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Regional Networks for the Development of a Sustainable Bioenergy Market in Europe

Biomass Action Plan

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Acknowledgments

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Biomass Action Plan

1. Introduction

Biomass is one of the most promising renewable energy sources in the Czech Republic and especially in the target region (municipalities of Bohuslavice nad Vláří, Brumov-Bylnice, Jestřabí, Lipová, Návojná, Nedašov, Nedašova Lhota, Petrůvka, Rokytnice, Rudimov, Slavičín, Šanov, Štítná nad Vláří-Popov). This Biomass Action Plan was created within the frame of Bioregions project with the aim to cover at least 1/3 of regional energy demand from local biomass sources. The action plan was elaborated in autumn 2011.

1.1. Background

- European Context

The European Union decided to increase the share of renewable energy sources (hereinafter referred to as RES) in the total consumption to 20%, reduce carbon dioxide (CO_2) emissions by 20%, and improve energy efficiency by 20% by the year 2020 (EU 20-20-20 targets). As part of these targets, the European Parliament passed the **Directive 2009/28/EC on the promotion of the use of energy from renewable sources**. As the biomass belongs to widely used RES, the European Commission adopted a plan promoting its efficient and environment-friendly use, the so-called **Biomass Action Plan EU (COM(2005)628).** The present Action Plan was prepared as part of the **Bioregions** European project, which strives to promote biomass energy production by creating stable local markets in the project's target regions.

- National and regional context

The Czech Republic adopted an **act on the promotion of electricity production from renewable energy sources**, which has later been supplemented with the **National Action Plan for Energy Produced from Renewable Sources**. These two documents provide a general RES promoting framework and cover also the use of biomass for energy production. As biomass is potentially the most important RES used in the Czech Republic, the **Biomass Action Plan for the Czech Republic** has been put together. In addition to the aforesaid documents, the **Territorial Energy Planning Concept of the Zlín Region** should also be taken into account whenever energy-oriented projects in the region are planned.

1.2. Action Plan Preparatory Objectives

The aim of this document is to give an overview about the current energy situation in the target region influenced by factors like demographic development, stagnation of local economy or development of RES. Recommendations leading to the achievement of covering 1/3 of regional energy demand by local biomass sources are presented in chapter 6 of this document.

1.3. Methodology of Creating the Action Plan

The Biomass Action Plan has been developed as part of the Bioregions European project based on a model created by partners from the experienced bio-regions of Achental (Germany) and Jönköping (Sweden). The introductory section describes the European, national and regional context in which the said strategic document has been set. The next section examines the target region consisting of the towns of Slavičín and Brumov-Bylnice and 11 neighbouring villages. Data used in the section were taken from national sources (the Czech Statistical Office; National Institute of Forest Stewardship; Ministry of Industry and Commerce; Ministry of Agriculture; Ministry of Environment; Carbon Map of the Czech Republic; and Regional Information Service), regional sources (Territorial Energy Planning Concept of the Zlín Region; microregions: Luhačovické Zálesí, Jižní Valašsko and Bojkovsko; EAZK database) and surveys performed by distributing questionnaires among the concerned municipalities, their citizens and major regional suppliers/consumers of biomass. The analytical section is followed by a strategic section defining the objectives of the Action Plan, activities necessary for their achievement, and evaluation of possible impacts of the implementation of the Action Plan.

- Definitions of terms

Biomass – From the point of view of energy production, any organic mass that can be used, within a given framework, for the production of energy (either a directly combustible substance or a raw material from which biofuels can be produced).

Biofuel – Biomass processed in a manner allowing its use for energy production, either as a solid matter, fluid or gas. In this paper, the biofuel shall mean solid and dry biomass directly combusted in boilers/furnaces (firewood, straw/hay bales, pellets or briquettes). Liquid fuels (biodiesel) are used in transport, which is not covered in this paper. The gas fuels (biogas) potential is currently low in the region.

Bioregion – A region where at least 1/3 of energy necessary for heating and electricity production comes from regional resources and sustainable energy sources, with an emphasis on solid biomass.

