ABC DE POSAVINA

THE CATALOGUE FOR INVESTORS

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CONTENTS

FIGURES

TABLES

ABBREVIATIONS

BiH – Bosnia and Herzegovina

EA – energy approval

FBiH – Federation of Bosnia and Herzegovina

FERK – Regulatory Commission for Electrical Energy in the Federation of Bosnia and Herzegovina

HEP ODS – Croatian Electricity Company, Distribution Network Operator

CERA – Croatian Energy Regulatory Agency

HROTE – Croatian Energy Market Operator

ME – Ministry of Economy

MENP – Ministry of Environmental and Nature Protection

OG – Official Gazette

RESEC – renewable energy sources and energy cogeneration

RES – renewable energy sources

PEA – preliminary energy approval

POSSPP – Rule book on acquiring the status of an eligible producer of electrical energy

EIA – environmental impact assessment

LU – livestock unit

VSC - Vukovarsko-Srijemska County

ZOE – Law on Energy

ZPUG – Law on Spatial Planning and Construction

ZTEE – Law on Electricity Market

ZZO – Law on Environmental Protection

RS – Republic of Srpska

PREFACE

The Catalogue for Investors is one of the documents compiled within the project titled “Agricultural Biomass Cross-border Development of Energy in Posavina (ABCDE Posavina) financed by the EU through IPA – Instrument for the Pre-Accession Assistance between Croatia and Bosnia and Herzegovina.

The Catalogue refers to the area covered by the project and includes the areas of Vukovarsko-Srijemska County in the Republic of Croatia, and Brčko District and municipalities of Orašje, Odžak, Domaljevac-Šamac and Šamac in the neighbouring Bosnia and Herzegovina (BiH).

This Catalogue was made by an interdisciplinary team of experts from the Energy Institute Hrvoje Požar and the University of Banja Luka.

1. INTRODUCTION

The Catalogue for Investors (hereinafter referred to as Catalogue) is a document intended for all potential investors, that is, project holders dealing with the use of agricultural biomass for generation of energy in Posavina and in the broader region as well. It aims to facilitate and enhance the implementation of such projects by providing investors with the most important data and information in a concise and comprehensive manner.

Besides potential investors, the Catalogue may help the representatives of local administration to promote projects dealing with the use of agricultural biomass for generation of energy in the area of Posavina.

Within the ABCDE Posavina Project, the projects aiming at the use of agricultural biomass for generation of energy refer to projects that deal with construction of biogas facilities and plants for production of biofuels. Agricultural biomass is a basic raw material and feedstock, but it is also a renewable source of energy. There are two key reasons to exploit biomass as a renewable source of energy: the awareness of limited fossil sources of energy and clear indicators that the so-far approach towards the environment, including exploitation and use of fossil fuels, had significant adverse effects on the environment itself.

Taking into account national policies, both in the Republic of Croatia and Bosnia and Herzegovina, as well as corresponding national goals in regards with renewable sources of energy, the abovementioned projects also have a very important role.

The Catalogue consists of four chapters. **The first chapter** gives a detailed account of agricultural production potential, that is, substrate for generation of energy in terms of quantity and area. In regards with this, another document is also important, namely the Study of agricultural market, compiled within this project as well, which represents an essential source of relevant data and information. It is available on www.abcde-posavina.org. **The second chapter** provides an overview of relevant legal framework that is central to key segments of development of these projects as well as a concise overview of administrative procedures. **The third chapter** describes possible sources of funding for the projects aiming at utilization of agricultural biomass for generation of energy whereas conclusions make up the last **fourth chapter**.

2. USING AGRICULTURAL BIOMASS FOR ENERGY PURPOSES IN THE AREA OF POSAVINA

The data, relevant assumptions and calculations given below are a result of the Study of agricultural market.

In the animal husbandry sector, the quantities of manure produced by breeding livestock, pigs and poultry have been considered. In respect with field crop production, the focus is on maize production (silage and grain), oilseed rape, soya bean and sugar beet. Moreover, biodegradable waste produced in slaughterhouses has been evaluated in terms of its quantity but only for Vukovarsko-Srijemska County.

The energy potential within this document, as well as within the

Study of agricultural market, refers to energy potential of agricultural biomass whilst assuming that the current conditions in agricultural production shall remain, along with the improvement of infrastructure in animal production that could enable exploitation of manure for production of biogas (the so-called referential scenario according to the Study).

The basic input assumptions are as follows:

1. **Animal production**
   - Livestock (the number of pieces of livestock units of cattle, pigs and poultry) is equal to the current number, hence the total annual quantity of animal manure available is the same;
   - All animal farms have the infrastructure that enables them to collect all the manure produced so as to exploit it for production of biogas.
2. **Field crop production**
   - Average annual yields of the crops considered are equal to the average yields for 2007-2010;
   - The total available land for non-food production is utilized for production of energy crops.

The agricultural biomass potential for generation of energy is given in more detail in the following sections according to the local units of the subject matter area, whereas a comprehensive spatial and quantitative review of the latter is given in Figures 2-1, 2-2, 2-3 and 2-4.

2.1. Agricultural Biomass Potential for Generation of Energy in Vukovarsko-Srijemska County

2.1.1. Plant production

Vukovarsko-Srijemska County is the most eastern county in the RC covering the total of 245,400 ha. Agricultural land spreads across around 150,000 ha, although the exact area varies depending on the source.

According to the data from the Administration Department for Agriculture, Forestry and Rural Development of Vukovarsko-Srijemska County, medium and large farms, ranging from 20 to 50 ha, own 95,751 ha. Almost their entire production is market-oriented.

Considering the sowing structure distribution, maize, wheat, soya bean, sugar beet, sunflower, barley and tobacco prevail. Maize is the dominating crop in the field crop production sown on average 26,872 ha and with average grain yield of 7.1 t/ha. Other field crops are grown to a lesser extent, such as soya bean that covers on average the area of 14,749 ha and with average grain yield of 2.8 t/ha, sugar beet on average 10,780 ha and with average root yield of 55.2 t/ha and oilseed rape on average 3,718 ha and with average yield of 2.7 t/ha. Distribution of these crops in the cropped area is 36.2% with respect to the total arable land.

2.1.2. Animal production

The basic biomass obtained through animal production is comprised of stable manure. Large quantities of manure resulting from rearing livestock can be used to produce biogas, and later as fertiliser in field crop production.

Based on the data collected, it can be said that cattle production is the dominating one, followed by pig and poultry production. Poultry production is mainly oriented towards production of eggs, whereas broiler production is less present. In this type of production, there is an evident trend characterised by large producers with four farms with over 1,000 pieces of chickens, out of which one of them has around 74,500 chickens. The total production of manure obtained from cattle, pigs and poultry is presented in Table 2-1.

Table 2-1: Manure production in the area of Vukovarsko-Srijemska County

Category	Stock	Number of LUs	Manure production	
			Per LU annually/t	Total annually/t
Cattle	38,004	32,283	9.49	306,366
Pigs	102,996	14,080	8.03	113,062
Poultry	170,314	511	9.49	4,849
Total	-	46,874	-	424,277

Following the data from the Veterinary Administration in the Ministry of Agriculture, the total of 875 t of animal origin by-products that were not to be used as food for people were disposed of in the county during 2009.

2.1.3. Energy potential of agricultural biomass

The results calculated for theoretical potential of biogas production, electrical and/or heat energy from biogas by using various technologies are shown in Table 2-2 whereas theoretical potential of fluid biofuels production is presented in Table 2-3.

Table 2-2: Theoretical potential of biogas production at an annual level

Production technology	Mono-digestion (MD)	Co-digestion (CD)		Cogeneration			
Sirovinska osnova	Biogas energy value	Biogas energy value	Agricultural area for silage crops	Electrical energy (h=0,36) GWh/year		Heat (h=0,30) GWh/year	
	GWh/year	GWh/year	ha	MD	CD	MD	CD
Cattle manure	168.5	304.6	3,905	60.7	109.7	50.6	91.4
Pig manure	18.8	69.1	1,441	6.8	24.9	5.6	20.7
Poultry manure	4.8	7.0	62	1.7	2.5	1.4	2.1
Slaughter. waste	4.4			1.6	1.6	1.3	1.3
TOTAL	196.51	385.03	5,408	70.74	138.6	59.0	115.5

It is evident from Table 2-2 that biogas obtained by co-digestion of the total animal husbandry waste (livestock manure including cattle, pigs and poultry, slaughterhouse waste and 181,833 t of maize silage (with 30% of maize silage in the feedstock) could be used in a cogeneration facility to generate 138.6 GWh of electrical energy and 115.5 GWh of heat annually. In addition, in order to grow the said quantity of maize silage, 5,408 ha/year would be needed. By assuming the said efficiency (66%) and 7,000 working hours annually under the rated load, total theoretical installed capacity of cogeneration facilities would amount to 19.80 MW_{el}.

As around 50% of the total livestock, i.e. cattle, pigs and poultry units are reared in large farms in Vukovarsko-Srijemska County, it is reasonable to assume that 50% of the total available animal waste could be used for generation of energy. Accordingly, the total installed capacity of the biogas cogeneration facilities could be 9.90 MW_{el}, a possible and feasible potential at the same time.

Table 2-3: Theoretical potential of fluid biofuel production (biodiesel or bioethanol)

Feedstock	BIODIESEL		BIOETHANOL		Agricult. area for growing raw materials
	t/god.	TJ/god.	t/god.	TJ/god.	ha
Oilseed rape	115.067	4.257,50			104.413
Soya bean	55.370	2.048,71			104.413
Maize - d.p.*			227.402	6.139,86	104.413
Maize - w.p.**			218.682	5.904,41	104.413
Sugar beet			446.790	12.063,33	104.413

*dry process; **wet process

As it can be seen in the previous table, when engaging total agricultural area for non-food use to grow a single crop for production of biofuel, bioethanol obtained from sugar beet shows the greatest potential and then follows bioethanol obtained from dry processed maize. When analysing the potential given, it is necessary to bear in mind the characteristics of agricultural production of the subject crops as well as pedologic conditions in the area of Vukovarsko-Srijemska County. Taking into account all factors, real potentials for production

of fluid fuels in Vukovarsko-Srijemska County could amount to 30% of the theoretical potential presented in Table 2-3, meaning that 31,324 ha of agricultural land could be utilized for energy crops where oilseed rape could be grown to supply a biodiesel facility with capacity of around 35,000 t/year, or maize to supply a bioethanol facility with capacity of 65,600 – 68,200 t/year.

2.2. Agricultural Biomass Potential for Generation of Energy in the Municipalities of Odžak, Orašje, Šamac, Domaljevac-Šamac i Brčko Distrikt

2.2.1. Plant production

An analysis of field crops distribution in the project area encompassing the municipalities of Domaljevac-Šamac, Odžak, Orašje, Šamac and Brčko District has shown that maize prevails, around 16,000 ha total, with total yield of 82,683 t and average grain yield of 5.1 t/ha. The largest area under maize has been registered in Brčko District (around 5,000 ha) and the municipality of Šamac (5,000 ha), whilst the largest total maize grain yield has been reached in the municipality of Šamac (28,765 t). The total land sown with soya bean in the said municipalities and the district was 1,240 ha, with total yield of 2,626 t and average grain yield of 2.2 t/ha. Soya bean has been a dominating crop in the municipality of Orašje, on approximately 500 ha and with total grain yield over 1,000 t. Within the project area, oilseed rape was grown only in Brčko District (105 ha) with average yield of 2.3 t/ha, whereas sugar beet was not grown at all.

2.2.2. Animal production

The key characteristic of animal production in the area under study is reflected in small farms. That is to say individual farms with a small number of animals prevail in the total livestock structure directly affecting the possibility to collect and sustainably manage biomass in this kind of production. Biomass production is relatively small-scale even in the processing industry (primarily slaughterhouses) and discontinuous (except poultry slaughterhouses).

