

Project: BiG>East
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Assessment Studies for Specific Biogas Sites in the target region of Romania

Deliverable D 6.3



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Summary

Site 1:

First site is situated 20 Km East from Bucharest, Romanian capital city. The biogas station will be developed in an agricultural platform, comprised by seed storage facilities (40 000 ton/year), drying, cleaning facilities for seeds, agricultural machinery workshop, mill, and a newly developed biodiesel plant (seeds to biodiesel, 16 ton/day biofuel production). The platform is approximately 3 Ha and has access to main roads and a secondary railroad. Main feedstock will be rapeseed and sunflower cakes from pressing facility, glycerol, maize straw and other vegetal agricultural waste matter. D 6.1 methodology was used mainly to define the right extraction area for the complementary biomass (corn and others). Area is already populated with growing agricultural based industry, more investors declaring ready to develop energy-consuming units on place.

Site 2:

Second site is situated in Buzau district, 110 Km North-East from Bucharest, in predominately-agricultural area. The biogas plant will be integrated with a biodiesel plant (oleaginous seeds pressing, extraction, oil filtering and biodiesel production equipment). The biodiesel production is 2000 l/day. The area of the facility is 8000 m³. Main feedstock will be

rapeseed and sunflower cakes from pressing facility, glycerol, maize straw and other vegetal agricultural waste matter. D 6.1 methodology was used to assess the potential of the agricultural area in terms of distance from the plant and also to assess the heat/electricity consumed in the area. Nearby village is a good opportunity to sell the heat in the winters and power on a regular basis (offering in this respect possibilities to develop a local district heat network, eventually based on regional development programs and structural funds).

Site 3:

The third identified site is located close to the second one, in the district of Buzau, being an agricultural research and production facility of Romanian Agricultural Sciences Academy. The farm has a 600 Ha property and a cow farm (80 heads and growing) situated in a 3 Ha agricultural complex. The facility has research laboratories and staff and develops a program for integrated farm production, being the perfect location for a small biogas pilot plant for research and demonstration purposes. The raw material (cow manure) will be supplemented with maize straw and cereal straw. Cow farm, the greenhouse and plans to have chicken/turkey farm with incubator, assure the use of the heat during winter and needs a significant part of the power. Excessing heat will not be used in the first step during the hot season, and the excess power could be sold to national grid or nearby village.

All three spots were basically identified by customer driven means, but they were assessed in order to meet D 6.1 basic recommendations and also integrated in the results of Task 3.1 Report. Both Ilfov (for the first site) and Buzau (for the other two) districts are situated in agricultural areas with high density of agricultural wastes, both primary and secondary production.

Results within Step 1: Selection of the Region

Description of the selected regions for potential Biogas Sites

Overall biomass production (primary agricultural production as described in Tasks 2.3 and 2.4 Reports) is one of the biggest in Romania in the region of the three sites. Particularly, the Site 1 is located at the intersection of NUTS RO315 and RO312, having the highest density in terms of energetic crops (biomass from seen as agricultural primary production). Site 2

and site 3 are located also in areas of high density of energetic crops but also with good potential in agricultural primary production wastes and wastes from secondary production.

Site selection was done starting with the selection of the interested customers, based on the biomass potential of proposed location. The particularities of the sites were compared against results from 2.3 and 2.4 Tasks Reports and integrated with the data about site vicinity and infrastructure and potential for energy utilization.