Biomass boiler – A piece of equipment in which biomass is combusted, used for home heating and/or water heating. Depending on a sort of combusted biomass, the biomass boilers can be divided into the following categories:

a) Classical firewood boilers – the simplest type of boilers, widely used, often outdated; combusted biomass: firewood, wood briquettes;

b) Gasification boilers for wood logs – these boilers combust biomass more efficiently than the previous ones, with lower emissions;

c) Wood chips boilers – boilers with a higher installed capacity (at least hundreds kW) used in municipal heating plants and power stations; suitable for wood chips and splinters with a various level of humidity;

d) Wood pellet boilers – state-of-art automatic boilers for high-class standardised fuel, as comfortable for the user as gas boilers; automatically controlled capacity, low emissions;

e) Straw/hay bales boilers – a specially designed grate is necessary, as straw or hay is combusted under different temperature than wood and ash gets caked; like the wood pellets boilers, they are not used for heating of family houses, but rather in municipal heating plants (higher installed capacity);

f) Boilers for agro-pellets – similar to the wood pellets boilers; some boilers can, to a certain extent, combust wood pellets as well as pellets processed from non-woody energy crops (e.g., sorrel).

Pellets – biofuel processed from dried biomass condensed into little cylinders (up to 50 mm long, 6-25 mm in diameter). Wood pellets are made of compacted wood dust, wood fines, or sawdust; the level of humidity is low (up to 8%), as well as contents of ash (depending on how much bark is contained); the heating (calorific) value of pellets is higher than that of firewood, with almost no pollutants being emitted during the combustion. Pellets processed from non-woody energy crops (agro-pellets) are made of agricultural waste; their heating (calorific) value is lower than that of wood pellets and contents of ash is higher. These pellets are cheaper than those made of wood, however, it is recommendable to consult a manufacturer of the boiler whether this sort of fuel can be used.

Rotation period – a period of time between the planting and felling of a tree.

Fast-growing trees – trees (e.g. poplars, willows, alder trees) with a short rotation period and growth significantly higher than average growth of other trees.

- Quality Control

During the implementation of the Action Plan, the current situation in the target region will be regularly monitored (energy production/consumption, technological progress, effective legislation, etc.) and an Analysis of Fulfilment of the Action Plan will be performed not later than the set deadlines (2, 5 and 10 years). The objectives of the Action Plan will be reviewed in the Analysis depending on the then current situation in the region and activities will be focused on the fulfilment of the amended/updated objectives (or new ones proposed).

During the application of the Action Plan, special stress will be put on adhering to the principles of sustainable development combined with economical use of biomass (preferable use of waste biomass, modern methods tree felling, preservation of the landscape and biodiversity). New legislation will be promoted (implementation of national directives and local regulations) focused on using renewable energy sources (biomass), improving energy efficiency (thermal insulation of buildings, installation of state-of-art technologies) and improving the quality of the environment (handling waste biomass, promotion of high-rate fuels to be used for heating). Special stress will also be put on promoting a biofuels certification scheme with the aim of making the relations in the supply chain more transparent (felling – processing – shipment – consumer) and improving the efficient use of fuels (including, but without limitation to, the most sophisticated biomass technologies).

2. Description of the Target Region

2.1. General Characteristics of the Region

- Geography, natural conditions

The target region is located in the south-eastern part of the Zlín Region, along the Czech-Slovak border. Its total area is 206.5 km^2. Its boundaries are formed by the Vizovice Hills in the north and White Carpathians in the south and east, with the highest points of Javorník (782 m) and Průklesy (835 m. As for its climate, a larger part of the region belongs to the moderately warm and moderately humid district (MT 3, MT 9), only the higher parts of the White Carpathian Mountains to the cold district (CH7). The major watercourses are little rivers Vlára, with its tributary, Brumovka, belonging to the catchment basin of the Váh (and, consequently, Danube). The rivers of the White Carpathians are characteristic for their fluctuating river flows, due to the low retention capability of the flysch subsoil and local climatic conditions – hence the important hydrological role of forests that cover a half of the region's surface. The countryside is made up of a typical patchwork consisting of woodlands, fields and pastures, cultivated by local people for centuries. In order to protect the unique landscape and rare species (both plants and animals), a Protected Landscape Area of the White Carpathians was founded in 1980, turned into a UNESCO Biosphere Reserve in 1996, that covers the whole area of the target region.

- Structure of local administration

The target region consists of two towns with second-class delegation municipal offices (Brumov-Bylnice and Slavičín) and eleven neighbouring villages (see Table 1).