The biggest number of livestock units of all kinds of animals under study is located in the area of Brčko District, which is logical as this area is the largest among all municipalities being studied. Brčko District is independent in terms of support systems for primary agricultural production, thus it can be said that this support is more efficient than in the other entities. It is also impacted by a smaller number of farmers in comparison to the Republic of Srpska and Federation of Bosnia and Herzegovina. Based on the number of livestock units presented, it is evident that pig production is prevailing in the area under study with 7,441 LUs, whereas other kinds of animals are being reared in smaller number of livestock units. The distribution of the number of livestock units presented for particular kinds of animals in the area under study points to the dominating kinds of livestock in each of the municipalities and may provide suggestions for additional incentives for development of specific branches of agricultural production and processing industry.

Table 2-4: Annual production of manure according to livestock species (t) in the area of Bosnian Posavina

Location	Livestock					
	Cattle		Pigs		Poultry	
	LU	t /year	LU	t / year	LU	t / year
Brčko District	3,537.9	33,574.7	3,966.3	31,849.4	3,089.4	29,318.4
Šamac	1,156.5	10,975.2	570.1	4,577.9	204	1,936
Odžak	721.5	6,847	1,125	9,033.8	762	7,231.4
Orašje	333	3,160.2	927.1	7,444.6	658.5	6,249.2
Domaljevac	135.4	1,284.9	852.5	6,845.6	243	2,306.1
Total	5,884.3	55,842	7,441	59,751.3	4,956.9	47,041.1

Annual manure production is in accordance with the number of livestock units and their distribution across the municipalities. Manure is mostly obtained from pig production (although the average annual manure production per pig livestock unit is lower as compared to cattle and poultry). The dominating type of manure and its characteristics provide a basis for planning of the exploitation by building up biogas facilities that could use manure from the municipality or district or wider area under study.

2.2.3. Energy potential of agricultural biomass in Bosnia and Herzegovina

An overview of calculations for energy potential of agricultural biomass in the municipalities of Domaljevac-Šamac, Odžak, Orašje and Šamac and Brčko District is given below. The results calculated for theoretical potential of biogas production, electrical and/or heat energy from biogas by using various technologies are shown in Table 2-5.

Table 2-5: Biogas production potential at an annual level

Generation technology		Mono-digestion (MD)	Co-digestion (CD)		Cogeneration			
Municipality/ District	Feedstock	Biogas energy value	Biogas energy value	Agricult. area for silage crops	Electrical energy (h=0,36) GWh/year		Heat (h=0,30) GWh/year	
		GWh/year	GWh/year	ha	MD	CD	MD	CD
Domaljevac - Šamac	Cattle manure	0.70	1.27	24	0.3	0.5	0.2	0.4
	Pig manure	1.14	4.18	129	0.4	1.5	0.3	1.3
	Poultry manure	2.28	3.31	43	0.8	1.2	0.7	1.0
	Total	4.12	8.76	196	1.5	3.2	0.12	2.7
Odžak	Cattle manure	3.77	6.81	129	1.4	2.5	1.1	2.0
	Pig manure	1.51	5.52	170	0.5	2.0	0.5	1.7
	Poultry manure	7.16	10.37	136	2.6	3.7	2.1	3.1
	Total	12.44	22.7	435	4.5	8.2	3.7	6.8
Orašje	Cattle manure	1.74	3.14	59	0.6	0.9	0.5	0.9
	Pig manure	1.24	4.55	140	0.4	1.6	0.4	1.4
	Poultry manure	6.19	8.97	118	2.2	3.2	1.9	2.7
	Total	9.17	16.66	317	3.2	5.7	2.8	5.0
Šamac	Cattle manure	6.04	10.92	212	2.2	11.3	1.8	3.3
	Pig manure	0.76	2.80	88	0.3	1.0	0.2	0.8
	Poultry manure	1.92	2.78	37	0.7	1.0	0.6	0.8
	Total	8.72	16.5	337	3.2	13.3	2.6	4.9
District Brčko	Cattle manure	18.47	33.39	1,149	6.6	12.0	5.5	10.0
	Pig manure	5.31	19.46	1,090	1.9	7.0	1.6	5.8
	Poultry manure	29.02	42.05	1,003	10.4	15.1	8.7	12.6
	Total	52.8	94.9	3,242	18.9	34.1	15.8	28.4
TOTAL		87.25	159.52	4,527	31.3	64.5	25.02	47.8

It needs to be underlined that in order to exploit animal waste for energy purposes it is necessary to have adequate infrastructure, as well as that the cost-effectiveness of such exploitation depends on the quantities of waste produced at individual farms (i.e. the number of livestock units). Comparing potentials of individual areas, it is evident that the potential of Brčko District comprises over 50% of the total potential for production of biogas by co-digestion in cogeneration.

Table 2-5 indicates that biogas produced by co-digestion of the total animal waste (stable manure) and 69,704 t of maize silage (with 30% of maize silage in the feedstock) in a cogeneration facility with 66% total efficiency at annual level could be used to theoretically generate 64.5 GWh of electrical energy and 47.8 GWh of heat energy. By assuming the said efficiency and 7,000 working hours annually under the rated load, the total theoretical installed capacity of cogeneration facilities would amount to 8.20 MW_{el}. In addition, 4,527 ha/year would need to be used to produce maize silage.

As animal production in the area under study is characterised by small farms, it would be reasonable to expect the construction of a few centralised biogas facilities (supplied by feedstock by a number of farms). Nevertheless, with good organizational skills of farmers and managers of centralised facilities, an assumption is made that it would be possible to use around 50% of available manure. In that case, the installed capacity of cogeneration biogas facilities would be 4.10 MW_{el}.

Theoretical potential for fluid biofuel production is shown in Table 2-6.

Table 2-6: Potential of fluid biofuel production (biodiesel and bioethanol)

Municipality / District	Feedstock	BIODIESEL		BIOETHANOL		Agricultural area for growing raw materials
		t/year	TJ/year	t/year	TJ/year	ha
Domaljevac - Šamac	Oilseed rape	1,335	49.39			1,422
	Soya bean	539	19.93			1,422
	Maize /d.p.*			2,181	58.89	1,422
	Maize/w.p.**			2,098	56.63	1,422
Odžak	Oilseed rape	5,817	215.25			6,197
	Soya bean	3,286	121.59			6,197
	Maize /d.p.*			10,455	282.28	6,197
	Maize/w.p.**			10,054	271.46	6,197
Orašje	Oilseed rape	4,998	184.93			5,324
	Soya bean	2,218	82.08			5,324
	Maize /d.p.*			7,513	202.84	5,324
	Maize/w.p.**			7,224	195.06	5,324
Šamac	Oilseed rape	6,856	253.67			7,303
	Soya bean	2,628	97.23			7,303
	Maize /d.p.*			12,993	350.81	7,303
	Maize/w.p.**			12495	337.36	7,303
District Brčko	Oilseed rape	19,237	711.78			20,855
	Soya bean	7,346	271.82			20,855
	Maize /d.p.*			29,491	796.25	20,855
	Maize/w.p.**			28,360	765.71	20,855
TOTAL	Oilseed rape	38,243	1,415.02			41,101
	Soya bean	16,017	592.65			41,101
	Maize /d.p.*			62,633	1,689.07	41,101
	Maize/w.p.**			60,231	1,626.22	41,101

*dry process; **wet process

As it can be seen in the previous table, with the use of total agricultural area for non-food needs to grow a single crop for production of biofuel, bioethanol obtained from the dry processed maize shows the greatest potential whereas oilseed rape has the greatest potential for production of biodiesel.

Taking into account the fact that the land for non-food production is also to be used for other purposes, a conclusion can be made that the real potential of fluid biofuel production could amount to 30% of the theoretical potential, meaning that 12,330 ha of agricultural land could be utilized for energy crops where maize could be grown to supply a biodiesel facility with capacity of around 18,000–19,000 t/year, or oilseed rape to supply a biodiesel production facility with capacity of around 11,400 t/year.

It is important to emphasise that areas considered and available in individual municipalities are relatively small, hence a potential biodiesel, that is, bioethanol production facility would supply its feedstock from the surrounding area, too.

Below we give overviews of plant and animal production according to areas, assumed attainable potential of biogas production by co-digestion in a cogeneration facility and assumed attainable potential of fluid biofuel production (Figure 2-1, Figure 2-2, Figure 2-3, Figure 2-4).

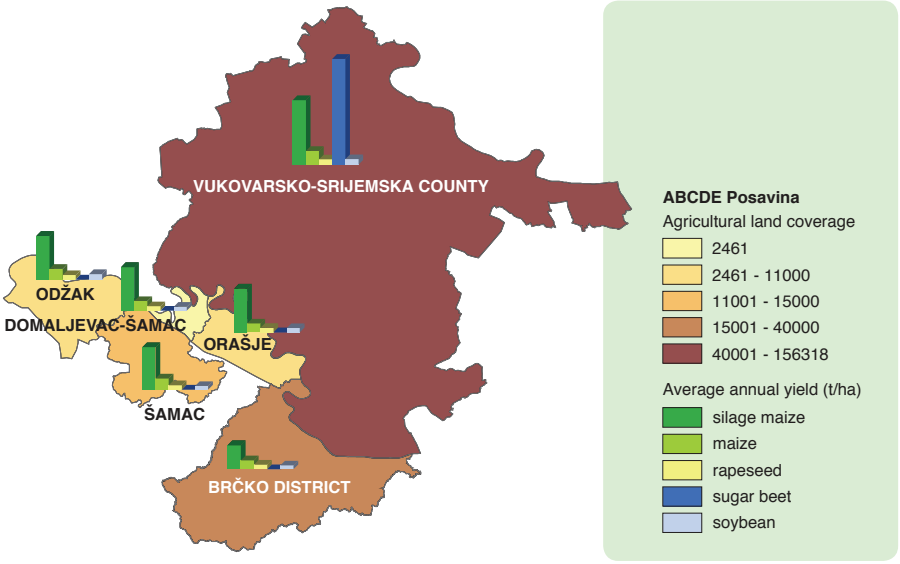

Figure 2-1: Plant production in the area of Posavina – available agricultural land and average annual yield of particular crops

