









INTEGRATING CLIMATE CHANGE INTO AGRICULTURE, FORESTRY AND OTHER LAND USE (AFOLU)

POLICY BRIEF



KEY ISSUES

-  North Macedonia has not experienced the major global drivers of GHG emissions in the AFOLU sector (increased livestock numbers, increased use of fertilizer, increased area under irrigation, increased human and animal populations). However, this situation could easily change because of advances in the EU accession process and other factors making the country more attractive for investments in the agricultural sector.
-  Currently, there is no monitoring of soil properties, soil processes, and degradation.
-  Livestock production emits greenhouse gases mainly as a result of enteric fermentation and manure management. The major challenge is still to identify for different species the population frequency in the common production systems. Deeper knowledge is required for feeding and manure management practice for each of those production systems.
-  Greenhouse gas emissions from crop production are a consequence of several factors:
 - inadequate and excessive fertilization with mineral fertilizers, which causes a long-term reduction in organic matter in soils and significant CO₂ emissions
 - infrequent and improper application of manure
 - conversion to land use from extensive to an intensive plant production system
 - inadequate management of arable land
 - improper fertilizer techniques.
-  Currently, there is no fully integrated management of forest fires. Forests, which remove CO₂ from the atmosphere, can also emit CO₂ when they burn, as was the case with the forest fires in 2012, 2017 and 2019.
-  There is a lack of country-specific emission factors and activity data in the AFOLU sector which hinder the assessment of GHG emissions in the AFOLU sector. Moreover, there is a lack of investment in the research, observations, and skills required to develop the necessary datasets.
-  The main institutions responsible for collecting data relevant for the AFOLU sector are not involved meaningfully in the process.
-  The Law on Soil Protection and the National Activity Plan for soils are not yet ratified.
-  It is necessary to develop a Strategy for Soils and Strategy for Forestry.

LEGAL AND STRATEGIC FRAMEWORK

LEGAL FRAMEWORK

[Law on forests](#)

Rulebook on special measures for protection of forests from fires

[Law on agricultural land](#)

[Law on nature protection](#)

Rulebook on Good Agricultural Practices

Rulebook on cross compliance for minimum requirements of GAP and environmental protection

Special rulebook for forest fire protection

[Law on spatial and urban planning](#)

STRATEGIC FRAMEWORK

National Strategy for Agriculture and Rural Development 2021-2027

[National Program for Agricultural Development and Rural Development for the period 2018-2022 \(2018\)](#)

Development Strategy for forest fire protection, diseases and insects with action plan for realization of the projects and procurements for the needs of PE "Makedonski sumi"

[Long Term Strategy on Climate Action](#)

Key objective/target (2050): 35% emissions reduction in AFOLU sector (relative to 2016), mainly originating from Forestland.



For more information regarding the country's legal, strategic and institutional framework for climate change at the national level, international agreements that the country has adopted, as well as the integration of climate change in sectoral policies and national reporting, please refer to the General Booklet and/or visit the [link](#).

THE CLIMATE CHANGE IMPACT ON AGRICULTURE, FORESTRY AND LAND USE

Negative impacts on the AFOLU sector from climate change include the following:

- farmers are moving pastures to higher altitudes;
- the grazing season is getting longer;
- damage to crops from insects has increased due increases in insect survival in milder winters;
- the growing season is longer; and
- more water is required for irrigation.

The agriculture sector is responsible for 12% of the total amount of greenhouse gases emitted in 2019. Forests and forest lands are the main CO₂ sinks in Macedonia.

More information about land cover and agro-ecological conditions in the country can be found in the [Agroecological Atlas](#) and on <http://agroekologija.mk/>. The total area of forest, forest land, and barren land (estimated in the 2017) is 1.122.258 ha, out of which 1.001.489 ha are forest, 109.126 ha forest land, and 11.643 barren land.

There are over 5000 cattle farms with mainly dairy cows in the country. In September 2019, 2315 pig keeping sites have been registered.