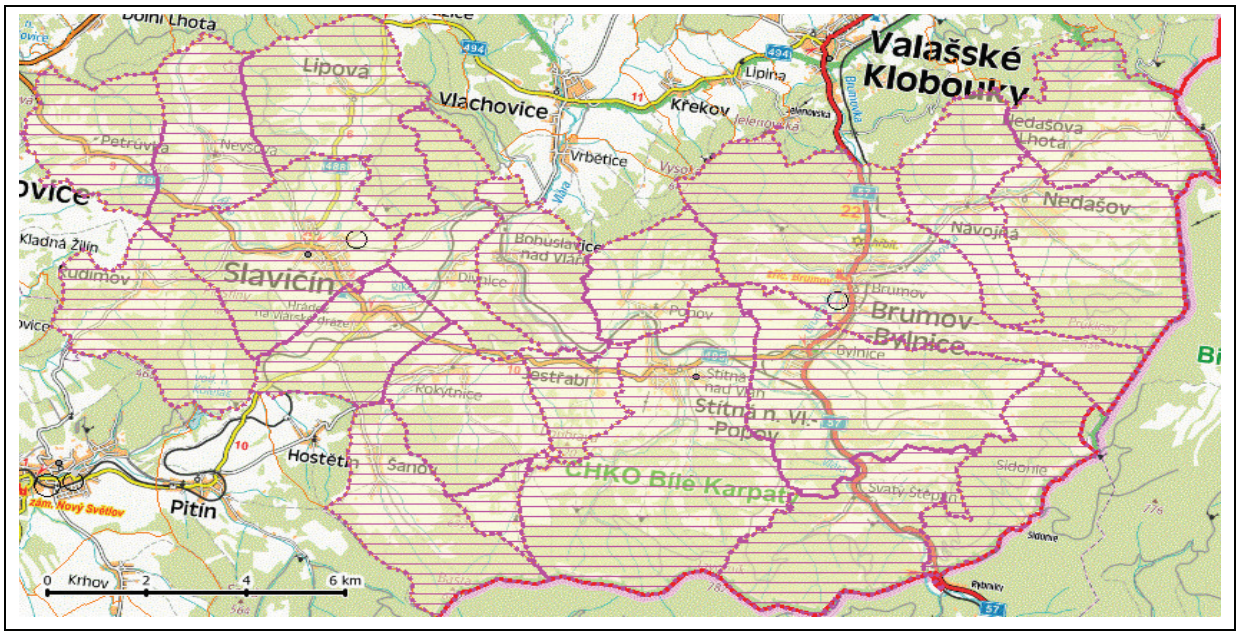


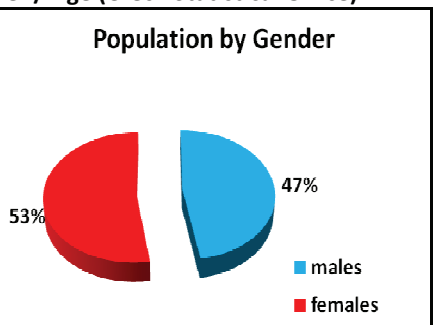
Fig. 1 : Map of the Target Region

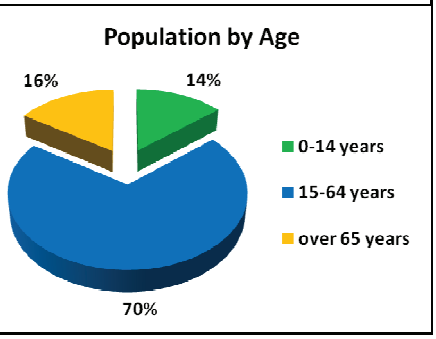
- Demographic characteristics, municipalities and townships

The population of the region is ca 20,500, with an average density of 100 inhabitants per km^2 (the national average being 133 inhabitants per km^2). The most densely populated are the region's natural centres, towns of Slavičín and Brumov-Bylnice. The local population is mostly within the productive age group, with ever-growing numbers of those over 65 years of age. As for migration, numbers of out-migrants are in excess over those of in-migrants.