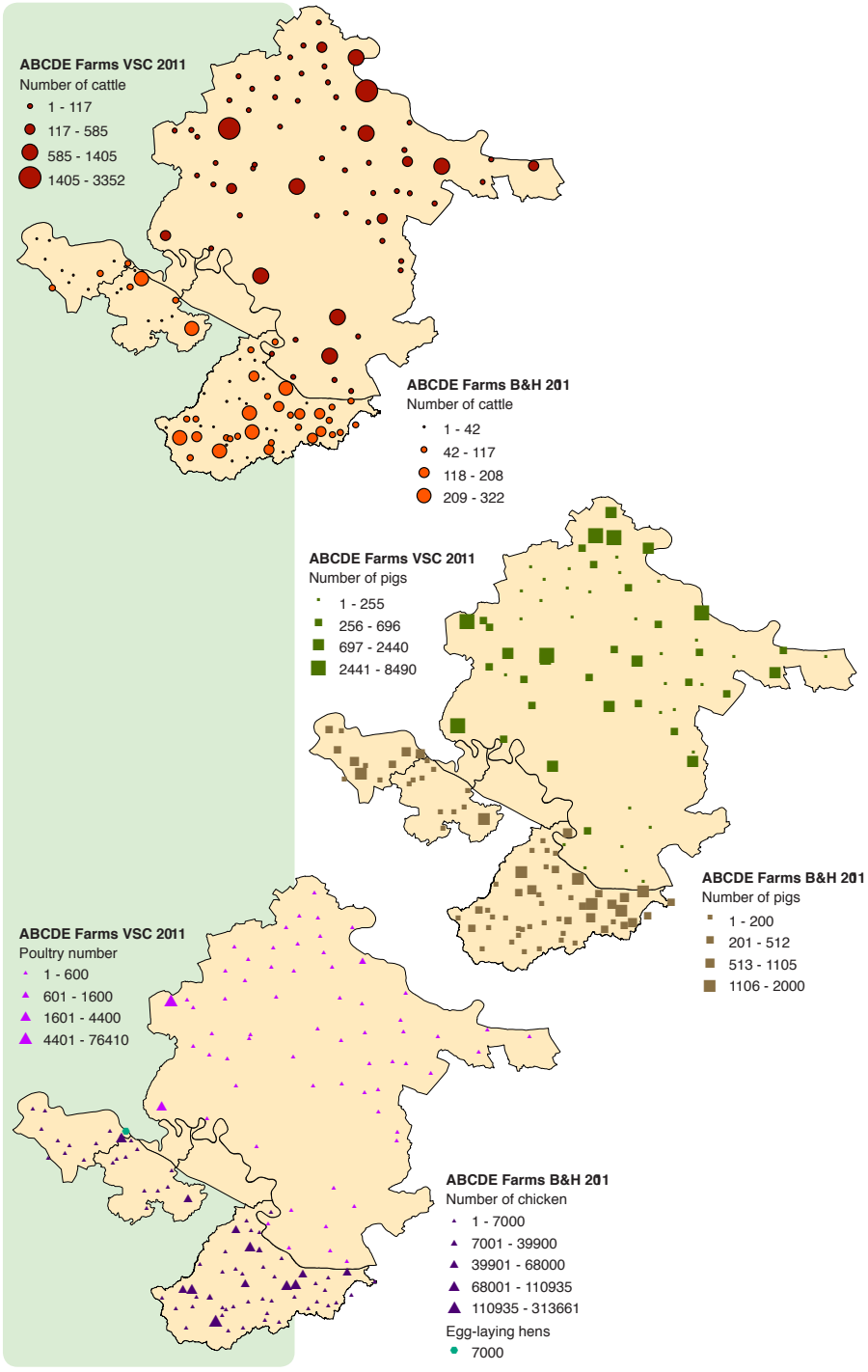

Figure 2-2: Animal production – the number of cattle, pigs and poultry, respectively, in the area of Posavina including its distribution

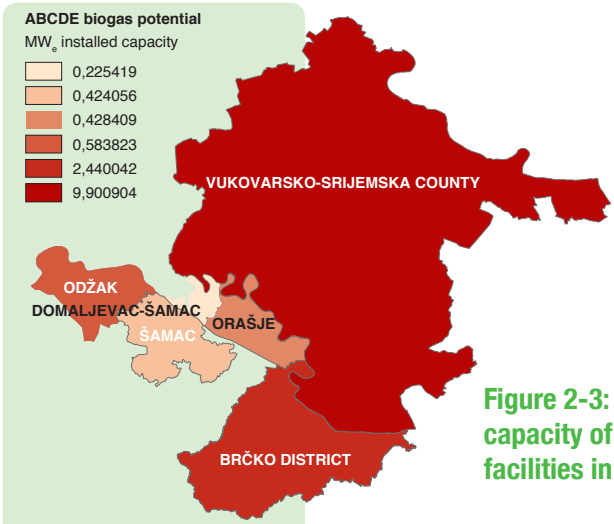

Figure 2-3: Total assumed attainable capacity of biogas cogeneration facilities in the area of Posavina

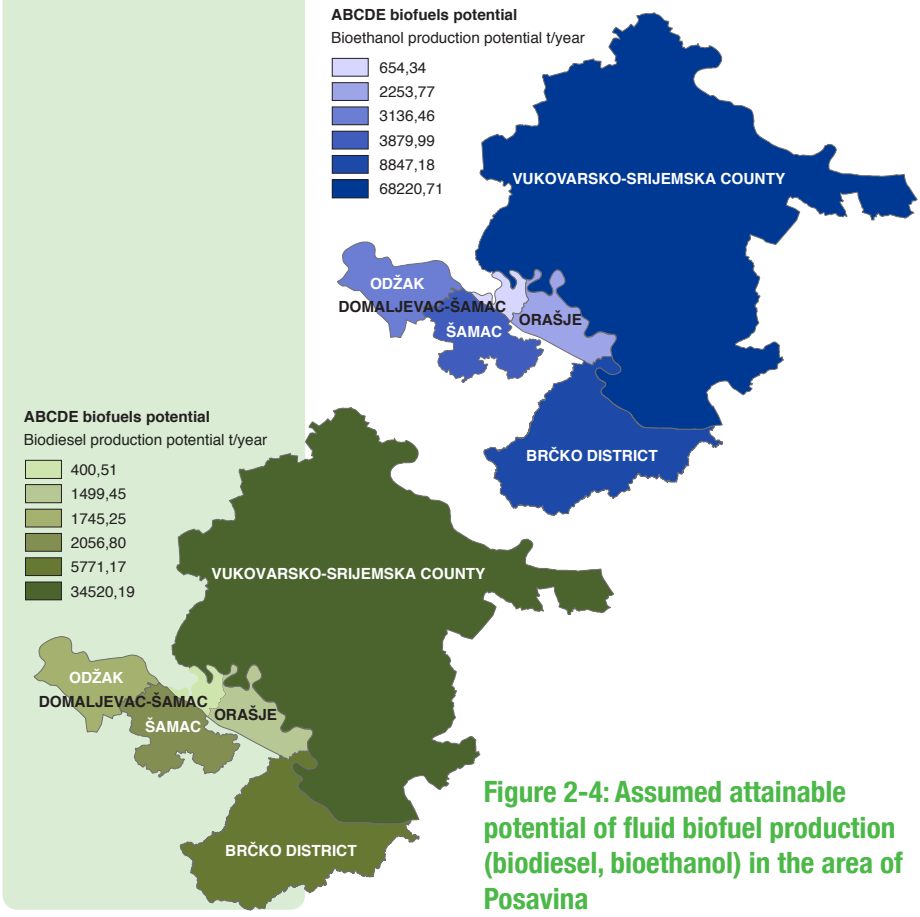

Figure 2-4: Assumed attainable potential of fluid biofuel production (biodiesel, bioethanol) in the area of Posavina

3. LEGAL AND ADMINISTRATIVE FRAMEWORK RELEVANT TO PROJECTS REGARDING USE OF BIOMASS FOR ENERGY PURPOSES

3.1. Legal and Administrative Framework Relevant to Projects for Use of Agricultural Biomass for Energy Purposes in the Area of Croatian Posavina

Obtaining permits for all renewable energy projects is a quite complex process. As with any investment project, the first step is to conduct a preliminary feasibility study.

Administrative procedures in Croatia are considerably centralised, and most documents can be obtained in Zagreb. Major part of these procedures is under jurisdiction of the Ministry of Economy. Croatian Energy Market Operator (HROTE) offices and Croatian Energy Regulatory Agency (CERA) (hereinafter the Agency) are also located in Zagreb.

Regulations concerning legal issues such as spatial planning and construction, environmental protection, energy, economy, property rights and water management are a starting point.

Energy-related activities and requirements for their implementation are regulated by the Law on Energy (Official Gazette 120/12) (hereinafter ZoE) and specific energy laws. According to ZoE, legal and physical entities can start carrying out an energy-related activity only on the basis of the Agency's decision allowing such activity.

The legal framework in the administrative procedure for facilities producing biofuels includes:

- Law on Biofuels for Transport (OG 65/09, 145/10, 26/11) which regulates production, trade and storage of biofuels and other renewable fuels, use of biofuels in transport, plans and programmes creation in order to encourage production and use of biofuels in transport, authorisation and responsibilities for establishing and implementing policies to encourage production and use of biofuels in transport as well as measures to encourage production and use of biofuels in transport. The abovementioned law considers biogas as a type of biofuel.

The legal framework in the administrative procedure for facilities producing biogas includes:

- Law on Electricity Market (OG 177/04, 76/07, 152/08, 14/11, 59/12) which provides a legal basis for five bylaw acts that administer the field of renewable sources of energy and cogeneration. The status of an eligible producer may be obtained if energy entity or other legal or physical entity simultaneously generates electrical energy and thermal energy at the same facility in a highly efficient manner, using waste or renewable sources of energy for generation of electrical energy in an economically viable manner consistent with environmental protection. Prior to obtaining the status of an eligible producer of electrical energy, energy entity or other legal or physical entity shall obtain a preliminary decision on obtaining the status of an eligible producer of electrical energy from the Agency.
- Law on Gas Market (OG 40/07, 152/08, 83/09) under Article 1 specifies that the law in question and bylaw acts refer to biogas, biomass biogas and other type of gases that meet technical and safety standards for distribution in gas-distribution networks.
- Law on Production, Distribution and Supply of Thermal Energy (OG 42/05, 20/10), among other things, states that the construction of a cogeneration energy facility has an advantage when selecting energy projects whilst making decisions on construction of energy facilities. An energy entity that uses cogeneration, waste, biodegradable waste or renewable sources of energy for heat production in an economically viable manner and in accordance with environmental protection measures may obtain the status of an eligible thermal energy producer.
- The bylaw acts that set forth generation of electrical energy from biogas and renewable sources are as follows:
- Tariff System for Electrical Energy Generation from Renewable Sources of Energy and Cogeneration (OG 63/12)
- Decree on Incentives for Electrical Energy Generation from Renewable Sources of Energy and Cogeneration (OG 33/07, 133/07, 155/08, 155/09, 8/11, 144/11)
- Decree on the Minimum Share of Electrical Energy Generated from Renewable Sources of Energy and Cogeneration which is encouraged (OG 33/07, 8/11)

- Rulebook on Use of Renewable Sources of Energy and Cogeneration (OG 88/12)
- Rulebook on Obtaining the Status of an Eligible Producer of Electrical Energy (OG 88/12)
- General Terms and Conditions for Electrical Energy Supply (OG 14/06)
- Rules and Regulations of Electrical Grid (OG 36/06)
- Rules on Electrical Energy Market Activity (OG 135/06, 146/10, 90/12)

Electrical energy generated using a facility for RES has priority in a distribution process. A guaranteed purchase price is guaranteed incentive price to be paid to a producer of electricity from renewable sources of energy. The status of an eligible producer is a guarantee to the producers of electrical energy that the incentive purchase price will be paid in accordance with the tariff system for generation of electrical energy from renewable sources of energy and cogeneration.

Currently in Croatia, there is no legal obligation to exploit "waste" heat that is emitted as a result of the electrical energy generation process, i.e. the proportion of waste heat used does not affect the tariff, but there is a regulatory minimum efficiency level of renewable sources of energy at annual level (50%).

The administrative process for biogas facility construction and for biofuels facility production is the same except for the part that relates to obtaining the status of an eligible producer of electrical energy from renewable sources of energy.

Generally speaking, when an investor has a planning permit, and in the case of biogas, also the Purchase Contract, then the long-term return of an investment is ensured either through guaranteed purchase of electrical energy at privileged prices (feed-in tariffs) in the case of a biogas facility or through production stimulation mechanisms and use of biofuels. Administrative algorithms and procedures are well explained on the BiogasIn project website (http://www.biogasin.org) and on the Ministry of Economy website (http://oie.mingorp.hr/).

A summary of administrative procedures that must be followed in order to start biofuel for transport and/or biogas production (cell marked BF refers only to a biogas facility) is shown in Table 3-1. Individual steps described in details are given below.

