



Interreg



Danube Transnational Programme

DanuBioValNet

Country Report

WP3 A-3.1.

***Cross-clustering partnership for boosting eco-innovation
by developing a joint bio-based value-added network for the Danube Region***

Framework Conditions for Cluster Development in bio-based industry
in **the Montenegro**

www.interreg-danube.eu/approved-projects/danubiovalnet/section/country-reports

twitter.com/danu_bioval



CONTENTS

Introduction.....	3
I. National context	3
II. Description of Montenegro	3
Annex	8

Introduction

I. National context

Basic key indicators	
Population Disaggregated by gender and age, rural and urban	622,218 (2016 estimates). 49.5% males and 50.5% females. 64% urban and 36% rural (2015).
GDP per capita, PPP (US \$)	15,485 (2015)
Income group	Upper middle income country
Economic growth in %	1.8%
Origin of GDP (%)	Agriculture 8% Industry 11.5% Services 80.5%
Manufacturing value added per capita	US\$ 283 to US\$ 333 for "Other Developing Economies"
Doing business rank	46 (out of 189) for 2016
Main natural resources	Water, wood, coal, bauxite, sea salt, oil and gas, stone, gravel and sand.
Major industries	Steelmaking, aluminium, agricultural processing, consumer goods, tourism, energy
Competitiveness index 2015-2016	70 (out of 140)
Main trading partners	Export: Serbia, Italy, Bosnia and Herzegovina, Albania, Kosovo Import: Italy, Serbia, Greece, Germany, Croatia, Bosnia and Herzegovina

II. Description of Montenegro

Montenegro is an upper-middle-income country with GDP per capita at PPP of USD 15,485, (42% of EU28 average)¹. It is one of the smallest countries in Europe with a total area of 13,812 km² as well as a 293.5 km coast along the Adriatic Sea, sharing land borders with Albania, Croatia, Bosnia and Herzegovina, Serbia and Kosovo². Montenegro is also the youngest country in the region as it gained sovereignty only in 2006. According to latest estimates, the population in 2016 accounts to 622,218 inhabitants³. The country is endowed with insufficiently utilized natural resources, such as water, whose used potential is just 17% (from total hydro power potential), and forest and forest land, which covers 69.4% of Montenegro's territory⁴. Additionally, Montenegro is rich in coal, bauxite, sea salt, oil and gas, stone, gravel and sand. Keeping in mind structure of Montenegrin industry and very high contribution of agriculture in GDP, the bioeconomy could be seen as a niche industry towards Montenegro should strive on. The Bioeconomy as a knowledge-based production, has not been promoted sufficiently on policy level. Thus there is not strategic framework tackling bio-based industries as a potential for building sustainable

and inclusive economy. From Montenegrin perspective, keeping in mind bioeconomy definition, it is important to build opportunities for cross-sectoral collaboration between following industries: agriculture and forestry, food industry, chemical industry, plastics and plastic processing industry, wood processing industry, construction industry, energy industry and machinery and plant engineering. The status of above mentioned industries will be shortly described in the coming chapters.

Agriculture:

The agricultural sector plays an important role in Montenegro's economy, with a significant share of the GDP (8.1% in 2014, including forestry and fisheries, compared to approximately 2% in the EU)⁵. The main agricultural products are wine, water, meat and meat products, wood and timber, as well fruits (apples, plums and citrus fruits)⁶. Agriculture along with the tourism sector is one of the strategic development sectors in Montenegro with a share of 2.2% of permanent employees from total employment, according to data from the Statistical office of Montenegro from the third quarter of 2015.⁷

1) Statistics Office of Montenegro (Monstat), National Accounts Statistics, available at <https://www.monstat.org/cg/>

2) Statistical Yearbook for 2016, available at: http://monstat.org/cg/publikacije_page.php?id=1474

3) Statistics Office of Montenegro (Monstat), Population estimates.

4) Montenegro Development Directions 2015- 2018.

5) Strategy for Development of Agriculture and Rural Areas 2015-2020.

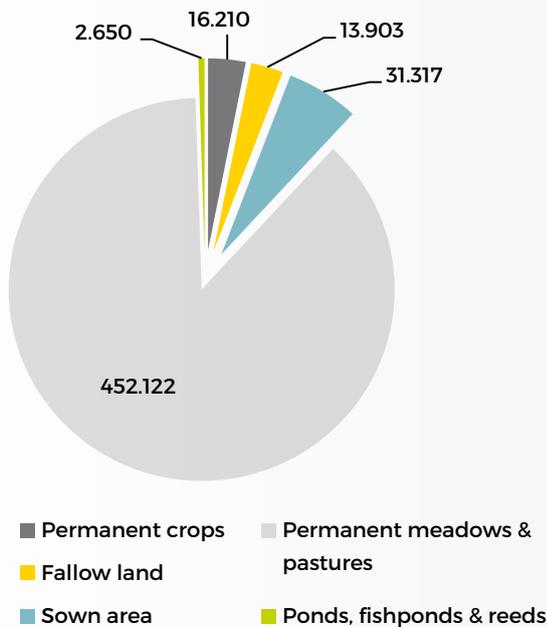
6) Agricultural development strategy 2015-2020.