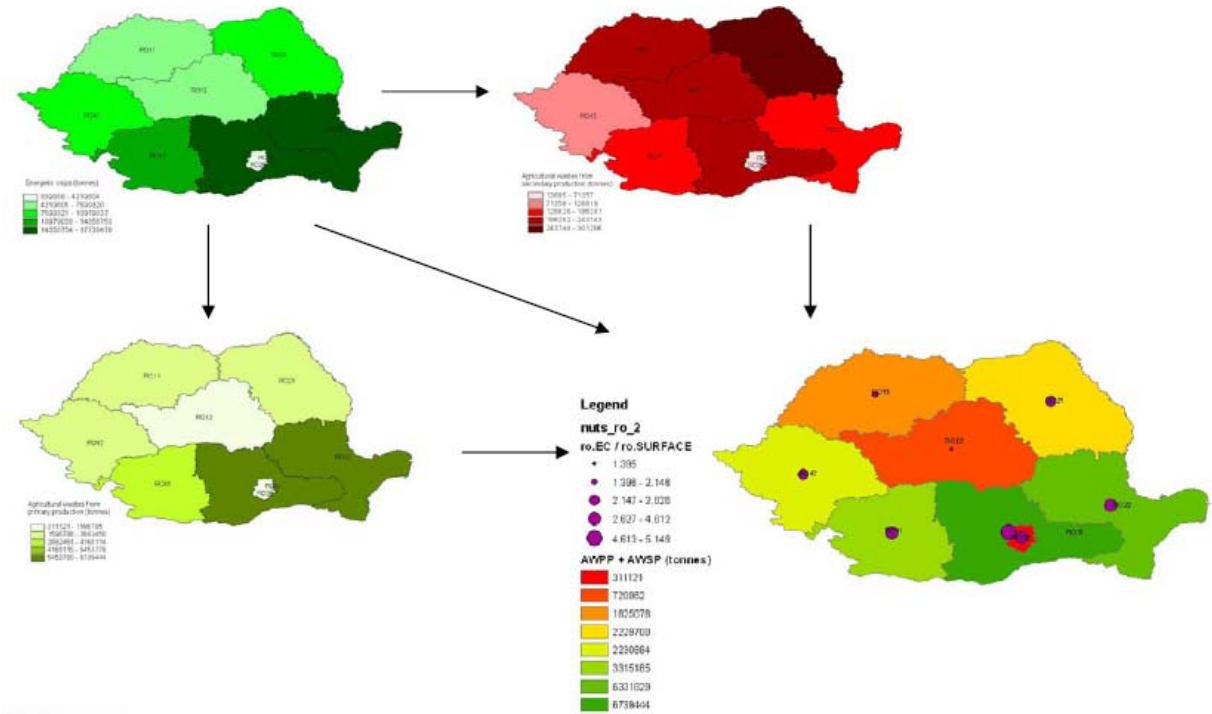


Figure 1 – Site selection considering biomass potential in the areas.

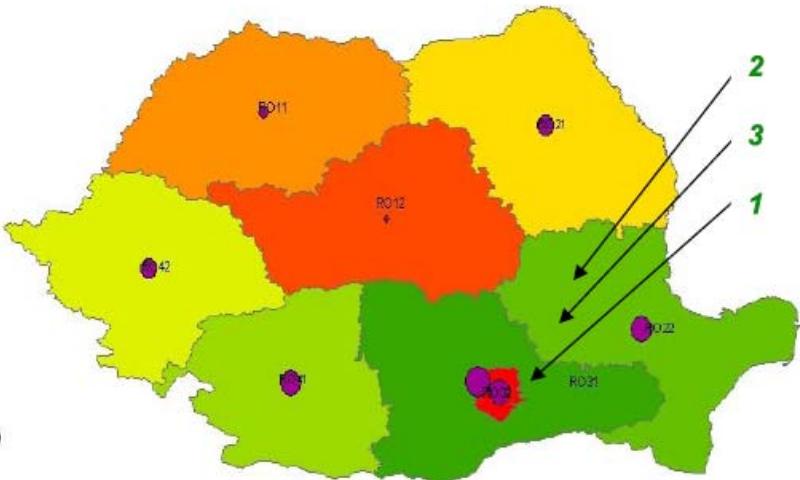


Figure 2 – Location of the sites on Romanian map

Biomass supply

Site 1 was chosen as a potential location for a biogas plant based on the agricultural wastes and rapeseed/sunflower cakes from a nearby biodiesel plant. Sarulesti is located in an absorption basin of 20 000 Ha (considering the net amount of grains stored annually in the investor silos, being 40.000 t). Assessment shows a feedstock of 12 000 t / year mixed cakes (rapeseed and sunflower) from the biodiesel plant and a minimum of 15000 t/year biomass from agricultural primary production (maize straw). Supplementary raw material is to be considered the technical glycerol from the biodiesel factory (in the percent admitted by anaerobic fermentation process).