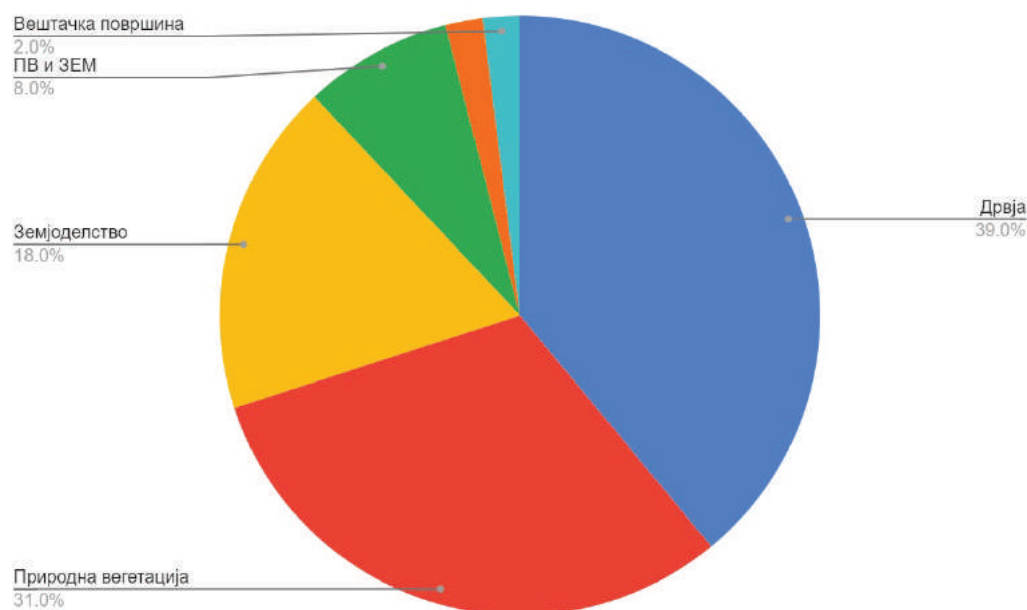
GHG emissions from the AFOLU sector include emissions associated with livestock, forestry, and land use. Activities related to livestock production emit methane (CH₄) and N₂O. Methane emissions are caused by enteric fermentation during the digestive process in ruminant livestock, but N₂O is also emitted during metabolic processes. N₂O is emitted as a result of manure storage and processing (management). Emissions due to livestock activity in 2019 totaled 824 Gg CO₂-eq. Since 2016, generally the emission trend is decreasing, mainly due to decreased number of heads in all species. It is worth to mention that in last 3 years, the estimation of GHG emission in two major contributors (dairy cattle and swine) the advanced Tier 2 methodology was applied. It also means that the figures regarding the emissions estimated before 2017 cannot be fairly compared.

The forestry sector is the major source of GHG sinks in Macedonia with the exception of several years when forest losses due to fire were significantly above the annual average. Total forested area, species composition (conifers, broadleaved, mixed), and the overall carbon balance in Macedonian forests are relatively stable. Estimated GHG sinks in this sector for 2016 totaled 2,120.65 Gg-eq CO₂ eq.

The percentage of forest land to total land in 2020 is around 40%, which is almost at the same level as the EU 28 average. The country with the highest forest land share in the EU is Slovenia (63.4%), followed by Croatia (50.6%).

Livestock sector as a one of the main sources of GHG with a total emission of CO₂-eq varying in a range of 1,109 Gg- CO₂ eq in 1990, to only 791 Gg-eq in 2014. Cattle are the main source of GHG among the ruminants. The majority of methane emission arises from enteric fermentation while manure management contributes with only 18% of the total CH₄ emissions.

Two key Sustainable Development Goals (SDGs) for this sector are SDG 13 (Climate Action) and SDG 15 (Life on Land).



KEY RECOMMENDATIONS

- Define mitigation measures to train farmers [how to collect, dispose and use manure, organic waste and by-products correctly](#)
- Introduce climate-smart agriculture to make farmers more productive and resilient
- Promote the use of digesters to generate biogas from manure
- Implement measures recommended in [Third Biennial Update Report on Climate Change of The Republic of North Macedonia - Mitigation report](#)
- Provide training for the relevant Governmental agencies to understand the relationship between CC and AFOLU and the importance of good sectoral reporting
- Develop a separate forest inventory as a digital database that is unique from the land title registry (cadastre)
- Support the development of country-specific emission and sequestration factors data and the collection of activity data;
- Create conditions for supporting an integrated forest fire management strategy
- Create conditions for developing new climate-smart forest management practices, creating forests that are resilient to climate change.

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