7) Statistical office of Montenegro, Labor force survey III quarter 2015.

However, according to the Agricultural Census from 2010⁸, 98,341 individuals (of approximately 625,000 inhabitants in Montenegro) carried out some agricultural activities on family farms (part-time or unofficial work). This suggests that the real employment in agriculture is almost 30% of the total number of employees⁹.

Agricultural land covers the 37% of the total land area in Montenegro. The major part of the agricultural land is characterized as permanent meadows and pastures (grassland), while the area dedicated to the cultivation of various crops was just 3,4% of the total land in Montenegro.¹⁰ The main crops producing considerable quantities of field crop residues in Montenegro are maize, wheat, rye and barley. The main arboricultural residue resources in Montenegro are vineyards, olives, apples, plums, pears and citrus fruits prunings.

Chart no. 1: Structure of agricultural land in Montenegro by category of use



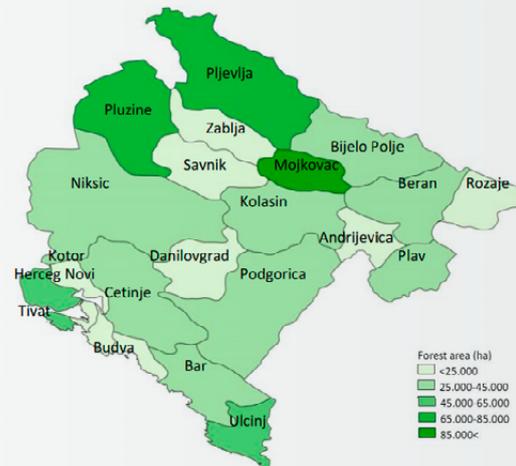
Forestry:

As per results of National forests inventory 60% of Montenegrin territory is covered by forests, while overgrown forest land is additional 9.7%¹¹. The total wood stock of all forests is 133 million cubic meters, of which 104 million is wood which is at disposal for

use (utilization) because it is accessible and out of protected zones (national parks, protected zones, etc).

Montenegro is the only country in South East

Picture no. 1: Forests area in Montenegro



European region with potentials for using wood residue for the purposes of producing modern wood fuels (i.e. beyond the traditional market for fire-wood for domestic heating) where these potentials are not used at all or are used to an Opportunities, challenges and current progress with developing woody biomass markets in Montenegro -extremely small degree. This statement especially refers to forestry sector where significant amounts of wood residue appear in the process of logging and wood assortment production.

Biomass feedstock in Montenegro:

Potential biomass resources in Montenegro sum up to 12.030.126 GJ, which is equivalent to 26% of the country's total primary energy supply. There is a big potential in Montenegro for energy crops cultivation. According to a conservative approach, perennial grasses cultivation in 10% and 5% of the country's grassland and fallow land respectively, could provide 7.441.176 of energy, which is two thirds of the total potential. Forest-based biomass is also a significant biomass resource in Montenegro amounting to 3.312.210 GJ, while almost half of it comes from industrial wood processing.

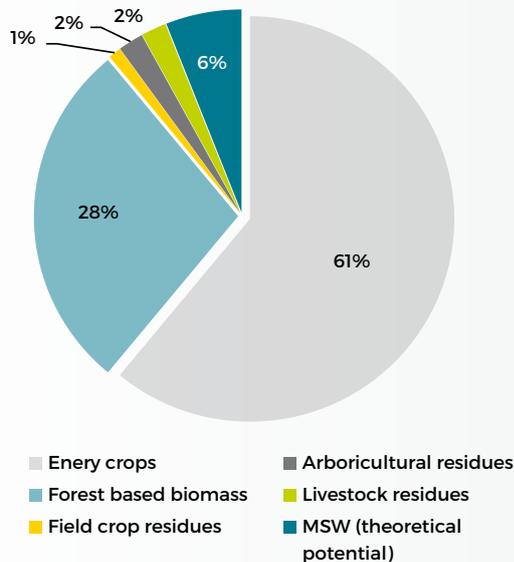
8) Statistical office of Montenegro, Agriculture census data.

9) Strategy for Development of Agriculture and Rural Areas 2015-2020.

10) Regional renewable energy assessment, page 5.

