, the deputy mayor of Tbilisi Municipality and the state representatives; while working group is a mechanism set up to address specific issues of climate change policy in the economic and social sectors, consisting of public officials, experts, NGOs and academics.

The Ministry of Environmental Protection and Agriculture and the LEPL Environmental Information and Education Center will be communicating with the general public through digital communication, remote and physical meetings.

6.2 Cycles of climate change response planning

The Climate Strategy and Action Plan is part of a consolidated and recurring climate change response planning process. This process begins with the updated NDC – a document at the top of the hierarchy, dictating the long-term vision. Its integral parts are other climate and energy action plans and strategies, which will be submitted to international organizations after their approval by the government (See Figure 25):

FIGURE 25: Links between climate and energy action plans and strategies



THESE DOCUMENTS ARE:

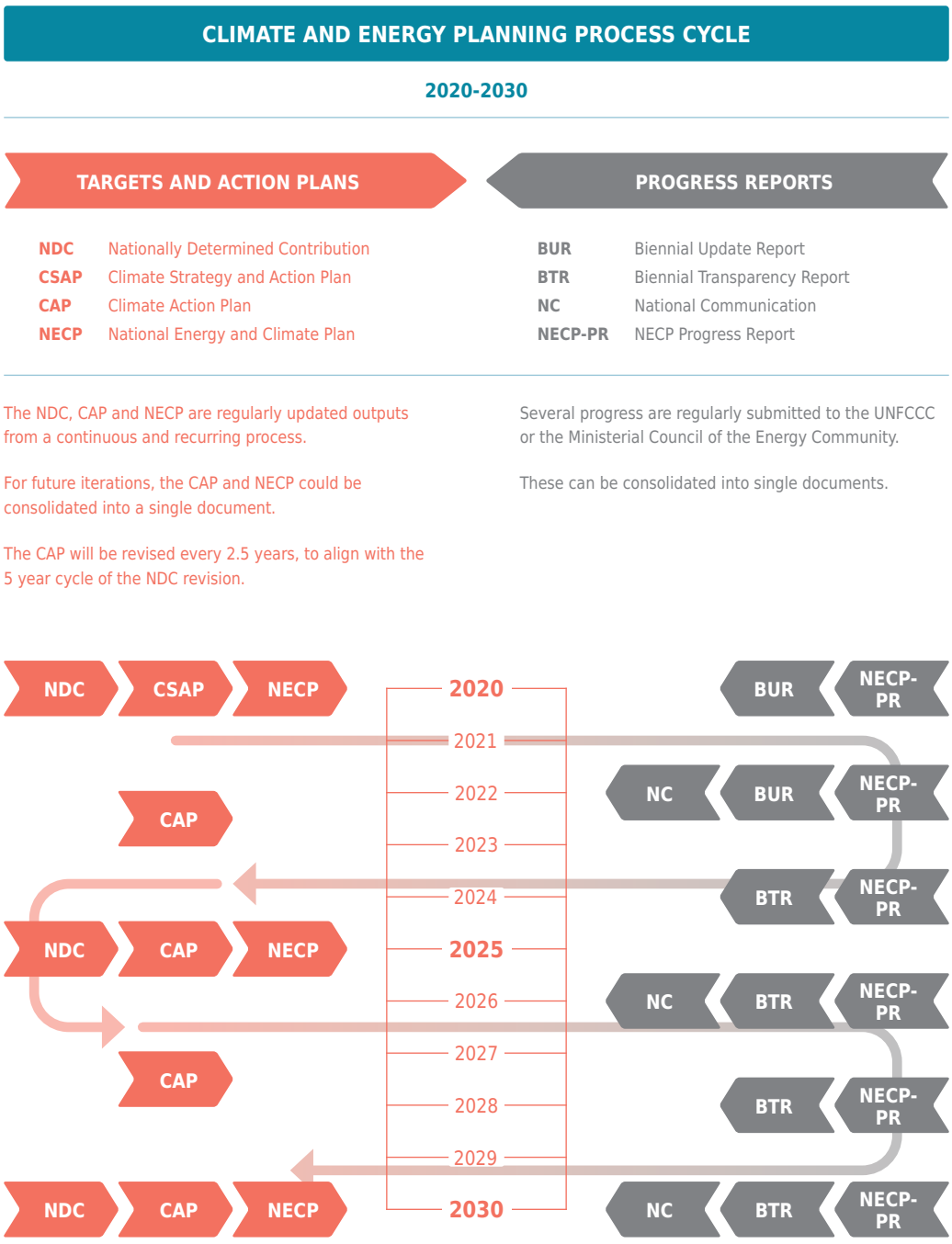
- **The Nationally Determined Contribution (NDC).** The document is revised every 5 years, in line with the Paris Agreement.

- **The Climate Strategy and Action Plan (CSAP).** The Action Plan will be revised around 2023. Precise timeline of future iterations to be determined later in order to be aligned with the updated NDC.

- **The Integrated National Energy and Climate Plan (NECP).** This plan is prepared in accordance with the recommendation from the Ministerial Council of the Energy Community. It will be aligned with the NDC and the CSAP, and could potentially be consolidated into a single document with the CSAP in the future.

Figure 25 and Figure 26 visualise the process of alignment and revision of these documents in the 2020–2030 period, as requested by the international climate community. As part of the recurring planning cycle, regular evaluation of these policy documents and reporting of progress plays an important role in updating targets and action plans.

FIGURE 26: Visualisation of the climate and energy actions planning process cycle



7 BUDGET AND FUNDING

This section provides information on the general framework for financing climate action in Georgia, existing and planned domestic budgets, funds, and mechanisms, as well as access to international funding in climate change.

As mentioned above, climate change mitigation measures in Georgia are implemented through and with the help of various institutions across different sectors. Implementation of these measures is primarily funded by the existing state budget, reviewed and drafted annually by the Ministry of Finance of Georgia. Notably, the State Budget was increased in 2020 for the Ministry of Regional Development and Infrastructure (MRDI), Ministry of Environmental Protection and Agriculture (MEPA), Ministry of Economy and Sustainable Development (MESD), Ministry of Internal Affairs (MIA), and Ministry of Finance (MoF) which together account for a quarter of the national budget. These ministries house the majority of agencies involved in the Climate Strategy and Action Plan, however, this does not mean that their budget was increased due to climate change mitigation measures (Civil., 2019; Parliament of Georgia, 2019).

The JSC Georgian Energy Development Fund, founded by MESD in 2010, supports exploring and development of promising renewable energy projects and, within this framework, makes relevant procurements for further development of pilot projects on renewable energy. The LEPL Municipal Development Fund of Georgia, coordinated by MRDI, makes procurements for projects related to municipal infrastructure.

Georgia has a large portfolio of projects sourced from international climate finance. It should be noted that Georgia's recently developed Country Programme with the GCF focuses on renewable energy, low emission transport, energy-efficient buildings, appliances, industries, forestry and land use as emissions reduction priorities for the country. Table 8 further lists other international climate finance sources engaged in funding climate change mitigation activities in Georgia since 2009.

For more details on the type of projects and dollar amounts funded, see Table 26 of Georgia's 2nd Biennial Update Report (MEPA, 2019), while Climate Action Plan includes details on budgets and sources of finance for mitigation activities identified for each sector in the Climate Action Plan.

TABLE 8: List of major international donors financing climate change mitigation related activities in Georgia since 2009

Donors financing climate change action in Georgia		
Asian Development Bank (ADB)	Germany's Federal Ministry of the Environment, Nature Conservation and Nuclear Safety of Germany (BMU)*	Korea Development Bank*
Austrian Development Agency (ADA)*	Global Environmental Facility (GEF)*	Kingdom of Norway*
Austrian State Funding	Government of Finland	Swiss Agency for Development and Cooperation (SDC)*
Czech Development Agency (CzechAid)	Green Climate Fund (GCF)*	Swedish International Development Agency (SIDA)*
European Union (EU)*	International Bank for Reconstruction and Development (IBRD)*	United Nations Development Programme (UNDP)*
EU Neighbourhood Investment Facility (NIF)	International Development Association*	United States Agency for International Development (USAID)*
European Bank for Reconstruction and Development (EBRD)*	International Finance Corporation (IFC)	World Bank (WB)*
European Investment Bank (EIB)	International Fund for Agricultural Development (IFAD)*	Nordic Environment Finance Corporation (NEFCO)
Federal Ministry of Economic Cooperation and Development of Germany (BMZ)*	German Reconstruction Credit Bank KfW*	French Development Agency (AFD)

Note: Asterisk (*) highlights projects still in operation

It is recognized that through the international carbon market mechanisms, for example, through the use of mechanisms established by Article 6 (Voluntary Cooperation) of the Paris Agreement, direct foreign investment could be channelled to support the implementation of climate change mitigation actions in Georgia. While the specific rules and procedures for the implementation of the mechanism established by Article 6 of the Paris Agreement are not yet finalised, and still subject to international negotiations on climate change, it is understood that as a result of this cooperation, the outcomes of GHG emission reductions, would need to be transferred to the investor through the International Transfer of Mitigation Outcomes (ITMOs) and could therefore not be counted towards the achievement of the domestic NDC target. Therefore, this is not considered as an action to achieve the NDC targets of the host country.