	REGULATION	LEGAL FRAMEWORK	JURIDICTION / IMPLEMENTATION
1.	Preliminary feasibility study on plant construction and/or network connection with techno-economic and spatial planning data	Rulebook on Use of Renewable Sources of Energy and Cogeneration	Investor
2.	Registration with competent trading court	Law on Court Registry , Law on Trading Companies	Trading Court
3.	Decision on interventions acceptability in relation to ecological network	ZZO	MENP
4.	Planning permit	ZPUG	County Governing Board
5.	Preliminary energy approval (for BF)	ZOE, General Terms and Conditions for Electrical Energy Supply	HEP ODS
6.	(Pre)agreement on connection (for BF)	General Terms and Conditions for Electrical Energy Supply	HEP ODS
7.	Feasibility study on plant construction	Rulebook on Use of RESC	Investor
8.	Energy license (for BF)	ZTEE, Rulebook on Use of RESC	ME
9.	Permit that allows construction-main project verification	ZPOUG	Competent admin. body in the county
10,	Preliminary decision on obtaining the status of an eligible producer of electrical energy (for BF)	ZTEE, POSSPP	CERA
11.	Electrical energy purchase contract (for BF)	ZTEE, Tariff System for Electrical Energy Generation from RESC	HROTE
12.	Ea-energy approval (for BF)	ZOE, General Terms and Conditions for Electrical Energy Supply	HEP ODS
13.	Agreement on network use (for BF)	General Terms and Conditions for Electrical Energy Supply	HEP ODS
14.	Occupancy permit	ZPUG	Competent admin. body in the county
15.	Water license	Water Framework Directive	“Hrvatske vode” Company
16.	Decision on obtaining the status of an eligible producer of electrical energy (for BF)	ZTEE, POSSPP	CERA
17.	Cadastre entry certificate	ZZK	Municipal Court – Legal department

DOCUMENTS AND ACTIVITIES ACCORDING TO REGULATIONS ON PERFORMING AN ECONOMIC (ENERGY-RELATED) ACTIVITY

Certificate of registration with the competent Trading Court

Permit to perform energy-related activities

Energy-related activities specified in the Law on Energy and specific laws for certain energy markets (electrical energy generation, gas production, heat production, etc.) can be done only pursuant to CERA decision - a permit to perform energy-related activities.

ACTS AND DOCUMENTS REQUIRED FOR CONSTRUCTION – PROJECT VERIFICATION

Actions related to spatial planning and construction involve necessary alignment between projects and spatial plans.

Planning permit

Any intervention in a region is carried out in accordance with spatial planning documents, special regulations and a planning permit. An integral part of a planning permit encompasses preliminary designs prepared in accordance with the spatial plan and specific Acts that contain precise terms and conditions or the manner and conditions of connecting building/s to traffic areas, utilities and other infrastructure, environmental protection measures, etc. as well as specific conditions in regards with the entity and persons regulated by special guidelines. A planning permit shall be attached to an application for obtaining an energy license and to the application for project verification.

According to the Law on Spatial Planning and Construction (ZPUG) (OG 76/07, 38/09, 55/11, 90/11, 50/12) and the Regulation on Spatial Intervention and Construction (OG 116/07, 56/11), an investor can start facility construction on the basis of project verification.

Facility construction and detailed design

A facility shall be built on the basis of detailed design that elaborates technical solution provided by the main design and that must be made in accordance with the main project.

Trial, testing

The main project shall predict and explain trial run, the essential requirements that are inspected, duration of trial run and safety measures.

Occupancy permit

After a competent administrative body in the county that ratified the main project or construction permit, issues an occupancy permit, the facility can be put into operation. That can be done only after technical inspection determines that the facility has been built in accordance with an approved project or construction permit.

Decision on building registration in the Cadastre

According to ZPUG, a building is registered in cadastral records if the occupancy permit (in case of buildings that occupancy permits are issued for), i.e., main project ratification or a construction permit is issued.

REGULATION OF PROPERTY RIGHTS IN CONNECTION WITH LAND AND CONSTRUCTED FACILITY

Before submitting an application for the main project permit, property rights referring to land where facility is to be built have to be settled. In this respect, it is necessary to obtain:

- decision on land ownership registration or other property rights or the decision on expropriation,
- decision on building registration in the Cadastre,
- decision on building registration in the land registry.

LEGAL FRAMEWORK FOR ENVIRONMENTAL/ NATURE PROTECTION

Legal framework for environmental/ nature protection relevant to the observed facility specifically includes the Environmental Protection Act (OG 10/07), Regulation on the Environmental Impact Assessment (OG 64/08, 67/09), Regulation on the Procedure for Determining Integrated Environmental Protection Requirements (OG 114/08), Environmental Protection Act (OG 114/08), Law on Nature Protection (OG 70/05, 139/08, 57/11), Decree on National Ecological Network of the Republic of Croatia (OG 109/07) and Rulebook on Evaluation of

Plans, Programmes and Interventions Acceptability for the Ecological Network (OG 118/09).

Environmental impact assessment

Environmental impact assessment is a process of evaluating acceptability of the planned project with regard to the environment and determining necessary measures to protect the environment in order to minimise impacts and to achieve the best possible preservation of the environment. The assessment process is carried out before issuing of a planning permit. According to the Regulation on the Environmental Impact Assessment (OG 64/08, 67/09), an environmental impact assessment is required in the case of:

- Biofuel production with capacity of 100,000 t/year and more
- Facility for electrical energy generation capacity is greater than 100 MW_{el}

The Ministry of Environmental and Nature Protection is responsible for activities that are necessary to be assessed if environmental impact appraisal is needed. Those activities are:

- Biofuel production with capacity of 20,000 t/yr and more
- Facilities that generate electrical energy, steam and hot water with capacity over 10 MWel whilst using renewable sources of energy (excluding water and wind)
- Facilities for production and processing of vegetable or animal origin oils and fats
- Facilities for biological treatment of waste and other waste treatment procedures with capacity of 100 t/day or more

Integrated conditions for environmental protection

Integrated conditions for environmental protection have to be determined if a facility carries out activities which may cause soil, air, water and sea pollution. Activities that cause emissions, and therefore procedures for determining integrated conditions that have to be carried out in accordance with the Regulation on the Procedure for Determining Integrated Conditions for Environmental Protection (OG 114/08) particularly refer to

- Facilities for management of animal carcasses or recycling, and animal waste (rendering plant), with treatment capacity over 10 tons per day

Ecological network – interventions acceptability

Owing to the Decree on National Ecological Network of the Republic of Croatia (OG 109/07), the ecological network of the Republic of Croatia has been identified as a system of ecologically significant areas and ecological corridors with conservation objectives and guidelines for the protection measures that are intended to maintain or establish favourable conditions for endangered and rare types of habitat and/or wildlife species. The assessment concerning interventions acceptability for the ecological network is governed by the Rulebook on Evaluation of Plans, Programmes and Projects Acceptability for the Ecological Network (OG 118/09). Assessment is required for an activity, which, alone or with other interventions, may have a significant impact on conservation objectives and integrity of the ecological network. Assessment is not needed for projects that are directly related to the management of the ecological network, as well as interventions that are performed within the existing construction area.

LEGAL FRAMEWORK FOR OBTAINING THE STATUS OF AN ELIGIBLE PRODUCER OF ELECTRICAL ENERGY

The status of an eligible producer is a guarantee to a producer of electrical energy that the incentive purchase price will be paid in accordance with a tariff system for generation of electrical energy from renewable sources of energy and cogeneration.

Feasibility study on facility construction

As required by the Rulebook on Use of RESC, a feasibility study on facility construction and network connection with techno-economic and spatial planning data is a prerequisite to apply for obtaining an energy license.

Agreement on connection

Agreement on connection shall be signed between HEP ODS and a producer in a process of connecting to a network on the basis of PEA, in accordance with the General Terms and Conditions for electrical energy supply.

Energy license

An application for approval of energy license shall be submitted to the Ministry of Economy.

Preliminary decision on obtaining the status of an eligible producer

The status of an eligible producer is based on Agency's (CERA) decision in compliance with the conditions stipulated in the Rulebook on Obtaining the Status of an Eligible Producer of Electrical Energy. Prior to obtaining the status of an eligible producer of electrical energy, energy entity, or other legal or physical entity shall obtain a preliminary (previous) decision on obtaining the status of an eligible producer of electrical energy.

Electrical energy purchase contract

According to a tariff system for electrical energy generation from RESC (OG 63/12), an electrical energy producer is entitled to incentive price for delivered electrical energy, provided that he:

- has obtained a decision on obtaining the status of an eligible producer from CERA
- has signed a contract for electrical energy purchase with HROTE

In order to sign a contract for electrical energy purchase, which will be concluded for a period of 14 years, the project leader has to submit, in writing, a request for signing an electrical energy purchase contract to the operator.

EA – energy approval

EA is a document whereby HEP ODS determines technical parameters for connection and use of grid, and it is issued after facility construction in accordance with the General Terms and Conditions for electrical energy supply.

Agreement on grid use

An agreement on grid use shall be signed between HEP ODS and a producer for an indefinite period of time, in accordance with the General Terms and Conditions for electrical energy supply.

Report on trial run in real working conditions

According to the rules of the electrical grid, a producer shall submit a written request to HEP DSO to run the power facility in parallel operation with the grid in order to test the power facility in real working conditions.

The decision on obtaining the status of an eligible producer

The request for issuing a decision on obtaining the status of an eligible producer shall be submitted to CERA in accordance with the Rulebook on the Use of RES and Cogeneration (OG 88/12)

DOCUMENTS AND ACTIVITIES IN THE FIELD OF WATER LEGISLATION

Water Framework Acts ensure that the conduct of legal and physical entities complies with general and individual interests in connection with water. These acts are implemented and protected under the Law on Water. “Hrvatske vode” Company is authorised to issue any documents and acts in connection with water. Figures 3-1 and 3-2 graphically show the abovementioned administrative procedures.

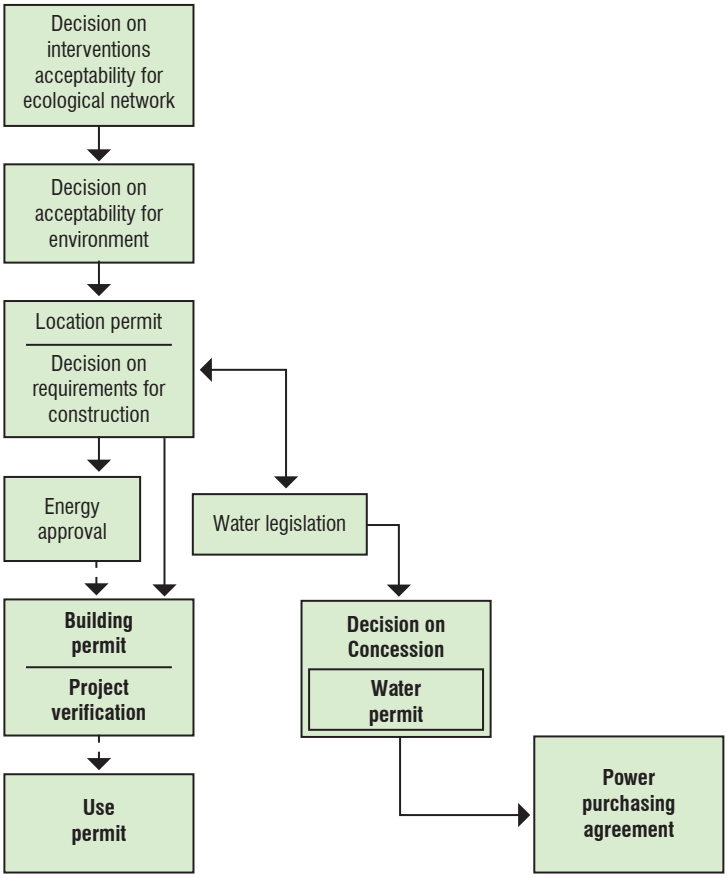

Figure 3-1: Administrative procedures for starting a facility for biofuel production