11) National forests inventory of Montenegro. Available at: <http://www.sumins.me/userfiles/1%20Prva%20nacionalna%20inventura%20suma%20Crne%20Gore.pdf>

Chart no. 2: Relative contribution of each biomass resource to the total potential



Agricultural biomass is far less significant in Montenegro, nevertheless significant quantities of vineyard prunings can be found in the region of

Table no. 1: Estimated technical biomass potential in Montenegro

	Potential (GJ)
Total	12.030.126
Energy crops	7.441.176
Forest-based biomass	3.312.210
Agricultural biomass	566.936
Field crop residues	72.157
Arboreal residues	246.615
Livestock residues	248.164
MSW (theoretical potential)	709.804

Podgorica. On the other hand animal farming is more widespread.

Agriculture field crop & arboricultural residues

Crop residues are mostly found in the municipality of Podgorica as it is shown in Figures F.3 and F.4, while the potential in this municipality contributes to the total potential by 47%. Furthermore, 89% of the produced residues in Podgorica come from the vineyards prunings. Significant amounts of residues are found also in the municipalities of Ulcinj and Bijelo Polje, where field crop residues make a significant contribution.

As per study undertaken it is estimated that 20.991 tons of field crop and arboricultural residues could be annually exploited for energy purposes (reference year of analysis 2008). This is equivalent to 318.773 GJ of energy or around 0,7% of the total primary energy supply.

Picture no. 2: Field crop and arboricultural residues technical potential map



Table no. 2: Crop residues available for energy production in Montenegro

Crop	Produktion (t)	Residues (t)	Degree of Availability (%)	Residues available for energy exploitation	
				Quantity (t)	Energy potential (GJ)
TOTAL	81.881	35.236		20.991	318.773
Field	15.306	15.878		4.763	72.158
Maize	9.626	10.589	30	3.177	49.237
Wheat	2.858	2.858	30	857	12.347
Barley	2.245	1.796	30	539	7.813
Rye	577	635	30	190	2.761
Arboricultural	66.575	19.358		16.228	246.615
Vineyards	43.991	10.998	90	9.898	148.470
Citrus	7.136	2.141	90	1.927	28.901
Apples	5.066	1.773	90	1.596	23.937
Plums	5.942	1.486	90	1.337	20.054
Olives	2.402	2.450	50	1.225	18.375
Pears	2.038	510	90	459	6.878

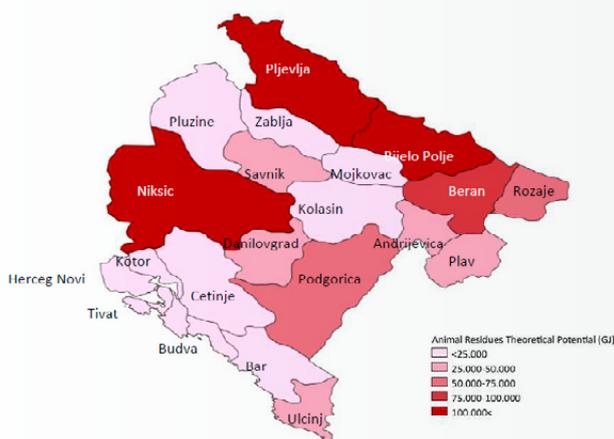
Source: Regional renewable energy assessment, page 9.

Livestock residues

In Montenegro according to official statistics [MONSTAT 2015] there were 92.452 cattle (heads), 24.951 pigs and 606.225 poultry in 2015.¹²

Even do Montenegro has a great potential in energy production from livestock residues still there is lot of efforts to be put in raising awareness of local agricultural producers on this source of energy. Still majority of producers, event it is envisaged by the law, have permeable septic tanks. From other side in order to be able to produce energy from livestock it has to be collected in lagoons or large tanks and can be considered feasible only in in-stall livestock systems, excluding therefore sheep and goats from such practices since their breeding is extensive making collection of manure impossible. Thus still cultivation culture as well as energy perception has to be changed in Montenegro.

Picture no. 3: Regional distribution of the theoretical potential of livestock residues (GJ)

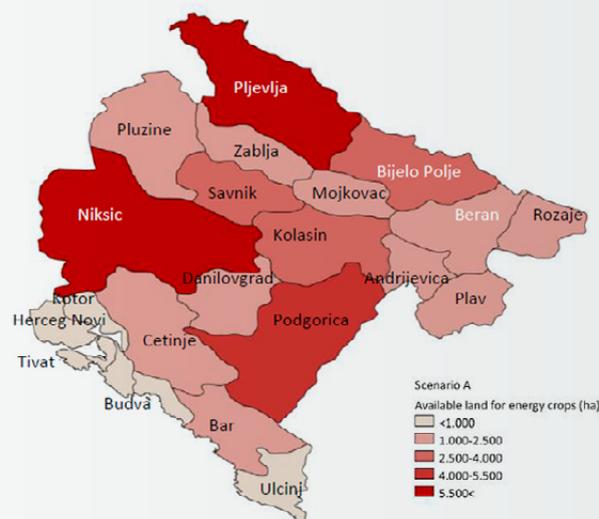


Energy crops

At the moment Montenegro has no production of agricultural crops in order to obtain energy. If we take parameters from regional countries it could be roughly estimated technical biomass potential which could be obtained from agriculture is ≈492GWh/year.