The total budget of the Climate Strategy and Action Plan is GEL 3,537,118,642.0, of which GEL 208,948,960.0 is the deficit. As mentioned above, the Government of Georgia is already in negotiations with potential donors to fill the deficit and find additional climate funding. Moreover, due to the specifics of climate change mitigation measures, the Climate Action Plan includes some actions that are mainly implemented by the private sector, with their own funds, including investments. Although these funds are indicated alongside the relevant measures in the Climate Action Plan, they are not included in the overall budget of the Climate Change Strategy and Action Plan. According to the Climate Action Plan, the total budget of private sector involvement amounts to GEL 4,392,477,936.0.

8 MONITORING AND EVALUATION

Implementation of the Climate Strategy and Action Plan will be monitored and evaluated in line with the official requirements for actions plans, as per the **Policy Planning, Monitoring and Evaluation Handbook of Georgia.**

Table 9 presents a calendar overview of the monitoring and evaluation responsibilities.

TABLE 9: Calendar of monitoring and evaluation actions and institutions responsible

ACTION	TIMING	RESPONSIBLE INSTITUTIONS
Progress report	Every 6 months after the approval of the Strategy and Action Plan, upon receipt of the status reports for each individual action	MEPA
Annual report	By January of each year except the last one	MEPA
First interim evaluation report	By January 2024	MEPA
Second interim evaluation report	By January 2028	MEPA
Final evaluation report (Final report)	By January 2030	MEPA

In coordination with the Secretariat of the Climate Change Council, the implementing/responsible institutions shall prepare the information on each action of the Climate Action Plan once in every six months and submit it to the MEPA (Secretariat). This information shall contain the minimum information set out for status reports in Annex 7 of the Policy Planning, Monitoring and Evaluation Handbook of the Government of Georgia.

Upon receipt of relevant reports from the implementing/responsible institutions, the Ministry of Environmental Protection and Agriculture (Secretariat) has to prepare a progress report, indicating the aggregated level of progress across all of the activities set out in the Action Plan. The progress reports have to be prepared every six months and contain the minimum information set out in Annex 7 of the Policy Planning, Monitoring and Evaluation Handbook.

In addition to the six-monthly reports, the Ministry of Environmental Protection and Agriculture has to prepare an annual monitoring report, including monitoring findings about the indicators of activity outcomes and objective outcomes. The annual monitoring report shall contain the minimum information set out in the Policy Planning, Monitoring and Evaluation Handbook.

About the fourth year from operationalization of the Climate Strategy and at the end of the Climate Action Plan implementation, at the end of 2023 and early 2024, the Ministry of Environmental Protection and Agriculture shall prepare an interim evaluation report that should provide grounds for development of the next Climate Action Plan document. The second interim report has to be prepared after four years, in 2028.

The final evaluation report, as set out Planning, Monitoring and Evaluation Handbook, will be prepared in 2030.

The monitoring and evaluation process will be conducted with stakeholder participation and in a transparent manner. Annual, interim evaluation and final evaluation reports will be published.

Draft monitoring and evaluation reports will be published on the websites of the MEPA and the LEPL Environmental Information and Education Centre.

Both physical meetings and virtual means will be used as tools for stakeholder engagement in the monitoring and evaluation process. The Secretariat will provide the drafts of annual monitoring reports to the members of the technical working group set up within the Council, for comments, which, together with the comments from stakeholders will be further discussed at a joint meeting. In addition, the scale, criteria, questions, research design and methodology of interim and final evaluations will be agreed with the members of the same platform. If feasible, priority will be given to the mixed evaluation, which will involve stakeholders in addition to the coordinating body and external independent consultants. After publishing of the monitoring and evaluation report drafts, as well as information on the issues to be evaluated and evaluation outlines, all the stakeholders and members of civil society will have 2 weeks to submit their comments electronically.

ANNEXES

ANNEX 1: Other Strategies, Action Plans and Laws relevant to the Climate Strategy and Action Plan

2021 Updated Nationally Determined Contribution (NDC)

OBJECTIVE:	Communicate climate-related targets by 2030 within the current cycle
PURPOSE:	Reported to the UNFCCC (required)

Under its commitment to the Paris Agreement, Georgia has communicated to the UNFCCC secretariat in 2021 a GHG emissions reduction target, which is to reduce GHG emissions to 35% below the 1990 level in 2030. The Climate Action Plan is a short-term action plan to achieve the 2030 target. The Updated NDC is due to be updated again by 2025.

Long-term Low Emissions Development Strategy (LT- LEDS)

OBJECTIVE:	Identify 2050 vision for climate change mitigation
PURPOSE:	Reported to the UNFCCC (recommended)

Under the Paris Agreement *"All parties should strive to formulate and communicate long-term low greenhouse gas emission development strategies"* (UNFCCC, 2016; Paris Agreement, Article 4, Paragraph 19). These strategies – also known as Long-term strategies (LTS) – set out a country's vision for emission reduction by 2050. The UNFCCC Conference of the Parties (COP-21) invited Parties to communicate their LTS to the UNFCCC registry (decision 1/CP, paragraph 35). Development of an LTS is also a requirement for EU member countries under new rules laid out in the EU Regulation on Governance of the Energy Union and Climate Action. Currently, the Energy Community discusses the option for these rules to become binding for Contracting Parties. Thus, they may become binding for Georgia as a Contracting Party of the Energy Community. Georgia is currently developing a Long-term Low-emission Development Strategy, which will be completed by the end of 2021.

National Energy and Climate Plan (NECP)

OBJECTIVE:	Set out climate and energy-related plans, covering the period from 2021 to 2030 and including prospects to 2050
PURPOSE:	Reported to the Ministerial Council of the Energy Community (recommended)

Georgia is in the process of developing its integrated NECP, as recommended through membership of the Energy Community Treaty. In line with the recommendations by the Ministerial Council of the Energy Community, Georgia's integrated NECP should cover the period from 2021 to 2030. It should set targets and an action plan for improving energy security, strengthening the energy market, improving energy efficiency and decarbonising the economy, by promoting research and innovations. The NECP will be aligned with the Climate Strategy and Action Plan, as the latter will be used for the NECP's fourth chapter on decarbonising the economy. Depending on whether the timings of the revision cycle of NECPs coincide in the future, the Climate Strategy and Action Plan and the NECP could continue to be closely aligned or could even be merged into one document. Progress reports on the achievement of NECP targets and objectives are recommended to be submitted every two years, which could occur simultaneously to the Climate Action Plan implementation reporting (see Monitoring and Evaluation).

2019-2020 National Energy Efficiency Action Plan (NEEAP)

OBJECTIVE:	Set out targets for improved energy efficiency for 2020, 2025 and 2030, with concrete energy efficiency actions for energy generation and transmission and buildings sectors in the years 2019–2020.
PURPOSE:	For national policy planning

The 2019–2020 NEEAP, which was adopted by the Government of Georgia in 2019, sets national energy-saving targets for the public and private sectors and proposes specific measures to meet these targets. The plan includes financial, regulatory and informational measures set for energy efficiency in all key energy demand sectors, including transport, buildings, electricity transmission and industry, as well as cross-sector and institutional measures.

2020 National Renewable Energy Action Plan (NREAP)

OBJECTIVE:	Set out targets for renewable energy for 2030, with specific actions for electricity generation and transport fuels.
PURPOSE:	For national policy planning

The NREAP was adopted by the Ministry of Economy and Sustainable Development of Georgia in 2019. It describes the target set for the renewable energy sector. Specific actions planned for 2020 include enhanced incentives for solar and wind energy generation, integration of new and existing renewable energy sources into the existing grid, as well as enhanced support of use and exploitation of clean fuels in the transport sector.

Municipal Action Plans for Sustainable Energy and Climate (SEAP and SECAP)

OBJECTIVE:	Develop targets and action plans for emission reduction in the energy sector at the municipality level; target years and implementation periods may vary between municipalities.
PURPOSE:	For submission to the Covenant of Mayors (CoM), municipal policy planning

By December 2020, 24 municipalities in Georgia were signatories to the Covenant of Mayors, committing themselves to the development and implementation of Sustainable Energy Action Plans (SEAPs) or Sustainable Energy and Climate Action Plans (SECAPs). The SEAPs include set targets and actions for GHG emission reduction, as well as for reducing energy demand and increasing energy efficiency over a period up to 2020. SECAPs cover the same issues for a period up to 2030. Some existing SEAPs have a direct overlap with the targets of the 2021–2023 Climate Action Plan, and the actions are thus reflected in the Climate Action Plan. In some cases, direct overlaps were not found since the SEAPs of some municipalities are older and cover a period up to only 2020. However, future updates of the SECAPs, intended by number of signatory municipalities, will be considered in the following iteration of the Climate Action Plan; should be aligned with.