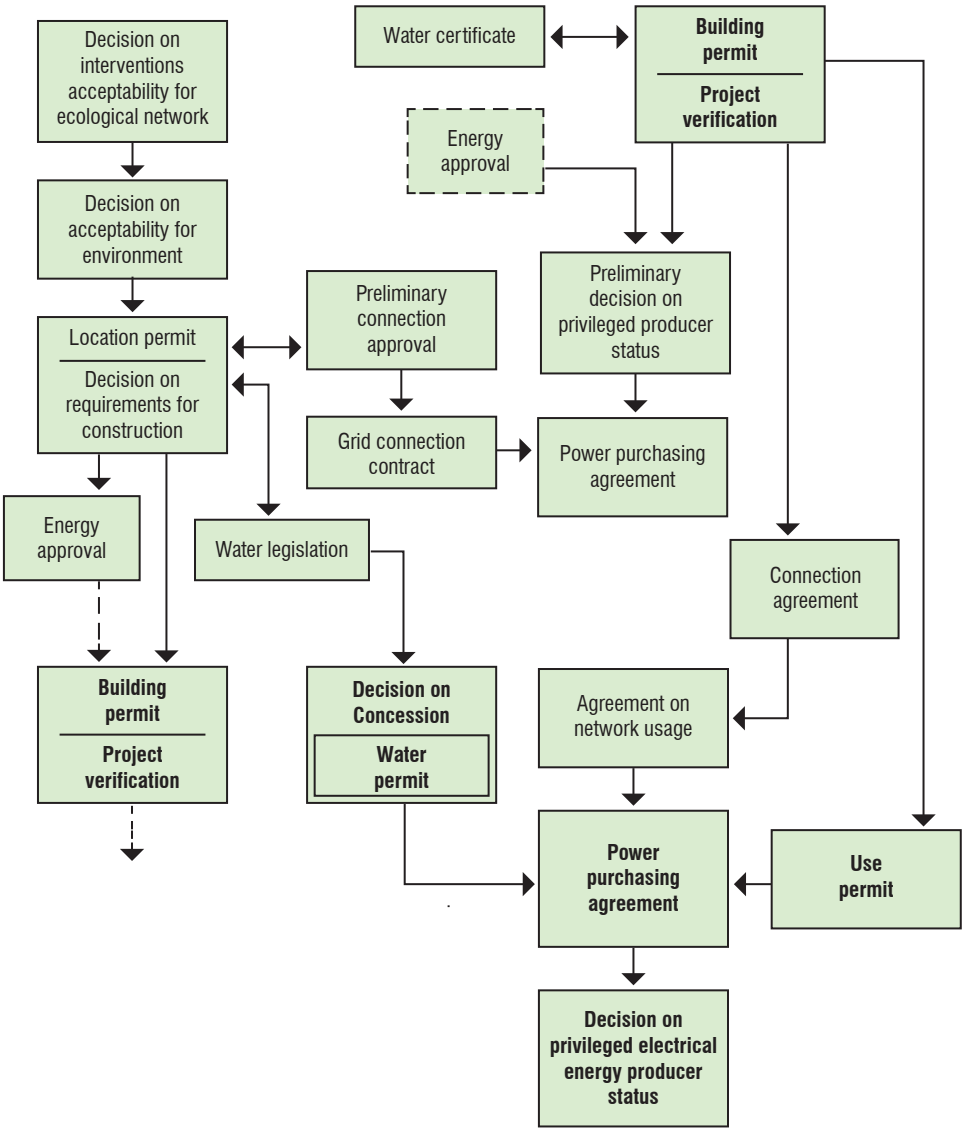

Figure 3-2: Administrative procedures for starting a biogas facility and obtaining the status of an eligible producer of electrical energy from renewable sources of energy

3.2. Legal and Administrative Framework Relevant to Projects for Use of Agricultural Biomass for Energy Purposes in the Area of Bosnian Posavina

Licensing procedures for all projects concerning exploitation of renewable sources of energy are rather complicated due to complex procedures and functional organisation of the BiH Government. Bosnia and Herzegovina consists of two entities (the Republic of Srpska and the Federation of BiH) and a district (Brčko). Entity ministries are competent for issuing of connection approval licenses and ecology licenses on local level. Administrative procedures in Bosnia and Herzegovina are not centralised and most documentation cannot be obtained at one place. During the process of obtaining licenses and approvals, it is necessary to abide by spatial planning and urbanism regulations, environmental protection, energy, law and property relations as well as water and soil protection.

In 2006, Bosnia and Herzegovina signed an Agreement on Establishment of Energy Community by which it has committed itself to implement EU Community Acquis in fields of energy, environment, competition and renewable sources of energy -RES. Cooperation in energy-related activities is being directed towards EU Community Acquis priorities in the field of energy in order to create legal and institutional framework for energy sector based on principles of effective sector regulation and liberalisation, competition freedom and improvement, safe energy supply whilst ensuring environmental protection.

The Republic of Srpska

Institutions competent for connection approval issuing on the Republic of Srpska level are Ministry of Industry, Energy and Mining and institutions in local communities.

According to the current legislation, construction of all energy facilities regardless their capacity is subject to concession.

- The Law on Concessions of the Republic of Srpska ("The Official Gazette of the Republic of Srpska", number 25/02, 91/06 and 92/09) sets forth procedures for the award of concessions. Activities on concession award are carried out by the Ministry concerned in cooperation with the Commission for Concessions.

- In the case when a legal entity is interested in building an energy facility, it submits an initiative offer to the ministry concerned together with economic feasibility study made in accordance with Article 25 of Guidance on the assessment of public interest ("The Official Gazette of the Republic of Srpska", number 103/05);
- The Ministry, in cooperation with other institutions, estimates whether realisation of listed projects is of public interest and makes a proposal to the Government of the Republic of Srpska. If the Government establishes that there is public interest for realisation of a certain project, the Ministry makes a public announcement or requests comparable offers for realisation of that project.
- After selection of the best bidder, the same is being awarded with a concession and signs a concession contract.
- The concession is awarded for a period that cannot be longer than 30 years. According to the Law, the contract can be extended and renewed. (Article 28 of the Law)
- The contract necessarily includes payment of a concession fee. A single concession fee is paid before contract is signed, while a permanent concession fee is paid after the construction of a facility - during the exploitation. The fee is calculated according to the Rulebook on criteria for establishing the concession fee amount ("The Official Gazette of the Republic of Srpska", number 45/07)
- A concessionaire, i.e. investor, needs to settle all property issues, get all necessary licenses (including the ecology one) and approvals, and to build the facility. Licenses and approvals are issued on local level, except the ecology license which is issued by the Ministry.
- Incentive funds for generation of electrical energy from renewable sources are provided from fees, defined as tariff for electrical energy delivered to end buyers in the Republic of Srpska. The amount of the incentives to encourage production by using RES is expressed as a separate item on the electrical energy bill. The incentive system has been established since January 1st 2012. The amount for 2012 was established by the RS Government and is paid by end consumers in the amount of 0.0018KM/KWh.
- After the construction of a facility is completed, a producer of electrical energy from renewable sources must get a certificate for production facility, and in a case that all quotas defined by

the Regulation on generation of electrical energy from renewable sources ("The Official Gazette of the Republic of Srpska", number 28/11 and 39/11) are not fulfilled, a producer cannot get the right to incentives for the period of 15 years according to the Rulebook on incentives of the Regulatory Energy Commission ("The Official Gazette of the Republic of Srpska", number 128/11). Pursuant to the Rulebook on incentives for electrical energy generation from renewable sources and in effective cogeneration, the following is regulated: conveniences regarding the connection to the grid; priority in grid access (dispatching); right to obligatory purchase of electrical energy; right to a guaranteed purchase price (feed-in tariff); right to premiums for electrical energy consumption for personal needs or market sales. Generation of electrical energy from renewable sources in the Republic of Srpska is subsidised whilst production of thermal energy is not. A producer of electrical energy from RESEC is entitled to a guaranteed purchase price (feed-in tariff) for a period of up to 15 years.

Considering that drafting of the new RS Law on Concessions is in process and taking into account a very complicated and long procedure of concession award as well as owing to a fact that the procedure should be carried out even in a case when production facility is situated within the existing facility, on the farms, or for example includes solar plants on private facilities, construction of all facilities with installed capacity of up to 250 kW has been envisaged to be excluded from concession award procedure.

The same has been stipulated by the Law on Renewable Sources of Energy, adopted by the RS National Assembly in a draft form.

Production facilities which produce thermal energy possibly can exercise the right to single funds according to the Law on Fund and Financing of Environmental Protection of the Republic of Srpska. ("The Official Gazette of the Republic of Srpska", number 117/11). The Article 23 of this Law defines allocation of the funds. Detailed information can be found on web site www.ekofondrs.org.

All legal acts considering renewable sources of energy, including the Regulation, Rulebook and Decision on the amount of guaranteed purchase price can be found on the web site www.reers.ba.

In the upcoming period, laws that are currently in a draft phase, but that are to be adopted, are expected to solve the issue of getting the connection approval, i.e. production facility connection to distribution network.

The Federation of Bosnia and Herzegovina

Institutions competent for connection approval issuing on Federation of Bosnia and Herzegovina level are Ministries of Energy, Mining and institutions on cantonal and local level.

- Article 2 of the Federation of BiH Law on Electrical Energy ("FBiH Official Gazette" no: 41/02, 24/05 and 38/05) has defined, among other things, economical and rational use of electrical energy, energy efficiency, protection of environment as the goals according to regulations, local and international standards and use of renewable sources of electrical energy.
- Article 33 of the Federation of BiH Law on Electrical Energy states that an electrical power company which generates electrical energy in a single production facility using waste material and renewable sources of energy or deals with combined production of thermal and electrical energy can acquire the status of a qualified producer.
- Article 46 of the same Law states that rights and obligations regarding the takeover and proportion of electrical energy from renewable sources of energy will be established by a special regulation, excluding big hydroelectricity power plants (over 5 MW), used by an electrical power company to perform the activities of electrical energy supply as public service.
- Use and production of biofuel is defined by the Regulation on use of renewable sources of energy and cogeneration ("FBiH Official Gazette" no: 36/10, 11/11 and 88/11). This regulation sets forth the following: the manner use of renewable sources of energy and cogeneration (hereinafter RESC), groups of facilities, minimal proportion of electrical energy generated in facilities which use RESC in total consumption, incentives for electrical energy generation from RESC, analysing renewable sources of energy potentials, project and facilities for use of RESC registry, construction of RESC facilities, purchase and fees, connection of RESC facilities to electrical grid, certification of origin of electrical energy generated from RESC, establishing of institutional structure for operationalisation of the incentive system for generation from RESC and other significant issues for use of RESC. Article 24 clearly defines research potentials with previously obtained necessary documentation (licenses, endorsements, approvals, etc.) set forth by laws and other regulations in the FBiH which

regulate spatial planning and construction, use of soil, water, water protection and environmental impact assessment.

- Before the RESC Operator is established, activities within its competence, pursuant to Article 12 of Regulation shall be performed by the existing electrical companies authorised to supply consumers with electrical energy.
- The request for registration in the Register according to RP 1 form shall be submitted before the start of investment and after being endorsed by authorised municipal, cantonal or federal construction body, as provided for in Article 24 of the Regulation.
- The request for registration in the Register according to RP 2 form shall be submitted after the urban approval is obtained and it precedes issuing of preliminary construction permit by FERK (Regulatory Commission for Electrical Energy in the Federation BiH) under Article 57 of the Law on Electrical Energy ("FBiH Official Gazette" no. 41/02, 24/05 and 38/05).
- The request for registration in the Register according to RP 3 form shall be submitted after technical acceptance is completed and it precedes issuing of FERK operation license under Article 77 of the Law on Electrical Energy.
- To generate energy, it is necessary to obtain a Connection approval, a document issued by the Federal Ministry for Energy, Mining and Industry.
- A qualified producer in possession of a Connection approval whereby the right to incentives has been established is entitled to conclude the contract on obligatory purchase of electrical energy from RESC with the Operator for RESC based on the fixed guaranteed price established according to the Regulation.
- A qualified producer is the producer of electrical energy generated from RESC, who has obtained that status by a decision of Regulatory Commission for Electrical Energy in the Federation of BiH (FERK).
- A guaranteed price (Gc) is the price being paid to the producer of energy from RESC throughout the duration of the contract on energy purchase.