Site 2 is a copy at lower scale of the first one. It is conceptually integrated with a 2000 l/day biodiesel plant, counting on a feedstock for biogas of approximately 1500 t/year mixed cakes (rapeseed and sunflower) from the biodiesel plant and a minimum of 1800 t/year maize straw and other vegetal agricultural waste matter. Supplementary raw material is to be considered the technical glycerol from the biodiesel factory (in the percent admitted by anaerobic fermentation process).

Site 3 is a typical small farm, based on a 600 Ha mixed crops (corn, wheat, maize), having a cow farm (80 heads) and plans to develop other chicken/turkey farm. The feedstock of the biogas plant will be composed annually by 400 t of cow manure and 2500 t of agricultural maize straw. Those are the quantities produced by farm itself. Further assessment of the potential is needed in order to see the real potential that was assessed at least three times the presented numbers. The site is located in a traditional agricultural area, with farm size ranging from 5-100 Ha, located in an area of 5000-8000 Ha potential feedstock-generating crops.

The detailed analysis of the potential in the three spots will be further investigated through continued interviews with stakeholders and local community.

Biogas Digestate Utilisation

For all sites, the total amount of the digestate could be used in the nearby fields as fertilizer and facilities for digestate storage during the winter could be built on place, if economically feasible.

Results within Step 2: Selection of the biogas neighborhood

Sale of energy in the neighborhood of the biogas plant

Biogas Site 1: Sarulesti (~ 6 millions m³ biogas/year)

Sale and Purchase of Electricity:

Site name: Sarulesti	Figure	Comments
Distance to the general electric grid in meters:	0	
Voltage of the general electric grid nearby in kV:	380	
Space for transformation station on-site in m ² :	>20	

Use of Heat:

	kW	Brief description of heat use (Distance to heat customer in meters	
Plant size in kWel	1500		
Heat Supply Total in kWth	1875		
Heat Supply Summer	1875		
Heat Supply Winter	1237,5		
Heat Demand 1 in Summer	281 losses		0
Heat Demand 1 in Winter	937 biogas plant and losses		0
Heat Demand 2 in Summer	500 pelletizing unit		200
Heat Demand 2 in Winter	800 pelletizing unit and facilities		200
Heat Demand 3 in Summer	100 seed dryer		500
Heat Demand 3 in Winter	200 utilities		500
Remaining Heat Load Summer	994		
Remaining Heat Load Winter	-699,5		

Biogas Site 2: Sahateni (~ 0,7 millions m³ biogas/year)

Site name: Sahateni	Figure	Comments
Distance to the general electric grid in meters:	0	
Voltage of the general electric grid nearby in kV:	380	
Space for transformation station on-site in m ² :	7	

Use of Heat:

	kW	Brief description of heat use	Distance to heat customer in meters
Plant size in kWel	190		
Heat Supply Total in kWth	237,5		
Heat Supply Summer	237,5		
Heat Supply Winter	156,75		
Heat Demand 1 in Summer	35	losses	0
Heat Demand 1 in Winter	115	biogas plant, loses	0
Heat Demand 2 in Summer			
Heat Demand 2 in Winter	15	households	200-500
Heat Demand 3 in Summer			
Heat Demand 3 in Winter			
Remaining Heat Load Summer	202,5		
Remaining Heat Load Winter	26,75		

Biogas Site 3: Dulbanu (~ 0,78 millions m³ biogas/year)

Site name: Dulbanu	Figure	Comments
Distance to the general electric grid in meters:	0	
Voltage of the general electric grid nearby in kV:	380	
Space for transformation station on-site in m ² :	10	

Use of Heat:

	kW	Brief description of heat use (Distance to heat customer in meters	
Plant size in kWel	233		
Heat Supply Total in kWth	291,25		
Heat Supply Summer	291,25		
Heat Supply Winter	192,23		
Heat Demand 1 in Summer	43 losses		0
Heat Demand 1 in Winter	145 biogas plant and losses		0
Heat Demand 2 in Summer			
Heat Demand 2 in Winter	50 cow farm		100
Heat Demand 3 in Summer			
Heat Demand 3 in Winter	50 greenhouse		100
Remaining Heat Load Summer	248,25		
Remaining Heat Load Winter	-52,78		