OTHER HORIZONTALLY AND VERTICALLY LINKED STRATEGIES AND NORMATIVE ACTS

In addition to the climate and energy strategies and action plans mentioned above, there are other national and municipal action plans and strategic documents, as well as normative acts that are related to the Climate Strategy and Action Plan. Below is a brief overview of the most relevant ones.

Third National Environmental Action Programme (NEAP-3) of Georgia 2017-2021

NEAP–3 identifies the environmental priorities of Georgia and establishes the strategic long–term goals, targets and activities required to improve the environment. The NEAP–3 includes a separate chapter on climate change, with actions to create enabling environment for GHG reductions, including development of a Climate Action Plan, an updated NDC and an LTS. The NEAP–3 also includes specific targets for reduction of water and air pollution, which could be achieved through the implementation of several Climate Action Plan measures.

Agriculture and Rural Development Strategy of Georgia 2021-2027

The strategy and action plan set out priorities, strategic goals and measures for agriculture and rural development. Three priorities and three major goals are identified in the strategy for 2027. These goals will contribute to higher productive livestock, decreased use of synthetic fertilizers and will promote research and education for implementing sustainable and climate smart agriculture practices. With regard to climate change, the strategy focuses mostly on climate change adaptation, however some components of the strategy are relevant to climate change mitigation targets.

National Environment and Health Action Plan (NEHAP-2) of Georgia 2018-2022

NEHAP–2 outlines the country's current approach to preservation of safe environment and defines priorities for a 5–year period. One of the strategic objectives of the NEHAP–2 is to integrate healthcare issues into climate change adaptation and mitigation strategy. NEHAP–2 puts a particular focus on climate change adaptation, although some components of the strategy are relevant to climate change mitigation targets.

The new 2020 Forest Code of Georgia and National Forest Concept 2013

The goal of the new Forest Code is to protect the forest biodiversity of Georgia, preserve and improve the characteristics of forest, and increase the quantity and quality of forest resources in order to preserve its ecological, social and economic functions. The new Forest Code defines the main principles for forest management to ensure that forests are managed sustainably. The goal of the National Forest Concept for Georgia is to establish a system for sustainable forest management, providing that Georgia's forest resources are used in a way, and at a rate, that maintains their ecological health and ensures the better and more effective use of their socio-economic potential. With regards to climate change, the concept focuses mostly on responding to the risks of climate change through adaptation. These measures from the Code and the Concept will be relevant for increasing the carbon capture capacity of forests and climate change mitigation.

National Biodiversity Strategy and Action Plan (NBSAP) of Georgia 2014 – 2020

The NBSAP sets out priority actions to address the most critical and urgent threats to biodiversity and provides a framework for further action planning. Climate change is identified in the NBSAP as a key threat to national biodiversity. The NBSAP contains actions related to awareness raising on the risks associated to Georgia's national biodiversity and climate change. Such actions will create and strengthen enabling environment for the subsequent update of the Climate Action Plan.

Waste Management Code and National Waste Management Strategy 2016-2030 and Action Plan 2016-2020

The goal of the Waste Management Code is to establish a legal framework in the field of waste management to implement measures that will facilitate waste prevention, re-use and recycling, as well as safe disposal of waste. In order to improve the waste management system, the Waste Management Strategy and Action Plan defines goals and objectives for waste collection and transportation, ensuring safe landfilling and reduced production of waste. Climate change is not directly referred to in the Code, Strategy and Action Plan, although implementation of the objectives of the Code and measures in the Strategy and Action Plan has an effect for climate change mitigation.

Law of Georgia on Energy Efficiency and Law on Energy Efficiency of Buildings

The general goal of the Law on Energy Efficiency is to provide the legal foundation for promoting and implementing energy efficiency in the country, to establish a procedure for developing national energy efficiency targets, and to coordinate, control, supervise and monitor the energy efficiency policy. The general goal of the Law on Energy Efficiency of Buildings is to promote the rational use of energy resources and to improve the energy efficiency of buildings, taking into account the external climatic and local conditions of buildings; and to create internal climatic conditions and cost-effectiveness. The law also sets the methodology for calculating the energy efficiency of buildings and the liability mechanism for non-completion. Climate change is not directly referred to in the laws, however their implementation has an effect on climate change mitigation.

The Law of Georgia On Promotion of Production and Utilization of Energy from Renewable Sources

The goal of the law is to establish the legal basis for promotion of the use of energy from renewable sources, and to set a binding national renewable energy target or share in total final energy consumption. The Law further establishes relevant promotion schemes. While climate change is not directly referred to in the law, implementation of the law has an effect for climate change mitigation.

ANNEX 2: Links to Sustainable Development Goals

In 2015, all member states of the United Nations adopted the 2030 Agenda, including 17 Sustainable Development Goals (SDGs) and 169 targets. SDGs are not legally binding; however, each government is expected to establish an integrated, national SDG strategy with an aim to implement the sustainable development agenda by 2030 (United Nations, 2018). Georgia submitted its first Voluntary National Report on the implementation of the SDGs following the adoption of the 2030 UN Sustainable Development Agenda in 2015, and second Voluntary National Report in 2020. Georgia's SDG implementation is coordinated by the Policy Planning Division within the Policy Planning and Coordination Department of the Government of Georgia Administration. The Government of Georgia set up the technical working groups in 2016 to work on different thematic areas of the SDGs and also established country-specific adjusted national SDG targets and indicators (Government of Georgia, 2019). The Government of Georgia has set all of the 17 SDGs as national priorities, prioritised 98 of 169 global targets and 204 of 244 global indicators.

Georgia has also established a SDG council to monitor implementation of SDGs and have identified priorities to enhance monitoring and evaluation of SDGs and to increase involvement of local self-governments, private sector, and civil society (Government of Georgia, 2020a). The Climate Strategy and Action Plan will fully support implementation of SDG goal 13 which is specific to climate action. Furthermore, climate mitigation activities, such as reducing emissions from transport or transitioning the energy sector towards higher renewable energy shares, deliver many other benefits such as improving air quality, increasing energy security and adding more jobs to the economy, which help fulfil other SDG targets prioritised by Georgia. All the targets listed below constitute global and national targets at the same time, except for targets 9.4 and 11.2, which are only global targets.

TARGET 1.2: By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions. Energy efficiency improvements in buildings will increase energy access and reduce energy expenditure. While the promotion of renewable energy will help remote settlements increase their access to energy (energy poverty reduction), and will support productive economic activities.

TARGET 1.4: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources. Sustainable forests management can lead to the diversification of incomes from additional forestry programs.

TARGET 2.3: By 2030, double the agricultural productivity and incomes of small-scale food producers. The measures include changing and improving livestock feeding practices and research on further actions such as organic fertilizer (manure) management system, which can enhance the productivity of agricultural activities. Successful operation of agricultural cooperatives could further support small-scale food producers.

TARGET 2.4: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, and that progressively improve land and soil quality.

The measures include reduction of fertilizer use, implementation of improved irrigation systems and feasibility study of climate-smart agriculture. All of those support the implementation of sustainable and resilient practices.

TARGET 3.4: By 2030, reduce by one-third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being. The transport sector measures reduce air pollution through reduced fuel use and the use of clean technologies. The measures related to renewable energy resources (solar, wind and hydro resources) reduce air, water and soil pollution and thus non-communicable diseases risks and incidences when replacing polluting energy sources (oil and bioenergy).

TARGET 3.6: By 2030, reduce the number of deaths and injuries from road traffic accidents. Reduction of private vehicle activity will lead to reduced number of vehicles and consequently decrease the number of road traffic accidents, deaths and injuries.

TARGET 3.8: By 2030, achieve universal health coverage, access to quality healthcare services and access to safe, effective, quality and essential medicines. The energy related measures facilitate access to better equipped local healthcare and communication services. Local electricity supply leads to better operation of relevant facilities.

TARGET 3.9: By 2030, reduce the mortality rate attributed to hazardous chemicals and air, water and soil pollution and contamination. By improving the energy efficiency of buildings, less fuel use will be required, leading to reduction of air pollution in buildings and urban areas. The measures listed in the industry chapter aim at increasing resource and energy efficiency in the industrial processes, contributing to reduced respiratory diseases, decreasing the use of fossil fuels in their processes or facilitating the movement towards waste-heat recovery systems. Closing of dumpsites and modernising existing landfills directly contribute to reducing respiratory diseases through adequate waste management and avoiding waste burning. Adequate waste management also contributes to less air, soil and water

pollution (caused by burning or runoff). The promotion of renewable energy reduces air, water and soil pollution and contamination when replacing polluting energy sources (fossil fuels and bioenergy).