Connection to distribution network

The issue regarding connection and expenses of connection to distribution network is set forth by General conditions for electrical energy and the Rulebook on connections of the authorised public electric energy company. All acts concerned are available on the web sites of “Elektroprivreda BiH” d.d. Public Company Sarajevo (www.elektroprivreda.ba) or “Elektroprivreda HZ HB” d.d. Public Company Mostar (www.ephzhb.ba).

Annual limits

Regarding the annual limits of electrical energy generation from RESC for 2012, the FBiH Government adopted Information of the Federal Ministry for Energy, Mining and Industry on 7 March 2012 and established the Criteria for use of incentive funds for renewable sources of energy and cogeneration (RESC) in 2012. These Criteria shall be implemented until enforcement of the Law on use of renewable sources of energy and efficient cogeneration and adoption of bylaw acts. The Government has tasked the Federal Ministry for Energy, Mining and Industry to make the Criteria for use of finances, RESC Register and an overview of the issued Connection approvals available through the web site. These documents shall be updated every 1st and 15th day of the month.

Brčko District

According to the arbitrage decision, the entities are obliged to provide energy supply of District with electrical energy, but it does not refer to renewable sources of energy and energy generated within the district territory. BiH, entity or district’s own legislation can be exercised in the district.

All local communities should have spatial planning documentation first which clearly specifies where biofuel facilities can be constructed.

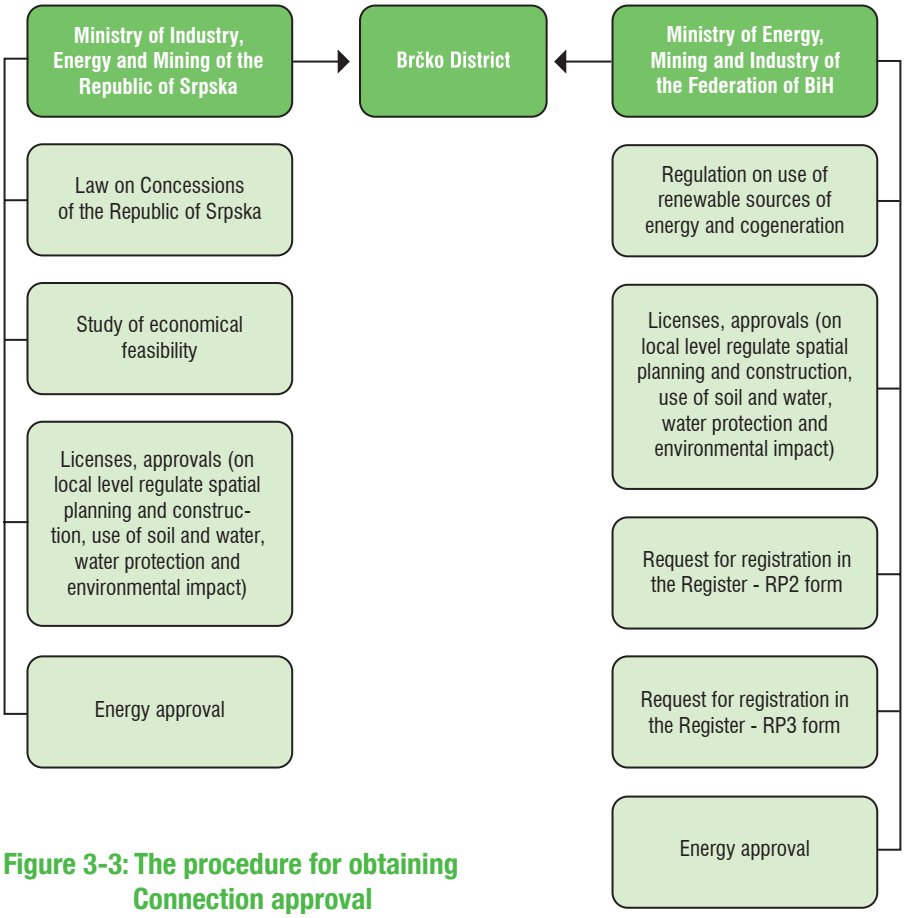

Figure 3-3: The procedure for obtaining Connection approval

According to the Constitution of Bosnia and Herzegovina, the environment, namely its protection, is under entities' jurisdiction. There is one Ministry authorised for environment in each entity: the Federal Ministry for Environment and Tourism in the Federation of BiH, the Ministry for Spatial Planning, Civil Engineering and Ecology in the Republic of Srpska and Department for spatial planning and legal-property relations in Brčko District. In the Federation of BiH, there is also a Ministry for Environment in each of ten cantons thus both the Federation and cantons are responsible together for the environment.

The Republic of Srpska

The Ministry for Spatial Planning, Civil Engineering and Ecology of the Republic of Srpska is authorised for the assessment of environmental impact that facilities cause and for issuing of ecological licenses for biofuel production facilities (biogas, biodiesel and bioethanol).

- The Law on Environmental Protection ("The Official Gazette of the Republic of Srpska", number 71/12; Articles 60-79) sets forth procedures for environmental impact assessment. Additional explanations can be found in the Regulation on projects for which an environmental impact assessment is conducted and the Criteria for decision-making in regards with obligatory implementation and scale of the environmental impact assessment ("The Official Gazette of the Republic of Srpska", number 7/06). Articles 2, 3 and 4 of the Regulation on projects for which an environmental impact assessment is conducted and the Criteria for decision-making in regards with obligatory implementation and scale of the environmental impact assessment stipulate which projects are liable to the Procedure for environmental impact assessment (EIA). The procedure for environmental impact assessment (EIA) is carried out in two phases:
  - Preliminary environmental impact assessment and
  - Environmental impact assessment
- Preliminary environmental impact assessment starts with submitting a Request for preliminary EIA, which a project holder submits to the Ministry competent for environmental protection. The request for preliminary EIA can be prepared by an applicant or by the institution authorised to perform activities in the field of environmental protection.
- Article 64 of the Law on Environmental Protection stipulates documentation which has to be attached along with the Request for preliminary EIA.
- The Ministry makes a Decision whereby an applicant is obliged to carry out environmental impact assessment and to determine the scale and content of the study or establishes that carrying out of environmental impact assessment and completing of the study is not necessary. This Decision shall be made 60 days upon submitting the Request.
- After issuing the Decision on obligatory environmental impact assessment and the scale of the environmental impact assessment, within six months since the approval of this Decision, a project holder is obliged to submit a request to an organisation authorised to prepare the impact study for activities determined by Location conditions and by the Decision on establishing the obligatory environmental impact assessment so as to make the impact study.

- The content of the Study is set forth in the Instruction on the content of the Study on environmental impact assessment ("The Official Gazette of the Republic of Srpska", number 118/05).
- A project holder delivers two hard copies and four electronic copies of the Study to the Ministry authorised for environmental protection, along with a request to make a Decision on the approval of impact study, within 30 days after receiving the study from an authorised institution. The explanation of the Decision on the study approval specifies that all remarks from stakeholders and the public concerned have been taken into account, as well as remarks from the other entity, Brčko District or other country.
- The decision on the study approval expires in the case that a project holder does not acquire a construction license or another Decision within two years after the day of receiving the first Decision.
- After receiving the Decision on the approval of the Study on environmental impact assessment, an Investor submits a request for the ecology license pursuant to Article 85 of the Law on Environmental Protection.
- Pursuant to the Law on Spatial Planning of the Republic of Srpska ("The Official Gazette of the Republic of Srpska", number 55/10, Article 32), within the procedure for issuing a construction license, an investor, whose project is considered to have or might have adverse effects on the environment, is obliged to obtain an ecology license first.
- Issuing of the ecology license is defined by Articles 80-100 of the Law on Environmental Protection ("The Official Gazette of BiH", number 71/12). The Regulation on projects for which an environmental impact assessment is conducted, the Criteria for decision-making in regards with obligatory implementation and scale of the environmental impact assessment ("The Official Gazette of BiH", number 7/06) and the Regulation on facilities that can be built and put into operation only if they have ecology licenses ("The Official Gazette of BiH", number 7/06) define types of production units and facilities which need ecology licenses.
- The request for ecology license is prepared by a person responsible for a facility or by an investor. Supporting documents enclosed with the Request for ecology license are prepared by an institution, authorised by the Ministry to perform activities in the field of environmental protection. Content of the request

for ecology licenses is stipulated by Article 85 of the Law on Environmental Protection.

- Pursuant to Article 89 of the Law on Environmental Protection, deadline for issuing of ecology licenses is no later than 60 days after the day when the request was submitted.
- Pursuant to Article 90 of the Law on Environmental Protection, the ecology license is issued for period of 5 years, after which an investor must submit a request for its revision. Article 95 of the Law on Environmental Protection sets forth conditions under which the ecology license can be revised before statutory term expires.

The Federation of BiH

Institutions authorised to issue ecology licenses on the level of the Federation of BiH are Federal Ministry for Environment and Tourism and cantonal Ministries.

- Pursuant to the Law on Environmental Protection ("FBiH Official Gazette" no. 33/03 from 19 July 2003) Article 42, the Federal Ministry for Environment and Tourism issues licenses for environment use according to its competence, whilst under Article 43 of the same Law, the cantonal Ministry issues licenses for environment use according to its competence.
- Environmental impact assessment is done pursuant to the Law on Environmental Protection, Article 53. Article 54 of the Law on Environmental Protection defines that a competent authority shall not issue urbanism approvals or other necessary approvals for projects for which environmental impact assessment is necessary if an ecology license is not attached to the Request.
- The competent Ministry conducts the procedure regarding environmental impact assessment pursuant to Article 55. Interested bodies on cantonal and federal level will get involved during the assessment procedure. A study on environmental impact assessment also needs to be attached to the request for issuing of ecology licenses for facilities and production units with an obligation to obtain the study on environmental impact assessment. Pursuant to the Law on Environmental Protection, Article 57, environmental impact assessment can be done in two phases:
  - Preliminary environmental impact assessment and
  - Environmental impact assessment.

- Pursuant to the Law on Environmental Protection (Article 58), a Request for preliminary environmental impact assessment is submitted to the competent Ministry.
- The competent Ministry, pursuant to Article 64 of the Law on Environmental Protection, approves the Study on environmental impact assessment by making a decision within 30 days after completion of the Study on environmental impact assessment. In a case of cross-border impact, the Federal Ministry shall forward the decision to other entity/country that may be affected by the project. The competent Ministry shall revise ecology licenses every 5 years.
- Pursuant to Article 70 of the Law on Environmental Protection, if operation of a production unit or a facility can cause significant adverse effects on the territory of other entity or country, or if other country or entity demands so, the Request for issuing of an ecology license shall be sent in to other entity or, through the competent authority, to the other country.
- Pursuant to Article 71 of the Law on Environmental Protection, the competent Ministry issues an ecology license within 120 days after the day of submitting a request. In cases where environmental impact assessment is needed, an ecology license is issued 60 days after the day when the Study on environmental impact has been submitted.

Brčko District

The Department for spatial planning and property-legal issues is responsible for environmental protection and ecology licenses on the territory of Brčko District.