From other side relevant studies on biomass in Europe states that 3-10% of arable land could be used for cultivation of energy crops. Having in mind specific geography of Montenegro it is considered that maximal amount of arable land which could be used for this purpose is up to 3%.

Picture no. 4: Available land (ha) for energy crops cultivation in Montenegro



Forest-based Biomass

Cumulative data show that it is possible to produce about 426.4 GWh of energy from the available wood residue in Montenegro. Compared to the realized production of electric power of 2,872 GWh in 2015, it represents 14.8%, which surely cannot be disregarded as Montenegro imports significant amounts of electric power and other fuels. Putting in function and the realization of available amounts of woody biomass for energy purposes will give significant contribution to the reduction of energetic dependence of Montenegro. Nowadays in Montenegro fuelwood is used for household heating. However, since energy demand increases and the prices of fossil fuels, soar, other forest-based biomass resources apart from fuelwood are also considered for energy exploitation. These include forest residues and bark as well as residues/by-products coming from the processing of industrial wood.

For the last two years there have been small steps ahead in using large wood residue from industrial wood processing in the sense of its sale to local residents for heating, making brandy and other needs, but in spite of this there are still significant amounts of wood residue which are not used. Apart from local residents, larger wood residue is also bought by schools, hospitals and health care centers and it is mostly used as kindling wood, while their main energy-generating product is fuelwood or coal. Such examples are highly frequent in Berane, Andrijevica, Bijelo Polje and Plav.

12) Statistical office of Montenegro data for 2015.

Table no. 3: Forest-based biomass available for energy production in Montenegro

Source of Biomass	Biomass (m ²)	Degree of Availability (%)	Biomass available for energy exploitation	
			Quantity (m ³)	Energy potential (GJ)
TOTAL	436.391		349.937	3.312.210
Fuelwood	156.181	100	156.181	1.535.530
Forest residues	81.390	50	40.695	331.175
Sawmill residues	147.986	80	118.389	1.122.458
Bark	23.020	60	13.812	110.436
Other wood industry residues	27.814	75	20.860	212.611

Biomass from waste

Due to importance of resolving environmental problems related caused by waste, policy makers are strongly supporting use of waste in energy purposes. When it comes to waste strategies all Municipalities in Montenegro should develop

sanitary landfills. Today we have active landfills in Podgorica and Možura for two Municipalities (Ulcinj and Bar). Gas collection is in progress and plant for cogeneration for gas usage from sanitary landfill is in progress.

Annex

Definitions/Glossary

Clusters: Clusters are generally described as groups of specialised enterprises, often SMEs, and other supporting actors in a particular location that cooperate closely together.

Cluster initiatives: A cluster initiative is an organised effort aiming at fostering the development of the cluster either by strengthening the potential of cluster actors or shaping relationships between them. They often have a character like a regional network. Cluster initiatives usually managed by a cluster organisations.

Cluster organisations: Cluster organisations are entities that support the strengthening of collaboration, networking and learning in innovation clusters and act as innovation support providers by providing or channelling specialised and customised business support services to stimulate innovation activities, especially in SMEs. They are usually the actors that facilitate strategic partnering across clusters. Cluster organisations are also called cluster managements.

Cluster participants: Cluster participants are representatives industry, academia or other intermediaries, which are commonly engaged in a cluster initiative. Given the case a cluster initiative has a certain legal form, like associations, cluster participants are often called cluster members.

Cluster policy: Cluster policy is an expression of political commitment, composed of a set of specific government policy interventions that aim to strengthen existing clusters and/or facilitate the emergence of new ones. Cluster policy is to be seen as a framework policy that opens the way for the bottom-up dynamics seen in clusters and cluster initiatives. This differs from the approach taken by traditional industrial policies which try (and most often fail) to create or back winners.

The Country Report was created by:

Montenegro Vine Cluster

Šarla de Gola br 2

81000 Podgorica

Montenegro

www.winesofmontenegro.me

vinogradari@t-com.me

www.interreg-danube.eu

[eu/approved-projects/](http://approved-projects/)

danubiovalnet/outputs