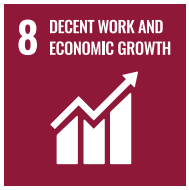
TARGET 4.4: By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship. Some of the building and agriculture sector measures in the Climate Action Plan will improve the availability of training and certification schemes for developing vocational skills in both sectors.

TARGET 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all. Closing of dumpsites and modernising existing landfills increase access to adequate sanitation and hygiene through efficient management of water treatment and sewage systems. The actions focusing on reduced use of fertilizers and the implementation of improved irrigation systems will also lead to reduced water contamination.

TARGET 7.1: By 2030, Georgia achieves significant progress in ensuring access to affordable, reliable and modern energy services. Improved energy efficiency of buildings can decrease energy poverty through the enhanced energy accessibility. Investments in renewable energy generate modern and sustainable energy services and increase energy security by reducing the dependence on imports for energy supply.

TARGET 7.2: By 2030, increase substantially the share of renewable energy in the energy system of Georgia. The relevant measures include wind and solar energy installations, and increasing the number of small and large hydroelectric power plants, which leads to increased share of renewable energy sources in the energy system.

TARGET 7.3: By 2030, significantly increase the rate of improvement in energy efficiency. The energy efficiency improvements in the buildings and energy sectors directly affect this target.



TARGET 8.3: Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation. Energy efficiency of buildings can support decent job creation and entrepreneurship, and forming of small enterprises, which will be enabled through the support of improved energy efficiency programs.

Strengthened sustainable forest management leads to creation of decent jobs (e.g., in the field of nature conversation), which will further support the decoupling of economic growth from environmental degradation.

TARGET 8.5: By 2030, implement effective state policy in order to achieve productive employment and decent work for all. The transport sector measures create decent jobs through the development of major infrastructure projects and the operation of public transport services. Further, improvements of the mobility between cities, in particular through strengthened public transport sector, can support accessibility to better economic opportunities and jobs in cities.

Closing dumpsites, modernising existing landfills and formalising waste recycling activities contribute to the creation of decent jobs and formalising the jobs of persons involved in these activities (mostly lower income population).

TARGET 8.9: By 2025, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products. Sustainable forests management supports sustainable tourism through preserving Georgia's natural landscape.

TARGET 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities. The measures for energy efficiency in buildings may lead to modernised and improved industrial processes, increased resource efficiency, and adoption of environmentally sound technologies through more efficient industrial buildings and appliances.

Building new landfills as well as modernising the existing ones, leads to resource efficiency, while developing sustainable and resilient infrastructure for waste management to support economic development and human well-being.

TARGET 9.5: Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending. The building sector measures support research and development and upgrading of industrial capabilities by creating demand for new energy-efficient building methods and materials and energy-efficient technologies. Reducing non-energy emissions and adopting and developing low emission processes, as suggested the industry chapter, requires further research, supporting the upgraded technological capabilities and encouraging innovations in the sector.

TARGET 11.1: Ensure safe living conditions for displaced persons living in Georgia. The measures for energy efficiency in buildings effectively improve access to adequate housing and reduce energy poverty by increasing affordability.

TARGET 11.2: Increase the proportion of the population that has convenient access to public transport. The relevant measures include extension of public transport services, leading to substantial increase in the use of these services.

TARGET 11.6: By 2030, reduce the adverse (per capita) environmental impact of cities, including by paying special attention to air quality and municipal and other waste management. Closing dumpsites and modernising existing landfills contribute to sustainable urbanization and human settlements planning. Adequate waste management also reduces environmental impact of cities. Air pollution can be reduced through energy-efficient urban infrastructure solutions (public transport) – by improving air quality and reducing noise, transport sector measures – by the reduced fuel use and the use of cleaner

technologies, and renewable energy promotion – by replacing pollutant energy resources (fossil fuel and bioenergy). Reducing non-energy emissions and adopting and developing low emission processes in industry reduces the impact of industrial activity in cities. Further, moving on to waste-heat recovery systems reduces the overall primary energy demand, which also allows towns and cities grow more sustainably.

TARGET 13.2: Integrate climate change measures into national policies, strategies and planning. Actions listed in the Climate Action Plan directly contribute to the integration of climate change issues in national policies. The link between climate actions and other development areas is explicitly represented in the assessed sectoral mitigation actions.

TARGET 15.1: By 2030, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands. Implementation of the identified actions, i.e., sustainable forest management and afforestation, directly leads to achievement of this target.

TARGET 15.2: By 2030, promote the implementation of sustainable management of all types of forests, reduce deforestation (destruction of forests), restore degraded (damaged) forests, increase afforestation and artificial and natural regeneration of forests. Implementation of the identified actions, i.e., sustainable forest management and afforestation, directly leads to achievement of this target.

TARGET 15.3: By 2030, combat desertification and restore degraded land and soil. The agriculture actions include reduced use of fertilizers and improved farming practices that may reduce land degradation. Implementation of the identified forestry measures contributes to the restoration of degraded land and soil as well as soil quality improvement.

ANNEX 3: Links to the Association Agreement between Georgia and the European Union

An Association Agreement between the European Union and Georgia (EU-AA) was signed in June 2014 and fully entered into force in July 2016. The Association Agreement aims to provide a framework that allows for deeper political and economic integration between the EU and Georgia, including through the approximation of Georgian legislation to that of the EU.

The EU-AA commits Georgia to a significant reform agenda that not only identifies a list of EU Legislation to which national legislation is to be approximated but also sets out a timetable for adoption of national legislation and fulfilment of the provisions of EU legislative acts, including directives/regulations on energy efficiency, air pollution, and renewable energy, which are also priorities for climate policy planning in Georgia. Implementation of many mitigation measures outlined in the Climate Action Plan have high synergies with fulfilling EU legislative acts under the Association Agreement.

ARTICLES

Article 302 of the Association Agreement, among other areas, establishes the cooperation on nature protection including forest protection. Georgia and the EU aim to cooperate for preserving, protecting, improving and rehabilitating the quality of the environment as well as for sustainable management of natural resources, including forests. Sustainable forest management and adoption of the new Forest Code of Georgia contribute to fulfilment of requirements of Article 233 of the EU-Georgia Deep and Comprehensive Free Trade Area (DCFTA) agreement which is part of the Association Agreement.

Article 314 of the Association Agreement specifies the need to facilitate the modernisation and restructuring of the EU and Georgian industry in sectors, where appropriate; and developing and strengthening the cooperation in the mining industries, and production of raw materials, with the objective of promoting information exchange and cooperation in the area of non-energy mining, in particular metallic ores and industrial minerals. The exchange of information includes developments in mining and raw materials sector, trade in raw materials, best practices in relation to sustainable development of mining industries as well as training, skills development, health and safety.

Articles 332 and 333 of the Association Agreement establish the cooperation on issues regarding agriculture and rural development. Georgia aims to harmonize its legislation regarding agriculture and rural development with that of the EU. In exchange, the EU has agreed to support Georgia in modernization and sustainable development of its agricultural production, improving competitiveness and efficiency of Georgia's agricultural sector.

DIRECTIVES

Council Directive 1991/271/EEC of May 21, 1991, concerning urban wastewater treatment, with the amendments by Directive 1998/15/EC and Regulation No. 1882/2003, refer the identification of sensitive areas and agglomerations; and the preparation of technical and investment programs for the urban wastewater collection and treatment.

Council Directive 1999/31/EC of April 26, 1999, on the Landfills, with the amendment by Regulation (EC) No. 1882/2003, includes: classification of landfill sites; preparation of a national strategy for reducing the amount of biodegradable municipal waste going to landfill; establishment of an application and permit system and of waste acceptance procedures; establishment of control and monitoring procedures in the operation phase of landfills and of closure and after–care procedures for landfills; establishment of conditioning plans for existing landfills; establishment of a costing mechanism covering setting–up and operation of a landfill; and ensuring the relevant waste is subject to treatment before landfilling.

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe specifies clear targets, including limit values for harmful substances concentrations in the atmospheric air, including an annual mean limit for particulate matter (PM10) in any given location of 40 μg/m³. Measurements conducted in Tbilisi in 2017 showed an average annual PM10 concentration of 46 μg/m³ (WHO, 2018), however apparently in some locations it exceeds this value.

LINKS TO THE TRANSPORT SECTOR:

It is estimated that 80% of local air pollution in Tbilisi is attributable to road transport (Karchkhadze, 2017). Several of the measures listed in Table aim at improving the efficiency of vehicles and reducing their emissions intensity, reducing the local air pollutant concentrations.

LINKS TO THE INDUSTRY SECTOR:

The measures listed in the Table aim at reducing the amount of energy required in the industrial processes, thus, reducing or replacing the fossil fuels currently used in the cement industry. This will reduce the air pollutant concentrations.