- Pursuant to Article 23 of the Statute of Brčko District, Bosnia and Herzegovina, the Assembly of Brčko District, Bosnia and Herzegovina has adopted the Law on Environmental Protection.
- The Law on Environmental Protection, Article 41, stipulates competencies of the Department in the field of environmental protection, which deals with environmental protection activities, issuing of ecology licenses pursuant to regulations of this Law and other directives which refer to environmental protection.
- Environmental impact assessment, Article 52 of the Law on Environmental Protection implies establishing, description and analysing of direct and indirect impacts of a project on the following elements and factors: people, flora and fauna; soil, water, air,

climate and space; material goods and cultural heritage; as well as interaction among these factors.

- Pursuant to the Law on Environmental Protection (Article 53), along with the approval for making decisions on construction approval, an applicant must submit a certified copy of the approved Study on environmental impact assessment. When it makes a decision on environmental impact assessment, the competent Department provides an approval from the Health Department in the Government of Brčko District, as well as remarks and suggestions of an inter-entity body.
- Article 56 of the Law on Environmental Protection defines documents which need to be submitted along with the Request for making decisions on environmental impact assessment.
- The procedure of environmental impact assessment is carried out pursuant to Article 57 of the Law on Environmental Protection. Within 6 months after receiving the Decision on impact assessment, it is possible to submit a request to the competent institution to make the Study on environmental impact assessment.
- Within 90 days after a contract is signed, the competent institution is obliged to make a draft of the Study on environmental impact assessment according to the instruction of the head authorised for environmental protection.
- The competent institution shall make a final Study on environmental impact assessment within 30 days after completion of public discussion.
- Pursuant to Article 61 of the Law on Environmental Protection, the competent Department for environmental protection shall or shall not approve the Study on impact assessment within 30 days after receiving the completed Study.
- The Decision is published in a way set forth by this Law.
- In a case of cross-border impact, the competent Department forwards the Decision to other entity/country that may be affected by the project.
- Pursuant to Article 62 of the Law on Environmental Protection, the competent Department for environmental protection participates in the procedure of issuing construction licenses for projects which are subject to environmental impact assessment.

- An ecology license is defined by Article 65 of the Law on Environmental Protection. The competent Department shall carry out revisions of all issued licenses every 5 years.
- Article 66 of the Law on Environmental Protection defines what the Request for issuing of an ecology license needs to contain. The competent body is obliged to issue an ecology license within 60 days after receiving the Request.
- If the operation of a facility can cause some significant adverse effects on the territory of the other entity, country or in Brčko District, or if other entity, country or Brčko District demands so, the Request for issuing of an ecology license shall be passed to the other entity, country or Brčko District through the authorised department, at the same time when it becomes available to the public.
- Inspectional supervision over enforcement of the provisions of this Law and other directives laid down on the basis on this Law is carried out by the Department for public security of the Government of Brčko District, namely the inspector for environmental protection within their jurisdiction.

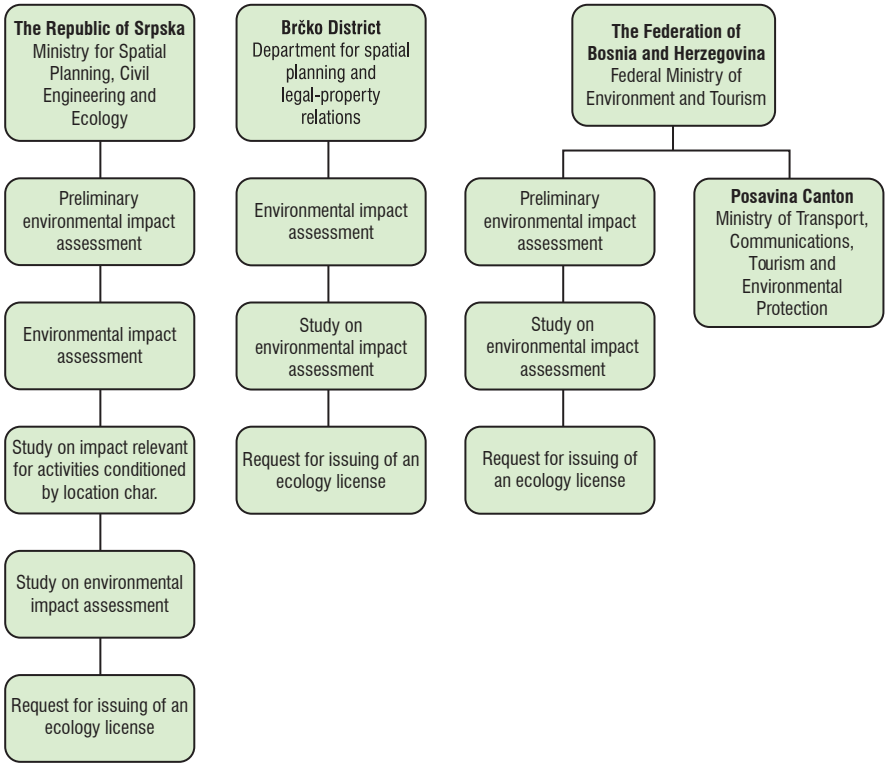

Figure 3-4: The procedure of obtaining an ecology license

4. FINANCING OF PROJECTS AIMED AT USING AGRICULTURAL BIOMASS FOR ENERGY PURPOSES

4.1. Financing of Projects Aimed at Using Agricultural Biomass for Energy Purposes in the Area of Croatian Posavina

It is necessary to differentiate two possible sources of funding of projects aimed at using agricultural biomass. The first source of funding refers to incentives paid for the amount of electrical energy generated from biogas, i.e. the amount of produced biofuel. The second source refers to the funding raised for the purpose of construction and equipping of facilities.

4.1.1. Incentive for amount of energy produced

Incentive tariffs for electricity generation from biogas facilities

Producers of electrical energy from biogas facilities are recognised within the Tariff system for electrical energy generation from renewable sources of energy and cogeneration (Official Gazette 63/12, 121/12) and can, therefore, realise a right to incentive tariff for the production of electrical energy from biogas. As a prerequisite to getting incentives, it is necessary for a producer to achieve the status of an eligible producer, issued by the Croatian Energy Regulatory Agency (CERA).

The level of incentive price, based on the aforementioned Tariff System, is defined by a contract signed between an eligible producer and the Croatian Energy Market Operator (HROTE) for the period of 14 years. In particular, for a facility of 300 kW of installed capacity, the Tariff system defines a tariff of 1.42 kn/kWh, whilst for a facility of over 300 kW, the tariff is 1.2 kn/kWh, which represents the starting incentive price.

When a producer starts production, the starting price is indexed every year for a change in the rate of inflation. That way, every eligible producer eliminates a price risk, i.e. they may know for sure how big their incomes will be for a given amount of electrical energy generated. It is

also important to mention that the funds for the payment of incentive rates are not paid from the state budget, but from the Environment Protection and Energy Efficiency Fund, which collects funds from end users of electrical energy. That way the risk of having insufficient funds for the payment of incentive prices in some years is reduced.

Incentive for biofuel production

Producers of biofuel do not have a specified purchase price of biofuel, but a unitary amount of incentive price is defined in kn/l of biofuel, which is added to the price of diesel and super petrol in the Republic of Croatia, finally giving a biofuel purchase price. Since the price of biofuel in the Republic of Croatia is changed every two weeks pursuant to the formula adopted by the Ministry of Economy, the purchase price of biofuel is also changed every two weeks.

The amount of above mentioned incentive is changed annually and, for the year 2012, it was defined by the Decision on a unitary amount of incentive price for the production of biofuel in 2012 (OG 123/2011) and was 3.46 kn/l for biodiesel and 1.75 kn/l for bioethanol. Just like in the case of incentive tariffs for electrical energy generation, biofuel incentive is not paid from the budget, but from the funds collected through motor fuel sales.

4.1.2. Facility Construction Funds

Investments in the construction of facilities for electrical energy generation from agricultural biomass are significant in principle and there are only a small number of investors who can cover all investment costs autonomously. Therefore, it is necessary for the majority of investors to search for external sources of funding in order to cover the costs of facility construction.

The most frequent way of funding in the Republic of Croatia is still the traditional one, i.e. by way of bank loans. A loan is raised by a physical or legal entity (depending on the size of a project) usually using some form of their property as a guarantee. A very simple procedure is the major advantage of this form of funding. Figure 4-1 shows a simplified scheme of this form of funding.

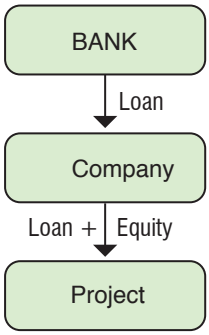

Figure 4-1: Classical funding scheme

Besides the classical (loan) form of project funding, an alternative way has also been developed in the field of energy based on a so-called project financing. In the case of project financing, a specific trading company is established exclusively for the execution of a given project, the so-called project company (Special Purpose Vehicle - SPV).

The founders or shareholders of this new trading company, i.e. the SPV, are different shareholders with specific obligations and rights. In its most simplified form, such a trading company consists of the following:

1. depositor or investor who puts part of his/her property into the project (for instance, an investor may invest construction land or cash to pay for a part of works)
2. creditor, i.e. bank or some other financial institution investing a portion of its assets.

The key characteristics of SPV are:

- legal entity founded exclusively for project execution
- has a task of harmonising project incomes (incomes from end users of service, or possibly some other contractual incomes – guarantees, grants etc.) with expenditures to keep a facility operational, as well as with repayment of financial liabilities
- positive difference between realised revenues and expenditures is assigned to equity investors in form of dividends, whereas it is paid to creditors in a form of repayment of capital and interests.

One of the main advantages of project financing is the sharing of risk between shareholders. A significant lack of project financing is its complexity as shown in Figure 4-2.

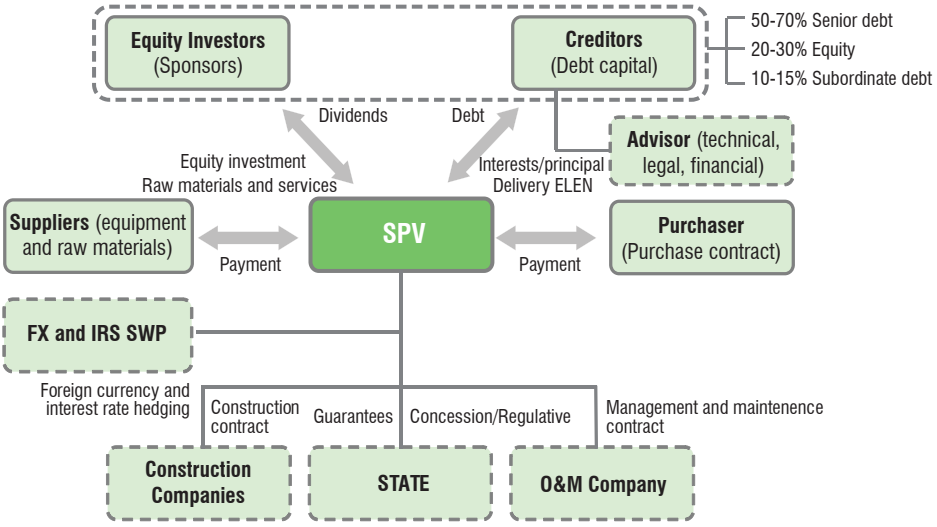

Figure 4-2: Possible SPV structure

Finally, it may be stated for traditional funding through classic loans to be more suitable for smaller projects (projects under one million Euros), whilst for bigger projects, project financing is offered as a funding option.

In the Republic of Croatia there is no umbrella institution that investors can address to get funding in order to cover their costs of investment in projects of electrical energy generation from agricultural biomass. Namely, market conditions constantly change and some institutions offer specific programmes until they exhaust all previously envisaged funds. Therefore, when a project is launched, it is recommended for a project investor to investigate autonomously a contemporary market condition by contacting at least the following institutions:

- Croatian Reconstruction and Development Bank (HBOR)

HBOR is a state development bank which often offers loan facilities for renewable energy under favourable conditions.