Results within Step 3: Selection of the Biogas Site itself

Requirements towards the biogas plant site

Biogas Site 1: Sarulesti



Located in Southern Romanian plane (Baragan) one of the most productive agricultural areas in the country, Sarulesti is situated near A2 highway and the main railway from Bucharest to Constanta. In Figure 3, up, the limitrof zone of the village and agricultural lands, and down, the detail of the biodiesel facility (red) and available area of the biogas plant (light green).

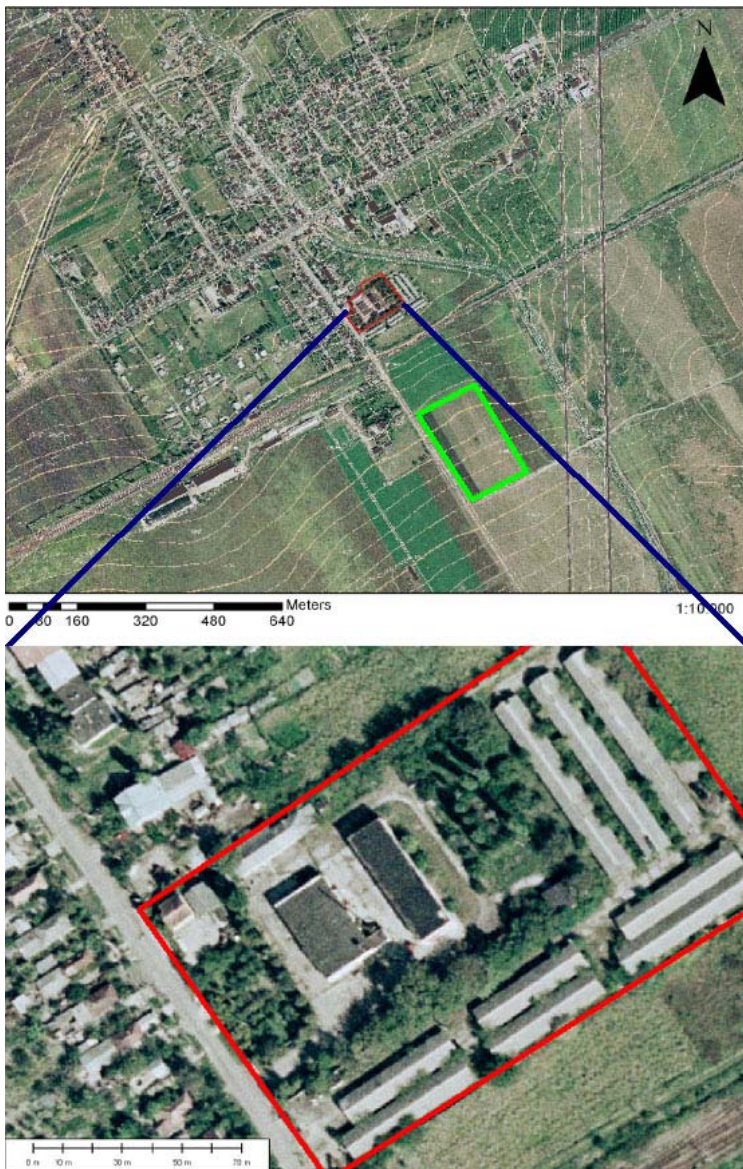
The facility has multiple road access and a distance of 200 m from a main industrial railroad station.

Figure 3 – Geographical location of site 1 - Sarulesti



Figure 4 Site-view of the future biodiesel facility in site 1

Biogas Site 2: Sahateni



Situated in the Sub-Carpathian plane of Buzau, close to Buzau river, Sahateni is an agricultural area proper for maize and cereals. In Figure 5, up, the limitrof zone of the village Sahateni and agricultural lands, biodiesel facility (red) and available area for the biogas plant (light green), and down the detail of the biodiesel facility.