LINKS TO THE ENERGY GENERATION AND TRANSMISSION SECTOR:

The measures listed in Table 3 include the renewable energy development capacity that reduces air pollution when replacing polluting energy sources, such as fossil fuels.

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste supports the preparation of the following waste management plans: the establishment of a cost recovery mechanism in accordance with the polluter pays principle; the establishment of a permit system for facilities that carry out waste disposal or recovery operations, with specific obligations for the management of hazardous waste; and the introduction of a register of waste collection and transport enterprises.

Directive 2009/40/EC of the European Parliament and of the Council of May 6 2009 on roadworthiness tests for motor vehicles and their trailers requires regular vehicle inspection including verification that emission control systems are functioning correctly, and monitoring of major air pollutants. This requirement is directly fulfilled by Action: *Design and implement technical regulations for vehicle roadworthiness.*

Directive 2009/28/EC of the European Parliament and of the Council of 28 April 2009 on the promotion of the use of energy from renewable sources requires that EU Member States derive at least 10% of their energy use in the transport sector from renewable energy sources, including biofuels, by 2020. *The Energy Community Treaty Protocol* indicates that the specific target for Georgia will be determined by a study carried out by the Energy Community Secretariat, based on a predetermined approach given in the Directive.

LINKS TO THE ENERGY GENERATION AND TRANSMISSION SECTOR:

The measures for energy generation and transmission listed in Table 3 include the installation of renewable energy capacity.

LINKS TO THE TRANSPORT SECTOR:

The identified measures incentivise transitioning to electric vehicles and penalise fossil fuel powered vehicles, supporting the implementation of this directive.

Directive 2009/33/EC of the European Parliament and of the Council of April 23 2009 on the promotion of clean and energy-efficient road transport vehicles requires that public entities in Georgia evaluate and consider environmental impacts, emissions of CO_2 and other air pollutants, and take into account lifetime costs of vehicles when purchasing them. This may lead to the reduced emission intensity of non-electrified vehicles as well as increased number of electrified transport and other low-carbon vehicles. Several identified measures restrict the imports of more polluting vehicles and promote penetration of electrified transport, making clean and energy-efficient vehicle options more available and competitive for public entities in Georgia to acquire them.

Directive 2012/27/EC of the European Parliament and of the Council of October 25 2012 on energy efficiency calls for the development and implementation of an action plan for energy efficiency, as already implemented by Georgia through its 2020 National Energy Efficiency Action Plan (NEEAP).

Directive 2010/30/EU of the European Parliament and of the Council of May 19 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products. The Directive requires Georgia to implement a labelling and certification scheme for appliances.

Directive 2010/31/EU of the European Parliament and of the Council of May 19 2010 on the energy performance of buildings requires Georgia to strengthen building-related regulations and introduce energy efficiency certification of buildings.

Directive 2010/75/EU of the European Parliament and of the Council of November 24 2010 on industrial emissions involves the possibility of preparing a transitional national plan to reduce total annual emissions from existing plants. The listed measures represent a transition plan towards lower emissions in the industry sector, in line with the Directive's objective.

ANNEX 4: Methodology

PROJECTIONS OF GHG EMISSIONS UP TO 2030 AND ESTIMATION OF SECTOR ACTIVITY AND EMISSION INTENSITY INDICATORS

The projections of GHG emissions up to 2030 under a reference scenario (business-as-usual (BAU), without actions scenario) have been provided by the respective sector experts that coordinated the process for the Climate Strategy and Action Plan development in each sector. They build on the data and estimates reported in Georgia's Second Biennial Update Report (BUR) and Georgia's latest National Inventory Report, both published in 2019. The LEAP[4] model was used as the overarching platform for collecting and calibrating the data from all individual sectors, excluding LULUCF. This model has also been used to develop the estimations and projections and assess the impact of mitigation actions in the buildings and the energy generation and transmission sectors, and to assess the impacts on the energy supply sector from the measures planned in different sectors.

4. *Long-range Energy Alternatives Planning system*

The main drivers for projecting future sector activity and emissions intensity up to 2030 are GDP and population growth rates. Additional drivers for individual sectors and key individual assumptions are outlined in the table. Wherever possible, national statistics and projections reported by GeoStat or other national entities have been used as the basis for calculations.

TABLE 10: GDP, projections and assumptions of GDP, population and population growth

YEAR	Real GDP, mill. GEL	GDP growth, %	Population, million people (incl. tourists)	Population growth, %
2015	22 819	3.2	3.71	0.5
2016	23 528	3.1	3.72	0.5
2017	24 636	4.7	3.75	0.5
2018	25 798	4.7	3.77	0.5
2019	26 959	4.5	3.79	0.5
2020	28 307	5.0	3.80	0.5
2021	29 864	5.5	3.83	0.5
2022	31 655	6.0	3.85	0.6
2023	33 284	5.1	3.87	0.6
2024	35 024	5.2	3.90	0.6
2025	36 906	5.4	3.92	0.6
2026	38 917	5.4	3.94	0.6
2027	41 034	5.4	3.97	0.6
2028	43 220	5.3	3.99	0.6
2029	45 538	5.4	4.02	0.6
2030	47 993	5.4	4.04	0.6

TABLE 11: Key assumptions by the sectors

SECTOR	ENERGY GENERATION AND TRANSMISSION
KEY ASSUMPTIONS	The demand for electricity is the sum of electricity consumptions in the reference scenarios of all relevant sectors. Technical losses of electricity and the proportions of thermal and hydro energy generation have not changed in 2014–2015. Projected coke consumption values follow the demand for coke in iron and steel production given in the industry sector projections. Fugitive emissions from solid fuels follow the growth rate of lignite consumption, while for fugitive emissions from gas transmission and distribution network it is assumed that the proportion of losses remains constant from 2014–2015 whereas gas demand is equal to the sum of natural gas consumption calculated in different scenarios. Fugitive emissions from oil extraction remain almost constant up to 2030, over the whole period. Effects of mitigation measures on electricity sector load and seasonal demand on electricity are not calculated. Capacity factors assumed for different technologies are: 30% for wind, 20% for solar and 35% for hydropower. The efficiency of thermal energy generation reached 44% by 2018 and is assumed to reach 48% by 2030.
ADDITIONAL MATERIALS	No additional materials available
SECTOR	**TRANSPORT**
KEY ASSUMPTIONS	Light-duty vehicle ownership projections for the transport sector reference scenario is modelled using the methodology developed by Dargay et al. (2007), which employed a Gompertz function S-curve to model light-duty vehicle ownership for 45 countries. The model uses population density and percentage of urbanisation as independent variables to estimate the maximum traffic flow density and vehicle saturation levels of a specific country, and GDP per capita to build the vehicle ownership growth elasticity curve (the speed at which a country reaches maximum saturation). For the reference case projections, population density statistics were calculated using national (GeoStat) and United Nations Population Fund (UNFPA) statistics. Statistics of urbanisation percentage were taken from UN Urbanization Prospects (World Urbanization Prospects, 2018), and GDP per capita were calculated from World Bank (2017) data.

ADDITIONAL MATERIALS	For more details see analysis conducted specifically for the purposes of the Climate Strategy and Action Plan development (NewClimate, 2020).
SECTOR	**BUILDINGS**
KEY ASSUMPTIONS	Main drivers are GDP growth rates, population and tourism growth rates and GDP per capita growth. Other significant drivers include increased gasification (assumed 75% of the buildings to be gasified by 2030), switching from biomass to gas (where gas is available), and an increase in heated areas in residential buildings.
ADDITIONAL MATERIALS	No additional materials available
SECTOR	**INDUSTRY**
KEY ASSUMPTIONS	Main drivers are GDP growth rates and population in conjunction with sub-sectoral assumptions as listed in the following: ➪ Emissions from mineral products mostly correlates with construction market development; ➪ Emissions from chemical industry depend on international market demands; ➪ Steel will be produced with electric arc furnace technology in the upcoming decade; ➪ GDP growth will increase demand on devices using f-gasses as cooling agents; Reference scenario of production of mineral, chemical and metal products takes into consideration the infrastructural capacity and construction market saturation and distribution since 2026.
ADDITIONAL MATERIALS	No additional materials available
SECTOR	**AGRICULTURE**
KEY ASSUMPTIONS	To estimate emissions from organic fertilizers (manure) management and enteric fermentation, livestock numbers are quantified based on values from the Second BUR and GeoStat growth rates for 2016-2018 for all livestock categories. For projections up to 2030 growth rates developed by FAO (2019) are applied for cattle livestock, and year-specific growth rates from the low-emission development strategy for all other livestock categories (MEPA, 2019; Georgia's Low Emission Development Strategy Coordination Committee). Emission factors for both enteric fermentation and organic fertilizers (manure) management are taken from Georgia's latest national GHG inventory report (2019) in line with IPCC recommendations.