- Commercial banks:

Commercial banks increasingly finance projects of renewable energy. In cooperation with foreign development banks (such as European Bank for Reconstruction and Development – EBRD, German Development Bank – KfW, etc.), they frequently offer funding under relatively favourable conditions.

In principle, it can be stated that every financially and administratively well-prepared and economically and financially justifiable project can succeed in finding an adequate source of funding.

4.2. Financing of Projects Aimed at Using Agricultural Biomass for Energy Purposes in the Area of Bosnian Posavina

Energy generation from agricultural sources is useful for every household with a possibility for production, for local and broader community, as well as for humanity in general. The reasons why such facilities are financed as part of agricultural production are multiple as follows: settling of issues regarding waste and excesses, taking advantage of new raw materials that polluted the environment or were unused and a community development both at local, as well as at regional level.

The most frequent ways of financing projects for energy generation from agricultural biomass are from private funds, through co-ownership and project financing. Financing by third parties can be performed from commercial sources or from dedicated funds and assets.

Financing from the EU

The construction of facilities for utilization of waste is encouraged in all EU countries and in countries aspiring to become members of the EU. Financing funds can be private, regional, state, interstate and global. The ways of funding from the EU can be through grants, participation, subsidies, technical assistance and support in the form of facilitated administration.

Pilot projects are extremely important in our conditions, which get significant attention in every way, including facilitated financing, as well as demonstration facilities with obligations of spreading technologies.

Possible sources for cofinancing pilot projects with renewable energz sources are

- Carbon-finance (intended at reducing CO_2 emission; contact UNFCC (UN Framework Convention for Climate Change); web page www.carbonfinance.org).
- CDM (intended at enhancing access to projects of clean energy development mechanisms; Centre for CDM (Clean Development Mechanism) in the entities; Competent Ministries responsible for environment protection should be contacted with regards to such projects).

- IPA Programme (Instrument for Pre-accession Assistance) including development projects.
- FP7 (Framework Programme for Research and Development; Use of renewable energy resources including biomass).
- CIP – Competition and Innovation Programme
- EBRD – European Bank for Reconstruction and Development
- EIB – European Investment Bank
- KfW – German Bank for Reconstruction and Development
- UNECE – UN Economy Commission for Europe
- EU/EBRD Western Balkans Private Sector Support Facility ("WB-PSSF") including two loan lines intended for specific projects in the following priority areas:
  - SME Competitiveness Support Facility (SME-CSF) intended for support of investments in small and medium entrepreneurship (SME) aimed at competition improvement and business sustainability in the process of EU admission;
  - Sustainable Energy Financing Facility (SEFF) intended for support of investments in energy efficiency (EE) and renewable sources of energy (RES)

There are numerous other programmes and funds, whilst assistance is directed to plan and project development, implementation, feasibility study, preliminary project, demonstration facility, commercial projects.

Subsidies

The level of purchase price for energy generated from biomass in the Republic of Srpska is specified in the Decision on level of guaranteed purchase prices and premiums for electrical energy generated from renewable sources or in efficient cogeneration (Regulatory Energy Commission of the Republic of Srpska, no. P-33-570-130/11, dated 25 November 2011).

Guaranteed purchase price

Guaranteed purchase price of electrical energy originating from electric facilities using solid biomass with up to 1 MW capacity in the Republic of Srpska is 0.1988 KM/kWh, whilst for energy resulting from capacity ranging from 1 MW to 10 MW, the guaranteed purchase price is 0.1730 KM/kWh. Guaranteed purchase price of electrical energy originating from electric facilities using agricultural biogas, with the capacity of up to 1 MW, is 0.2254 KM/kWh. Guaranteed purchase price of electrical energy originating from electric facilities using biogas with up to 150 kW capacity is 0.1484 KM/kWh, for facilities with capacity ranging from 150 kW to 1 MW, it is 0.1459 KM/kWh, whilst for facilities with capacity ranging from 1 to 10 MW the price is 0.1434 KM/kWh. Facilities using fluid fuels with capacity ranging from 150 kW to 10 MW have the same guaranteed purchase price of electrical energy as electric facilities using biogas.

5. CONCLUSION

5.1. Using Agricultural Biomass for Electrical Energy Generation in the Area Of Croatian Posavina

When there is no guaranteed long-term supply of raw materials, the investments in projects of electrical energy generation from biomass are exposed to a risk of lack of raw materials and/or unacceptable increase of their price. As illustrated in the data shown in Chapter 2 at the territory of Vukovarsko-Srijemska County, there are unused potentials for the use of agricultural biomass and manure, along with waste from agricultural production, for energy purposes. By respecting a priority use of agricultural surfaces for food production, it is possible to use manure efficiently from livestock production inside biogas facilities in anaerobic processes of co-digestion by using energy crop. It is recommended that one part of energy crops (primarily maize silage) should not exceed 30% of total raw material composition for production of biogas. According to calculations made and to the assumption that 50% of manure can be used for biogas production, it is possible to construct a biogas facility in the area of Vukovarsko-Srijemska County with a cumulative installed capacity of at least 9.90 MWel. Furthermore, for a sustainable production of fluid biofuels, 31,324 ha of agricultural land can be engaged in the area of Vukovarsko-Srijemska County where either oilseed rape would be grown in order to supply a facility for biodiesel production with capacity of about 35,000 t/year, or maize in order to supply a facility for bioethanol production with capacity of about 65,600 – 68,200 t/year. Accordingly, investments in energy generation from agricultural biomass in the area of Vukovarsko-Srijemska County could provide new directions for development to local communities by creating a rounded chain of activities to expand markets for agricultural holdings to investment opportunities for operators who are active in energy sector.

The process of obtaining all necessary permits to run a biogas facility or a facility for biofuel production is a complex and a lengthy one. It is necessary to comply with legal regulations in different areas (urban planning and construction, energy, economy activities, water management, legal property issues, environment/nature protection, etc.). From the above mentioned areas, except insofar as it relates to the acquisition of the status of eligible producer of electricity from renew-

able sources of energy, the administrative procedure for the construction of biogas facilities and facilities for the production of biofuels is the same.

In the Republic of Croatia, the electrical energy generation from biogas facilities is encouraged through tariff incentives (feed-in tariff) where a producer of electrical energy gets a fixed price for every kWh of electrical energy produced. On the other hand, biofuel producers receive a fixed fee per litre of fuel added to the price of diesel or super. Unlike producers of electrical energy who get a guaranteed purchase price through tariff incentives, biofuel producers only get a guaranteed incentive, whilst the final purchase price depends on the price of gasoline or diesel fuel changing every two weeks on the market. In terms of financing projects aimed at using agricultural biomass for energy purposes, two financing options are offered. The first and the classical one, through bank loans, can be applied to smaller projects due to its simplicity. The second, through project financing, is rather applicable to larger projects because of its higher cost and complexity of implementation. As for funding, in Croatia no institution has continuously funded any subject project. Therefore, it is necessary for an investor to investigate autonomously all currently available sources, including amongst the others HBOR and commercial banks.

5.2. Using Agricultural Biomass for Electrical Energy Generation in the Area of Bosnian Posavina

The major characteristic of animal production in the considered area is its general fragmentation, or rather the domination of individual farms with small number of animals in total livestock structure, which directly affects ability to collect, as well as to manage sustainably biomass from this kind of production. Namely, fragmented production by a small-scale biomass production on an individual farm makes the construction of a biogas facility at the level of farm economically unjustified, both due to the facility cost and in terms of availability of raw materials. Similar to a tendency existing in primary production, biomass production in manufacturing industry (primarily in slaughterhouses) is relatively small, discontinuous (with the exception of poultry slaughterhouses) and it does not provide economic justification for the production of separate facilities. The examined area encounters

a problem of adequate disposal of slaughterhouse waste, because there is no dedicated depot or rendering plant. In this sense, as an adequate and economically justifiable solution the construction of a smaller number of regional facilities for biogas production is imposed, which would take over raw material from a significant number of individual facilities or from smaller processing plants throughout its target area, thereby simultaneously satisfying their needs for quantity and continuous inflow of raw material and helping in reducing harmful effects of waste biomass from animal production on the environment.

For a smaller number of farms and processing plants in the tested area, disposing of a larger number of livestock units, or a larger processing capacity (i.e. slaughterhouses), there is an economic justification to build their own biogas facilities, with respect to the quantity and continuity of raw material supply, which would enable full facility exploitation and utilization of energy generated for their own purposes, as well as their access to a common energy system. Potential sites for the establishment of separate biogas facilities are located in the following settlements (or rather their close surroundings):

- Broiler farm in the settlements of Maoča, Brezovo polje, Marković polje, Brezik, Dubrava, Gredice, Potočari, Rahić, Seonjak, Gajevi and Brka (Brčko District);
- Cattle and dairy cow farms in the settlements of Maoča, Donji Rahić, Buzekara, Trnjaci, Brka, Palanka, Brezik, Omerbegovača and in the wider area of the city of Brčko;
- Pig farms in the settlements of Krepšić, Vučilovac, Bijela, Buzekara, Brezovo polje and in the wider area of the city of Brčko;
- Cattle farm in the settlement of Tišina (community of Šamac);
- Pig and poultry farm in the settlement of Obudovac, along with farms in the settlements of Gornja Slatina and Batkuša (community of Šamac);
- Poultry slaughterhouse in the settlement of Odžak;
- Cattle and dairy cow farm in the wider area of Odžak;
- Broiler and hen farm in the settlement of Bazik (community of Domaljevac);
- Broiler and hen farm in the wider area of the city of Orašje.

There is a potential for the construction of biogas facilities on all the given sites, either at a level of a single farm, like in the case of cattle farm in the settlement of Tišina, the community of Šamac, or at a level of a settlement, supplying raw material from a number of farms from the same settlement.

In any case, the issue regarding number, location and distribution of regional facilities for biogas production require a detailed analysis of a field situation in terms of testing of feedstock, regional energy requirements, local regulations, financial support by local communities and entities, as well as economic justification of the investment.

Municipalities/districts considered in the project area covering Domaljevac-Šamac, Odžak, Orašje, Šamac and Brčko District are relatively small, therefore a possible facility for biodiesel or bioethanol production would surely supply raw material from the surrounding areas as well. The analysis of agricultural areas under field crops for bioethanol production has shown that maize was grown, whilst sugar beet was not grown in the given area. The most represented agricultural crop for biodiesel production in the project area is soya bean, but cropped areas are small, as well as the total yield of grain. Oilseed rape, which already has the biggest potential for biodiesel production in the project area, is grown only in the area of Brčko District, on a relatively small cropped area. Should the overall agricultural areas for non-food purposes be used for the purposes of growing a single crop for biofuel production, bioethanol, produced through a dry procedure from maize, shows the biggest potential (1.689,07 TJ/year), whilst the biggest potential for biodiesel would be from oilseed rape (1.415,02 TJ/year). Given the fact that land for non-food production will be used for other purposes as well, a conclusion can be made that a real potential for production of fluid biofuels in the considered area could be 30% of the theory one, i.e. that 12,330 ha of agricultural land could be engaged for energy crops, where maize would be grown for the supply of bioethanol production facility with a capacity of 18,000-19,000 t/year or oilseed rape for the supply of biodiesel production facility with capacity of about 11,400 t/year.

Legal regulations at the BiH state level are complicated, simply because there are two entities and one district, which all have their own procedures for issuing permits. In this domain the incentives also vary. The bulk of upcoming laws that are to regulate this area are still under construction or have been adopted in their draft form. Spatial planning documents have not been regulated at a local level, as the existence of facilities for RES utilization has not been recognised.

Pilot projects are of particular importance for our conditions, which, besides being used for demonstration plants for energy generation from renewable sources of energy, are introducing modern technologies and have an educational character. Funding a pilot plant can develop as a result of cooperation with international institutions.