

PA #3 The North Macedonian Bioeconomy and supporting knowledge on the transition to a local circular bioeconomy

North Macedonia is predominantly a country oriented towards agriculture with this sector having the most significant impact on the country's economy. According to data from 2021, agribusiness contributes 7.6% to the GDP and 11.5% in the overall employment, including agriculture, forestry, and fisheries. Around 9.6 % of North Macedonia's total exported goods in the same year are agricultural and food products. The EU (50.6 %) and CEFTA countries (32%) are the primary export markets for agricultural and food products. In addition, 47.5 % of North Macedonia's total agricultural imports originate from the EU, with the remaining 17.6 % from the UK.

There are approximately 1.1 million ha of forests and forestland in the Republic of North Macedonia distinguished by a high biodiversity, low quality, and slow yearly growth. Around 90% of the country's forests are deciduous. The public enterprise "National Forests" controls over 90% of the forestland on behalf of the government and the remaining forest area is privately owned. More than 70% of forests are coppiced.

Beech is the dominating species, followed by a number of oak species. The estimated total wood reserve is 70 million m³ and the expected yearly growth is 1 million m³. A very substantial portion of the area classified as forestland is a Mediterranean-style forest with smaller trees and plants. The processing of wood is done by more than 100 entities with the majority being small sawmills. Many large businesses specialize in the manufacture of furniture and carpentry, while others work with the primary and secondary wood processing.



Figure 1: Fish Farming | North Macedonia

According to the State Statistical Office of North Macedonia, the total catch of fish in 2021 amounts to approximately 2 171 537 kg and compared to 2020 is increased by 4.1%. Of the total catch in 2021, 65.6% are cold-water fish, and the share of warm-water fish is 34.4%. Compared to 2020, the catch of cold-water fish was higher by 1.8%, and the catch of warm-water fish increased by 7.9%. Fish production and catch are based on aquaculture production (92.9%), commercial fishing (5.8%) and recreational fishing (only 1.3%). In the same year 1 815 million fish eggs were produced and juvenile fish with a total weight of 132 403 kg. Of the fish species, rainbow trout is the most

bred in the country. The most utilized methods of fish farming are fishponds (10655 ha), cages (6625 m³) and tanks and raceways (9980 m³).

Biomass is usually a domestic product in North Macedonia and therefore is independent from price fluctuations on a global level which characterizes it as an independent energy source. According to the energy balance, biomass accounts for 6% of the total primary energy production in the country. The most used biomass resource in North Macedonia is wood. North Macedonia has great potential for using biogas from animal manure for energy production, as well as the production of biofuel from vegetable crops. The largest fuel distribution company in North Macedonia "Makpetrol" introduced a facility for biodiesel production from oilseed rape in 2007 with a maximum capacity of 20,000 tons of B100 (pure biodiesel) intended for diesel engines and combustion chambers.

Biomaterials and bio-based products are derived from renewable biological feedstocks processed for production of conventional products (timber and textiles) or advanced products (bioplastics and pharmaceuticals). North Macedonia's bio-based industry is in the very early stages of development with very few small-scaled bio-based production capacities.