	Emissions from agricultural soils are quantified based on the values from the Second BUR and FAO for each category up to 2030. For synthetic fertilizer use, updated estimates from GeoStat (2019) are used for 2016–2018 values. Fuel consumed in the agriculture sector is based on values calculated in 2015 which grow in line with GDP growth.
ADDITIONAL MATERIALS	For more details see analysis conducted specifically for the purposes of the Climate Strategy and Action Plan development (NewClimate, forthcoming in 2021)
SECTOR	**WASTE**
KEY ASSUMPTIONS	CH_4 from Municipal Solid waste and CH_4 and N_2O from wastewater systems sub-sectors are calculated based on the latest National GHG Inventory Report and figures from Georgia's Second Biennial Update Report for 2014 and 2015, and using the population increase and annual flow of tourists as drivers. The calculation was performed with both, reference and mitigation scenarios. For the **Solid Waste** sub-sector the actual data of landfilled waste (tons) from existing sites for 2017 was used for verification. For calculation of the CH_4 emissions the advanced version of the IPCC Waste Model (V5 IPCC Model Advance) was used. Separate calculations were conducted for big cities and regions using the local/regional data for waste compositions. For the wastewater system emissions (CH_4 and N_2O) the 2006 IPCC Guidelines were used. The CH_4 emissions from domestic & commercial wastewater systems were calculated based on the actual plant-specific activity data (from Gardabani-Tbilisi and Batumi wastewater systems) allowing to calculate biological oxygen demand (BOD) country-specific coefficient. For calculation of the N_2O from domestic and commercial wastewater systems the only activity data in the formula are connected to population number and protein intake per capita. The former was based on the wastewater systems' plant-specific data for recent years, according to population growth projections. The data on protein intake per capita has been taken from the latest GHG inventory report (2015) and the projection was based on the annual growth rate from the same source, assuming that the rate will be kept invariant. For the industrial wastewater systems only CH_4 is calculated. The base figures for 2014 and 2015 are taken from the latest GHG inventory report (2019) and Georgia's second BUR. The projections since 2015 are calculated based on the GDP projected growth rate.
ADDITIONAL MATERIALS	No additional materials available

CALIBRATION CHECK

The table below compares the emissions calculated for 2015 in LEAP with the estimates reported in Georgia's National Inventory Report for the same year. The total emissions of 2015 differ by 0.24%. The reasons for this slight mismatch can be found in rounding methods and in accounting certain emissions under different source categories.

TABLE 12: Calibration

Unit: Gg CO_2e	GHG Inventory (NIR)	GHG Inventory -modelled (CAP)	Difference (%)
SECTOR	**2015**	**2015**	
Energy	**10,873**	**10,858**	
A – Fuel Combustion	**8,841**	**8,833**	
1. Energy Industries	1,622	1,654	
2. Processing Industries and Construction	1,064	1,065	
3. Transport	4,163	4,115	
4. Other Sectors	**1,992**	**1,998**	
4a. Commercial and Public Services	413	413	
4b. Residential Buildings	1,541	1,547	
4c. Agriculture, Fishing and Forestry	38	38	
5. Other			
B – Fugitive Emissions from Fuels	**2,032**	**2,025**	
1. Solid Fuels	137	136	
2. Oil and Natural Gas	1,895	1,889	
Industrial Processes	**2,058**	**2,058**	
Agriculture	**3,271**	**3,326**	
Waste	**1,388**	**1,389**	
TOTAL	17,590	17,632	

ESTIMATION OF THE GHG EMISSION REDUCTION IMPACT

The estimation of the GHG emissions reduction impact from the CAP measures has been provided by the respective sector experts that led the process for the Climate Strategy and Action Plan development in each sector. For some of the sectors, additional tools have been used for the quantification of impacts. A short description of these tools is given in the following section.

TOOLS AND MODELS

The following gives a short description of tools and models that were used for individual sectors to project reference emissions and to quantify the impact of proposed measures, as well as for accounting total emissions and reductions from all sectors.

LEAP

The Long-range Energy Alternatives Planning system (LEAP) model developed by the Stockholm Environment Institute (SEI) was used as the overarching platform for collecting, processing and combining the data from all individual sectors, excluding LULUCF.

This model has also been used to develop the projections and assess impact of mitigation actions in buildings and energy supply sectors.

LEAP is an integrated, scenario-based modelling tool that can be used to track energy consumption, production and resource extraction in all sectors of an economy. It is a convenient tool to account for both, energy sector and non-energy sector greenhouse gas emission sources and sinks. As a bottom-up accounting model, LEAP is used for systematically analysing energy-environment interdependence, from primary energy development (extraction, production, transformation, distribution) to end-use energy consumption.

Each reference and mitigation scenario used in final LEAP calculation was developed by the respective sector experts that coordinated the process for the Climate Action Plan development in each sector. Fuel consumption from other sectors was entered into LEAP, which then calculated the emissions according to the consumption and other respective factors and estimated cross-sectoral impacts on the energy supply sector.

PROSPECTS+ (A tool for projecting greenhouse gas emission scenarios)

PROSPECTS+ was used to estimate emissions in the transport sector and to calculate the emissions reduction impact of the different transport related measures.

PROSPECTS+ is a sector-level, bottom-up Excel tool developed by NewClimate Institute and the Climate Action Tracker (CAT) which uses decarbonisation relevant activity and intensity indicators to identify and project overall and sectoral GHG emissions trends.

PROSPECTS+ system is driven by key indicators that shape emission trends on sectoral level for each country (e.g., emission intensity of electricity generation for the energy sector or distance travelled per passenger for the transport sector).

EX-ACT

The Ex-Ante Carbon-balance Tool (EX-ACT) was used to quantify emissions in the forestry sector and to estimate the emissions reduction impact of the proposed measures in both, the forestry and the agriculture sectors.

EX-ACT is an appraisal system developed by the Food and Agriculture Organization of the United Nations (FAO) providing estimates of the impact of agriculture and forestry development projects, programmes and policies on the carbon-balance.

The calculations are carried out with the method of so-called 'C Stock Changes', by observing the changes identified from comparing the carbon stocks for various periods of time. EX-ACT takes into consideration the Guidelines for National Greenhouse Gas Inventories from the IPCC (2006). In line with those guidelines, the calculations in the forestry sector include five reservoirs of carbon: above-ground biomass, below-ground biomass, litter, deadwood and soil organic carbon.

EX-ACT uses geographic, climate and agro-ecological variables for processing information related to land use and agriculture methods. EX-ACT's computation logic is based on comparing the results of planned measures with the results of a reference scenario without these measures.

EX-ACT by default uses emission coefficients for first-level computations according to the IPCC methodology. For the agriculture sector national-level emission coefficients in line with Georgia's National Inventory Report (2019) were entered.

IPCC Waste Model (enhanced in 2019)

IPCC Waste Model calculates CH_4 emissions related to waste disposal sites according to their composition. The model is based on FAO methodology (first order decay methodology), recommended by the 2006 IPCC Guidelines, and allows modelling of the parameters, climate type, waste composition in terms of energy efficiency, population and the number of municipal waste landfills.

ANNEX 5: Effects of the Major Interventions of the Strategy on Emissions Reduction by 2030

TABLE 13: Direct Impact of Climate Action Plan's Energy Generation and Transmission Sector Measures on Emissions Reduction by 2030

Direct Impact of Major Interventions of the Strategy (2021-2023) on Emissions Reduction by 2030 (Energy Generation and Transmission Sector)	
Area of intervention	**Direct reduction effect by 2030**
Wind energy production	399 $ktCO_2e$
Solar energy production	5 $ktCO_2e$
Hydropower plants	146 $ktCO_2e$
Thermal power plants	423 $ktCO_2e$

TABLE 14: Direct Impact of Climate Action Plan's Transport Sector Measures on Emissions Reduction by 2030

Direct Impact of Major Interventions of the Strategy (2021-2023) on Emissions Reduction by 2030 (Transport Sector)	
Area of intervention	**Direct reduction effect by 2030**
Regulations related to technical inspection of vehicles	150 $ktCO_2e$

Emission quality standard for imported vehicles (EUR4 / EUR5)	265 ktCO2e (EUR4) / 370 ktCO2e (EUR5)
Increase of fuel tax rate	416 ktCO2e
Biodiesel production and sale	32 ktCO2e
Public transport measures	141 ktCO2e
Tbilisi transport policy measures	90 ktCO2e
Batumi Sustainable Urban Mobility Plan measures	7 ktCO2e

TABLE 15: Direct Impact of Climate Action Plan's Buildings Sector Measures on Emissions Reduction by 2030

