

# **Biomass potential from agricultural waste for energetic utilization in Greece: a review**

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## **Extended Abstract**

Greece is not characterized by significant agricultural and livestock production. However, in the present work, an attempt has been made to calculate both the total biomass potential for the lignocellulose sources on a national level and for the respective individual Regions. This calculation can be used for the targeted development of biomass-to-energy projects in specific areas with the aim of simultaneously solving energy as well as environmental issues related to the uncontrolled disposal of biomass.

Biomass is the biodegradable fraction of products, wastes and residues of biological origin from agriculture (including plant and livestock), forestry and related industries, including fisheries and aquaculture, as well as the biodegradable fraction of industrial waste and Household waste. When biomass is burned to produce energy, it does not burden the atmosphere with CO<sub>2</sub>, because it has already absorbed about the same or more of its CO<sub>2</sub> during its life cycle.

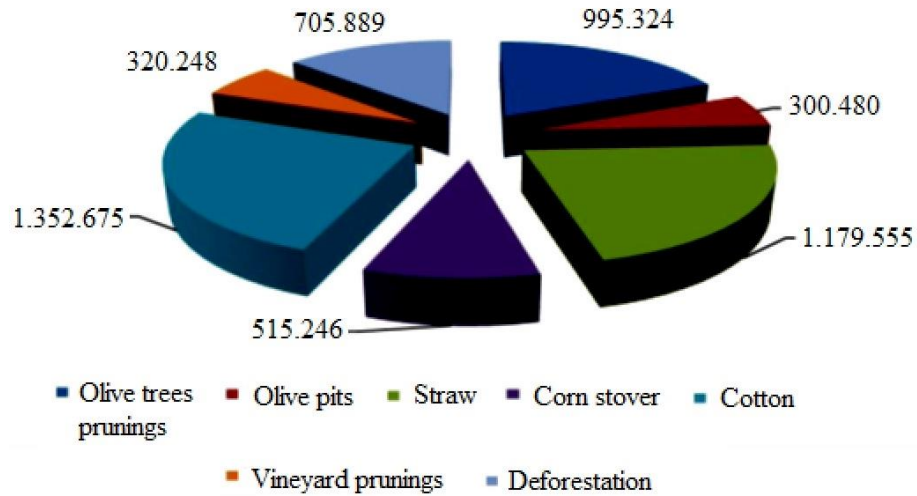
The term "agricultural and livestock waste" means any kind of by-products or derivatives of agricultural and livestock farming which either have ceased to have any economic value for the enterprise or their further management or processing is considered to be economically unprofitable. In such a case, they are considered to be "useless" for the activity that produces them and are intended to be removed, either in solid or liquid form. (Strategic Environmental Impact Assessment, Western Macedonia PECA). Agro-livestock waste includes: Livestock waste, crop residues, Fresh fruits and vegetables, Greenhouse coverage plastics, Fertilizer, agrochemical and pharmaceutical packaging waste, Irrigation equipment withdrawn and parts of agricultural machinery (National Waste Management Plan, 2015)

The energy production from biomass in order to meet the needs of electricity, heating and cooling and transport targets for installed power and output were set in line with EU Directive 2009/28 / EC. The estimation of total non-hazardous agricultural and livestock production in 2011 amounts to 10,781,000 tons, with a projected increase of 14,083,000 tons in 2020.

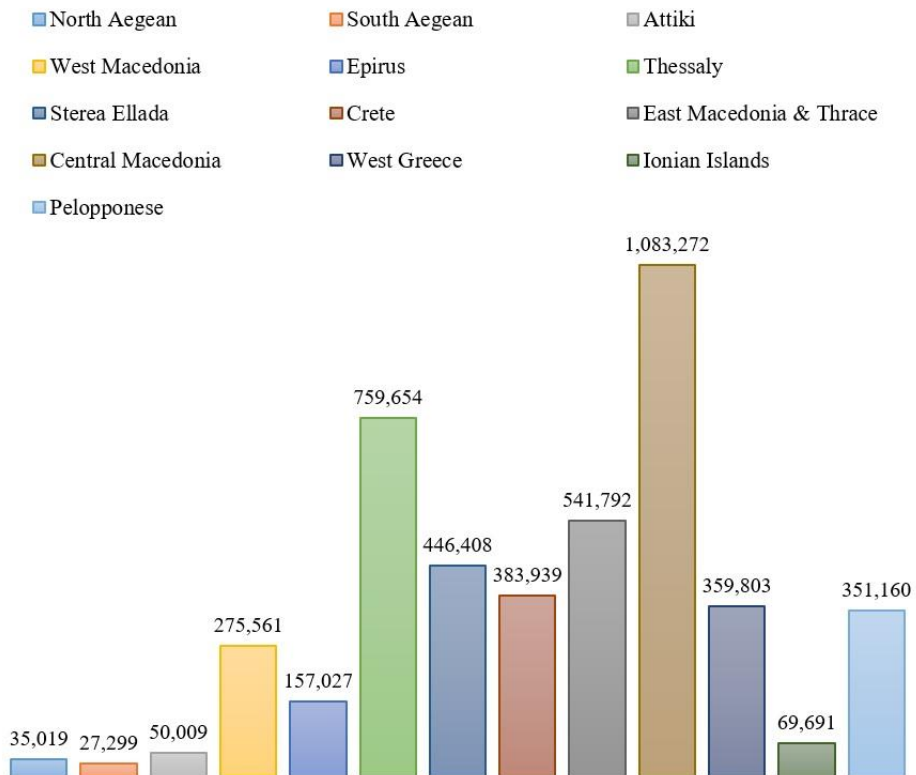
According to estimates by the Ministry of Development (2007), the energy equivalent of the agricultural and forest residues available annually is estimated at 1,000,000 tons, while other estimates show that the total available biomass in Greece is about 7,500,000 tons of residues of agricultural crops and 2,700,000 tons of forest logging residues. (PECA Region of Crete, 2012).

The distribution of annual biomass production in tons by agricultural waste category in Greece is shown in Figure 1.

A significant parameter for the development of biomass-to-energy units is the potential of lignocellulosic, i.e. woody, biomass. The woody biomass potential in Greece by region is shown in Figure 2.



**Fig. 1.** Distribution of annual biomass production in tons by agricultural waste category in Greece  
(Source: CRES, 2007)



**Figure 2.** Potential of woody biomass in Greece by region

In the framework of this study, several other types of biomass will be presented like the total biomass from tree plantations and forests per Regional Unity, the distribution of annual biomass production in tons by agricultural waste category in Greece, the total amount of arable crops production in Greece and finally the total biomass potential in Greece by Region. The results have been extremely encouraging, proportionally to the size of Greece and to the potential for developing biomass-to-energy units is promising.