



# Mapping Portugal's bio-based potential

Executive Summary





# EXECUTIVE SUMMARY

Portugal has the economic and innovation powers and the biomass feedstock to rapidly expand bio-based industrial activities on regional and national levels and become a strong partner in the European bioeconomy. On the European innovation [scoreboard 2020](#), Portugal moved from a moderate innovator to join the group of strong innovators. The country's bioeconomy already contributes almost **€20bn in turnover** annually placing it in prime position to lead Europe's bioeconomy transformation.

Despite its relatively small size, Portugal has a variety of climates and ecosystems, from the forested northern hills to the dry southern plains and from the Atlantic coast to the mountainous interior. The two island regions of Açores and Madeira add to the country's (bio)diversity. Portugal's exclusive economic zone, stretching from continental Portugal to Madeira and the Açores islands, includes a sizeable portion of the Central-North Atlantic Ocean. Furthermore, Portugal prepared a claim to the United Nations to extend its continental shelf. If accepted, this would increase its territory to 3.8 million km<sup>2</sup> (only 3% of which is terrestrial) becoming one of the largest countries in the [world](#).

Agri-food, forestry-based, marine-based (fisheries, algae and aquaculture) and chemical industries are among the strong drivers of Portugal's economy. In the bio-based processing sectors, the leaders in terms of production value are the food and beverages, pulp and paper and wood processing industries.

The presence of a well-organised innovation support infrastructure contributes to a significant list of ingredients for a sustainable bio-based sector. The Portuguese Government, through the Ministry of Environment and Climate Action, is currently preparing a national bioeconomy strategy: The Sustainable Bioeconomy Action Plan. This plan aims to promote a paradigm shift, accelerating the production of high-added-value products from biological resources (as an alternative to fossil-based materials). This plan is being developed while taking into account existing bio-based sectoral maps and with an understanding of the ecological limits of both the bioeconomy and the territories in question, providing considerable support for local, regional, and national bio-based operations.

While the country's Smart Specialisation Strategy does not feature a specific dedicated bioeconomy priority, it includes elements of bioeconomy in practically all its axes. Residual biomass is within the 'Commodities and materials' axis, while the axis 'Product and process technologies' has green chemistry as a topic. Biotechnology falls within the axis 'Natural resources and environment' and biomaterials are in the 'Health and wellbeing' axis.

The primary sectors and the subsequent processing sectors in Portugal have substantial bio-based residual streams and waste, most of which are generated in the processing stages. The pulp and paper industries are the most abundant source of residual biomass, followed by the food and beverage industries. The 2018 data show that less than 1% of the residual streams from the primary and processing sectors are routed to energy production, 82% is recovered and find mostly low-value applications and about 18% is disposed of. Excluding

current energy applications, this leaves over 1 million tonnes of residual streams that potentially could be routed to bio-based operations in the country, through which they can realise higher added-value in almost every market sector.

In addition, municipalities have significant quantities of bio-waste. The organic fractions thereof are estimated to total about 2.7 million tonnes in 2018, about 38% of which is landfilled. Since landfilling is being phased out, these quantities should find other destiny and the bio-based industry offers opportunities for conversion into value-added applications. It's not clear how the bulk of the organic fraction of bio-waste is managed. These streams are also relevant feedstocks for bio-based operations.

In recent years, Portugal has established itself as a rising force in biotech, thanks to the presence of several national and international actors and a healthy start-up ecosystem. There is a strong support towards high-tech university spin-offs and start-ups. The national agency FCT actively supports the creation of public-private cooperative hubs in which industry, academia, universities and research centres co-invest and co-create new products. The country has a well-established network of technology parks and incubators, the main ones are located in or close to universities; e.g., in Coimbra, Porto, Lisbon, Braga, Aveiro and Faro.

Several EU-funded research projects using biomass feedstock and biotechnologies have been running in Portugal in the last few years. Many Portuguese industrial and academic actors participate in European bio-based projects at all technology readiness levels. MULTI-STR3AM, a demonstration project receiving a €6.6