Direct Impact of Major Interventions of the Strategy (2021-2023) on Emissions Reduction by 2030 (Buildings Sector)	
Area of intervention	**Direct and indirect reduction effects by 2030**
Tax regulations and replacement of incandescent light bulbs	48.7 GWh of electricity savings (indirect, in the energy generation and transmission sector)
Energy-efficient light bulbs in public buildings	1.4 GWh of electricity savings (indirect, in the energy generation and transmission sector)
School buildings	Direct: 18.8 ktCO2e Indirect: 53.9 GWh of electricity savings
Solar water heating systems	Direct: 18.7 ktCO2e Indirect: 477 terajoule of energy savings

TABLE 16: Direct Impact of Climate Action Plan's Industry Sector Measures on Emissions Reduction by 2030

Direct Impact of Major Interventions of the Strategy (2021-2023) on Emissions Reduction by 2030 (Industry Sector)	
Area of intervention	**Direct reduction effect by 2030**
Dry process of cement manufacturing	352 $ktCO_2e$
Nitric acid manufacturing	416 $ktCO_2e$

TABLE 17: Direct Impact of Climate Action Plan's Agriculture Sector Measures on Emissions Reduction by 2030

Direct Impact of Major Interventions of the Strategy (2021-2023) on Emissions Reduction by 2030 (Agriculture Sector)	
Area of intervention	**Direct effect by 2030**
Changing the food of domestic animals	7 $ktCO_2e$
Rehabilitation of windbreaks	100 $ktCO_2e$ (Not included in the full calculation)

TABLE 18: Direct Impact of Climate Action Plan's Waste Sector Measures on Emissions Reduction by 2030

Direct Impact of Major Interventions of the Strategy (2021-2023) on Emissions Reduction by 2030 (Waste Sector)	
Area of intervention	**Direct effect by 2030**
Closing of official non-hazardous waste landfills	70 $ktCO_2e$
Closing of dumpsites	29 $ktCO_2e$

Building regional non-hazardous waste landfills	220–238 $ktCO_2e$
Renovation/upgrading of Tbilisi landfill	136 $ktCO_2e$
Kutaisi non-hazardous waste landfill	33 $ktCO_2e$ *(Assuming methane emissions will decrease by 59% after closing)*
Batumi non-hazardous waste landfill	29 $ktCO_2e$ *(Assuming methane emissions will decrease by 59% after closing)*
Recycling of paper waste	54 $ktCO_2e$
Recycling of biodegradable waste	1 $ktCO_2e$ Total reduced emissions in 2021–2030: 9.16 $ktCO_2e$ (or 0.436 $ktCH_4$)
Municipal wastewater	12 $ktCO_2e$ Total reduced emissions in 2021–2030: 118 $ktCO_2e$ (or 5.62 $ktCH_4$) *Assuming new wastewater treatment plants are in place at 6 stations; 80% of methane is captured in Poti and Zugdidi*
Tbilisi wastewater	81–87 $ktCO_2e$ (or 3.85–4.14 $ktCH_4$); *Assuming 80% of the produced methane is removed (captured)*
Batumi wastewater	23.5–28 $ktCO_2e$ (or 1.12–1.32 $ktCH_4$); *Assuming 80% of the produced methane is removed (captured)*
Kobuleti wastewater	7.1–7.9 $ktCO_2e$ (or 0.34–0.38 $ktCH_4$); *Assuming 80% of the produced methane is processed*

TABLE 19: Direct Impact of Climate Action Plan's Forest Sector Measures on Emissions Reduction by 2030

Direct Impact of Major Interventions of the Strategy (2021-2023) on Emissions Reduction by 2030 (Forest Sector)	
Area of intervention	**Direct reduction effect by 2030**
Reforestation of degraded forests	11.5 $ktCO_2e$
Natural regeneration of degraded forest	6.9 $ktCO_2e$
Sustainable forest management plans	560 $ktCO_2e$
Forest supervision with sustainable management	393 $ktCO_2e$
Emerald Network forest fund	51.2 $ktCO_2e$
Expanding protected areas	43 $ktCO_2e$
New protected areas	213 $ktCO_2e$

ANNEX 6: Abbreviations, Definitions, Tables and Figures

ABBREVIATIONS

ADB	Asian Development Bank
AFD	French Development Agency
AR	Autonomous Republic
BAU	Business as Usual
BOD	Biological Oxygen Demand
BUR	Biennial Update Report
CAP	Climate Action Plan
CENN	Caucasus Environmental NGO Network
CH_4	Methane

CO2	Carbon dioxide
CoM	Covenant of Mayors
COP	UNFCCC Conference of the Parties
CSA	Climate-smart Agriculture
CSAP	Climate Strategy and Action Plan
DANIDA	Danish International Development Agency
DCFTA	Deep and Comprehensive Free Trade Agreement
e	Equivalent
E5P	The Eastern Europe Energy Efficiency and Environment Partnership Fund
EBRD	European Bank for Reconstruction and Development
Etc.	Et cetera
EU	European Union
EU Twinning	EU Twinning Project
EU-AA	Association Agreement between the European Union and Georgia
EU-NIF	European Union's Neighbourhood Investment Facility
EX-ACT	The Ex-Ante Carbon-balance Tool
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GeoStat	National Statistics Office of Georgia
Gg	Gigagram
GHGs	Greenhouse Gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit | German Society for International Cooperation
GNERC	Georgian National Energy and Water Supply Regulatory Commission
ha	Hectare
ICCT	International Council on Clean Transportation
IEA	International Energy Agency
IEA	International Energy Agency

IPCC	Intergovernmental Panel on Climate Change
ITMOs	Internationally Transferred Mitigation Outcomes
JSC	Joint Stock Company
KfW	German credit bank for reconstruction
km/h	Kilometre per Hour
kWh	Kilowatt Hour
LDVs	Light-duty vehicles
LEAP	Long-range Energy Alternatives Planning System
LEPL	Legal Entity of Public Law
LLC	Limited Liability Company
LT- LEDS	Long-term Low Emission Development Strategy
LULUCF	Land Use, Land Use Change and Forestry
MEPA	Ministry of Environmental Protection and Agriculture of Georgia
MESD	Ministry of Environment and Sustainable Development of Georgia
MIA	Ministry of Internal Affairs of Georgia
MICS	Multiple Indicator Cluster Survey of Georgia
MoENRP	Former MEPA, Ministry of Environment and Natural Resources Protection of Georgia
MOF	Ministry of Finance of Georgia
MRDI	Ministry of Regional Development and Infrastructure of Georgia
MW	Megawatt
mWAE	Windbreak and Agroforestry Ecosystem
N2O	Nitrous Oxide
NBSAP	National Biodiversity Strategy and Action Plan
NDC	Nationally Determined Contribution
NEAP-3	Third National Environmental Action Programme of Georgia 2017-2021
NECP	Integrated National Energy and Climate Plan
NEEAP	National Energy Efficiency Action Plan

NEFCO	Nordic Environment Finance Corporation
NEHAP-2	National Environment and Health Action Plan of Georgia 2018-2022
NIR	National Greenhouse Gas Inventory Report
NNLE	Non-entrepreneurial (Non-commercial) Legal Entity
NREAP	National Renewable Energy Action Plan
PROSPECTS+	A tool for analysis and modelling of greenhouse gas emissions scenario
PTI	Periodical Technical Inspection
SDG	Sustainable Development Goal
SEAP	Sustainable Energy Action Plan
SECAP	Sustainable Energy and Climate Action Plan
SEI	Stockholm Environment Institute
SIDA	Swedish International Development Cooperation Agency
SUMP	Sustainable Urban Mobility Plan
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
v-km	Vehicle-kilometre
WB	World Bank

KEY DEFINITIONS[5]

CO_2 Equivalent (CO_2e) – conversion of other greenhouse gases to CO2 equivalent, calculated based on global warming potentials of the GHGs.

Anthropogenic Impact on Climate – since the industrial revolution, human activity has released unprecedented amounts of greenhouse gases into the atmosphere, increasing their concentration and enhancing the 'greenhouse effect'. Consequently, the temperature also rises. Human–induced warming has already reached 1°C compared to the pre–industrial level. See also: Greenhouse Gases and Emissions.

Anthropogenic emissions – in the context of climate change, emissions mean the release of greenhouse gases, precursors of GHGs and aerosols into the atmosphere in a certain area and over a specific period of time. Emissions are caused by human activities, like burning of fossil fuels, deforestation, land use, industrial livestock production, waste management, industrial processes, etc. See also: Greenhouse Gases.

Biofuel – a liquid or gas fuel produced from biomass, mostly used in transport.

United Nations Framework Convention on Climate Change (UNFCCC) – international treaty adopted in 1992. The Convention's objective is stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time–frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner. The supreme body of the Convention is the Conference of the Parties (COP), which regularly reviews the implementation of the Convention and any legal document relating to the Convention that may be adopted by the COP. See also: Non–Annex I Country.