The facility has access to a national road and is 200 m far from a main railroad with station 2 Km to East.

Figure 5 Geographical location of site 2 – Sahateni



Figure 6 Site-view of the future biodiesel facility in site 2

Biogas Site 3: *Dulbanu*



Figure 7 - Geographical location of site 3 – Dulbanu

Dulbanu village is situated close to second site, in an agricultural intensive area with many animal farms. Dulbanu is a research-orientated unit under the Romanian Academy of Agricultural Sciences and it was one of the stakeholders manifesting interest in Big_East project even before acceptance (issuing a letter of interest in that respect).

It has good infrastructure – concrete access road with national road network intercommunion. Electrical grid has a transformer on place.

The biogas plant could be partially build on the farmland (in red) and the silage could be stored on the red perimeter.

Biogas Site 1: *Sarulesti*

Available space

Site name: Sarulesti	Figure	Comments
Space for Biogas Plant (in m2)	Up to 10 000	
Space for the storage of biomass on-site:	20 000	
Space for the storage of biomass at the producer	0	
Space for the sludge storage	2000	

Sufficient Road Access

Site name: Sarulesti	Figure	Comments
Distance to intersectorial road (in km)	1	

Additional site requirements

Site name: Sarulesti	Yes	No	Comments
Site access for trucks possible	X		
Soil contamination is unlikely	X		
Soil is suitable for industrial construction	X		
Planning instrument prohibits biogas plant on – site		X	
Planning instruments foresees residential, cultural or nature protected areas nearby		X	
Residential, cultural or nature areas do exist in the proximity	X		

Ownership structure

Site name: Sarulesti	
Who is the owner of the selected site:	Private entity - confidential
Will the owner also be the operator of the biogas plant	Yes
Is there a basic possibility to buy the land	No

Biogas Site 2: Sahateni***Available space***

Site name: Sahateni	Figure	Comments
Space for Biogas Plant (in m2)	3000	
Space for the storage of biomass on-site:	7000	
Space for the storage of biomass at the producer	0	
Space for the sludge storage	500	

Sufficient Road Access

Site name: Sarulesti	Figure	Comments
Distance to intersectorial road (in km)	0,5	

Additional site requirements

Site name: Sahateni	Yes	No	Comments
Site access for trucks possible	X		
Soil contamination is unlikely	X		
Soil is suitable for industrial construction	X		
Planning instrument prohibits biogas plant on – site		X	
Planning instruments foresees residential, cultural or nature protected areas nearby		X	
Residential, cultural or nature areas do exist in the proximity	X		

Ownership structure

Site name: Sahateni	
Who is the owner of the selected site:	SC NAVIGAL IMPEX SRL

Will the owner also be the operator of the biogas plant	YES
Is there a basic possibility to buy the land	YES

Biogas Site 3: *Dulbanu*

Available space

Site name: Dulbanu	Figure	Comments
Space for Biogas Plant (in m2)	5000	
Space for the storage of biomass on-site:	10000	
Space for the storage of biomass at the producer	3000	
Space for the sludge storage	2000	

Sufficient Road Access

Site name:	Figure	Comments
Distance to intersectorial road (in km)	2	

Additional site requirements

Site name: Dulbanu	Yes	No	Comments
Site access for trucks possible	X		
Soil contamination is unlikely	X		
Soil is suitable for industrial construction	X		
Planning instrument prohibits biogas plant on – site		X	
Planning instruments foresees residential, cultural or nature protected areas nearby		X	
Residential, cultural or nature areas do exist in the proximity	X		

Ownership structure

Site name: Dulbanu	
Who is the owner of the selected site:	Academic self-budgeted unit
Will the owner also be the operator of the biogas plant	YES
Is there a basic possibility to buy the land	NO

Results within Step 4: Optimizing the soft requirements for selected sites

Can political support be found on municipal and regional level?
YES

Is Know-how for biogas operation in the region available?
NO

Would it be possible to involve a committed project developer in the region?
We will try to further detail this during implementation of the courses for farmers.

(answers identical for all the sites)