Afforestation – planting of new forests on lands that historically have not contained forests.

Deforestation – destruction, clear–cutting of forest, clearing of soil that is then used for different purposes. In short, conversion of forest area to non–forest area.

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5. The definitions are adopted from the Glossary of the IPCC Special Report on Global Warming of 1.5°C, IPCC 2006 methodology, 'Short Glossary of Climate Change Related Terminology' of the Institute of Hydrometeorology of the Georgian National Academy of Sciences, relevant legislation.

Global Warming Potential (GWP) – a measure of impact of a particular greenhouse gas in causing greenhouse effect. Reference value for GWP measurement is Carbon dioxide GWP for a 100 year period. According to the IPCC Fifth Assessment Report from 2014, for other gases it varies in a very broad range and amounts to, for example, 21 for methane, 310 for nitrous oxide. For HFC group hydro fluorocarbons GWP varies from 140 to 11,700; while for sulphur hexafluoride (SF6) it reaches 23,900.

Non-Annex I Country – United Nations Framework Convention on Climate Change divides countries into three categories: Annex I countries, Non–Annex I countries and Annex II countries. The first category includes developed/industrialized countries, second category – developing/non–industrial countries, and the third category includes developed countries, which provide support to developing countries particularly vulnerable to climate change, to cover the costs for adapting to adverse effects of climate change. See also: United Nations Framework Convention on Climate Change.

Decarbonisation – the process by which countries, individuals or companies aim to achieve zero emissions from fossil fuels. The term is generally used in the context of reducing greenhouse gas emissions related to electricity, transport and industry. Zero emission refers to the balance of emissions and sinks, equalling zero.

Electric vehicle (EV) – a mechanical, motorized vehicle powered not by an internal combustion engine but fully or mostly by an electric engine.

Emission scenario – a representation of the future development of emissions based on a consistent and logical assumptions and expectations. See also: Mitigation scenario.

Alternative Energy – energy from non–fossil fuel sources (e.g. solar, water and wind energy). Utilization of alternative energy sources is widely considered to be one of the most promising ways for reducing greenhouse gas and aerosol emissions into the atmosphere.

Energy Efficiency – the ratio of performed work, a provided service, product and/or energy, to the energy consumed.

Energy Efficient Technologies – technologies that provide significant reductions in fossil fuel or electricity consumption to achieve a target level of energy consumption, or economic efficiency. The technical potential of energy efficient technologies is unquestionable, however their economic potential varies and depends on market resistance.

Climate Smart Agriculture – an approach that supports transforming and reorienting agricultural activities and systems to ensure food security and supply in a changing climate. Climate Smart Agriculture aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes; building resilience to climate change; and reducing greenhouse gas emissions from the sector, where possible, including through their absorption.

Adaptation – the process of adjustment to new or changing environment in natural and human systems. Adaptation to climate change involves the response of a natural or anthropogenic system to actual or expected climate change in order to moderate harm or exploit beneficial opportunities. There are several types of adaptation, including adaptation in expected climate change and responding to actual climate change.

Climate mitigation/Greenhouse Gases reduction – a human intervention to reduce emissions or enhance the sinks of greenhouse gases. Words 'Action', 'Intervention', 'Measure' and 'Activity' are used as synonyms in the context of climate change mitigation.

Climate neutrality – anthropogenic emissions of greenhouse gases are balanced by their sinks over a period of time and the balance of greenhouse gas emissions comes to zero. The IPCC defines climate neutrality as 'Concept of a state in which human activities result in no net effect on the climate system'.

Climate System – the combination of and interaction between the atmosphere, the hydrosphere, the biosphere and the geosphere.

Climate Change – greenhouse gas emissions and, consequently, the increase of greenhouse gas concentrations in the atmosphere, which blocks the reflection of heat from the Earth's surface and thus enhances the 'greenhouse effect'. UNFCCC Article 1 (2) defines climate change as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'.

Composting – a biochemical process in which solid organic waste is transformed into a humus–like product. The material obtained from composting is used as soil fertilizer.

Sustainable Development – a system of society's development that ensures human well–being, enhancement of life quality and the right of future generations to use natural resources and the environment that are protected from reversible quantitative and qualitative changes, considering the interests of society's economic development and environmental protection.

Sink – a reservoir (natural or human, in soil, ocean, and plants) where a greenhouse gas, an aerosol or a precursor of a greenhouse gas is stored. Note that UNFCCC Article 1.8 refers to a sink as any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere. In the Earth's surface, the major sink of the key greenhouse gas – carbon dioxide – is the vegetation cover, which absorbs CO_2 from the atmosphere through photosynthesis and converts it into carbohydrates, releasing oxygen (O_2).

Waste – any substance or object that the holder discards, intends to discard or is obliged to discard. Household waste – waste generated by households.

Landfill – a waste disposal facility where waste is placed on or under the ground. A landfill includes an internal waste disposal facility (a waste landfill where a waste producer disposes its own waste at the place of production), but it does not include a temporary storage facility and a waste transfer station.

Waste Management – collection, temporary storage, pre-treatment, transportation, recovery and disposal of waste, and the supervision of such activities, measures, operations and the later maintenance of waste disposal facilities.

Waste Management Hierarchy – prevention; preparation for re-use; recycling; other recovery, including energy recovery; disposal.

Enteric fermentation – one of the main components of the digestive process, which, in the case of ruminant animals, results in methane emissions. In countries where livestock farming plays an important role in the economy, the methane emissions from this process make significant contributions to global warming.

Soil Degradation – unfavourable physical, biological or chemical process, resulting in the soil losing its organic matter – humus, leading towards decrease of soil fertility with 55–65% and thus reducing its economic value.

Paris Agreement – a global agreement (international treaty) under the United Nations Framework Convention on Climate Change adopted on December 12, 2015. Goals of the Paris Agreement are: 1) to keep the increase in the global average temperature to well below 2°C above pre-industrial levels and to limit the temperature increase to 1.5°C above pre-industrial levels; 2) to increase the ability to deal with the adverse impacts of climate change and to support climate resilient and low-emission development; 3) to make finance flows consistent with a low GHG emissions and climate-resilient pathway.

Pre-industrial level – in developed countries or in general, the period prior to the onset of largescale industrial activity. This is not specified in either the Paris Agreement text or the COP decision, however, the IPCC uses the reference period 1850–1900, as this is the earliest period for which data on (almost) global temperature dynamics are available.

Baseline Scenario/Reference Scenario/Without Measures Scenario/Business As Usual – depicting the development of emissions based on assumptions without planned and implemented policies to reduce emissions and mitigate climate change. The baseline scenarios are developed to demonstrate the emission development paths that would occur without planned measures.

Greenhouse Gases – those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit infra-red radiation. The main greenhouse gases regulated by the international climate change regime are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydro chlorofluorocarbons (HFCs, PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).

Greenhouse Gas Inventory – calculation and accounting of greenhouse gases according to the methodology adopted by the IPCC, by years and sectors, including source-categories of sectors.

Industrial Processes – according to the methodology adopted by the IPCC and in the context of Georgia, industrial processes include: Mineral Industry (2A), Chemical Industry (2B), Metal Industry (2C), Non-Energy Products from Fuels & Solvent Use (2D); Product Uses as Substitutes for Ozone Depleting Substances (2F); Other Product Manufacture and Use (2G); Other industrial processes such as paper production, food and beverage production (2H).

Sequestration – a process aimed at increasing the carbon content in carbon reservoirs other than the atmosphere.

Forest – the area inside a forest contour covered with forest forming species and other area which is an integral part of the forest ecosystem. Tree-dominated vegetation.

Forest Management – planning and implementation of measures for using the useful properties of forest and forest resources, as well as for the protection, tending, reforestation and afforestation of forests;

Sustainable Forest Management – the management and use of forest in a manner and extent so as to maintain forest biodiversity, productivity, regeneration capacity, vitality and potential, such that the environmental, social and economic functions of forests are performed at local, national and global levels both at present and in the future, and whereby other ecosystems are not damaged;

Chemical Industry – according to the methodology established by the IPCC and in the context of Georgia, chemical industry refers to the source-categories of ammonia and nitrous oxide production and relevant emissions from these categories.

Mitigation scenario – a representation of the future development of emissions under climate change mitigation policies and planned mitigation measures based on consistent and logical assumptions and expectations.

Fossil fuel – carbon-based fuels from fossil deposits, including coal, oil, and natural gas.

Wastewater system/Sewerage system – a technological process that provides collection of wastewater discharged by users, carrying it and delivering to a treatment plant. Sewage system is an infrastructure facility designed for wastewater passage and treatment. E.g., Treatment Plant.

Source – any process or type of activity that results in the release of greenhouse gases, aerosols, or precursors of greenhouse gases into the atmosphere.

Reforestation – Planting/recreating of forests on deforested lands that historically contained forests.

FIGURES AND TABLES

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