Table 1: Demographic Characteristics of the Region – Population by Gender / Age (Czech Statistical Office)

Municipality	Population		
	As of 01 Jan 2010	As of 01 Jan 2011	Change
Bohuslavice nad Vláří	392	388	-4
Brumov-Bylnice	**5 863**	**5 828**	**-35**
Jestřabí	298	300	2
Lipová	330	338	8
Návojná	717	740	23
Nedašov	1 401	1 399	-2
Nedašova Lhota	745	718	-27
Petrůvka	321	323	2
Rokytnice	583	573	-10
Rudimov	251	252	1
Slavičín	**6 847**	**6 800**	**-47**
Šanov	504	497	-7
Štítná nad Vláří - Popov	2 303	2 270	-33
Total	**20 555**	**20 426**	**-129**





- Economic profile

An outlying borderland region far from major roads, railways and industrial centres has long recorded a higher-than-average unemployment rate (14.5% as of 31 Dec 2010 according to the Czech Statistical Office). The structure of the local economy is well balanced, as none of major sectors (agriculture, industry, building industry, transport, public sector) scores for more than 24%. Several major agricultural companies are established in the region (JAVORNÍK CZ s.r.o., ABM HRÁDEK s.r.o.), in addition to numerous arms and individual biofarmers. Industrial companies, mostly SMEs, are mostly active in the sectors of light engineering and wood processing industry (Kloboucká lesní s.r.o., Pila Vágner). A Regional Cooperation Centre was established to promote and back the local SMEs. The tertiary sector (services) is a major local employer, too. The most important road is the route I/57 running through Brumov-Bylnice and linking the region to Slovakia. The railway transport is less important; the Vlára Railway branch line (No. 341) connects Staré Město u Uherského Hradiště with Slovakia; the line No. 283 operating between Brumov-Bylnice and Valašské Klobouky is connected to the international line No. 280 at Horní Lideč.

2.2. Current Energy Situation

- Existing energy infrastructure

Electricity is distributed throughout the region by the E.ON Distribution network (0.4 kV low-voltage network, 22 kV high-voltage network). The whole region is supplied by a single ultra high voltage power line (100 kV), without any backup, which causes power shortages especially during winter. There is no major power plant in the region; electricity is only produced by co-generation gas units (BTH Slavičín – total output 475 kW), a small hydro in Bohuslavice nad Vláří (output 37 kW) and photovoltaic solar parks (installed capacity 7.75 MW). However, electricity is largely imported from other parts of the Czech Republic. Almost the entire area of the region, except for six municipalities (Lipová, Petrůvka, Rudimov, Kochavec, Svatý Štěpán, and Sidonie), is supplied with natural gas. Homes are mostly heated individually (gas boilers or boilers for solid fuel). Two municipal long-distance heat supply systems are operated in Brumov-Bylnice and Slavičín,[1] respectively.

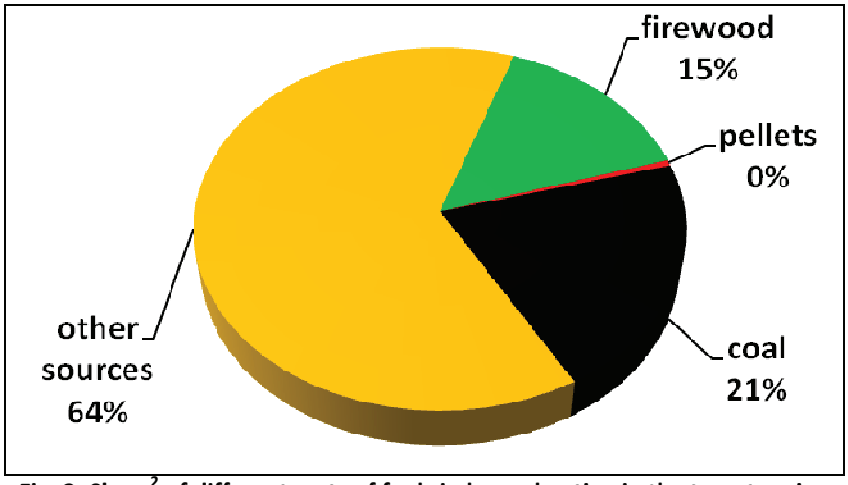


Fig. 2: Share[2] of different sorts of fuels in home heating in the target region (pellets 0.5%; other sources – long-distance heat supply, gas, electricity) (Source: questionnaires by Bioregions 2011 - municipalities)

- Current energy situation – supply and consumption (broken down according to the energy medium – available data)

When energy is taken into account, the most important players are: homes and households (notably home heating), consuming 56% of the total volume of consumed energy; tertiary sector (public buildings heating), consuming 30%; and industry, consuming 9%. According to the data contained in the Territorial Energy Planning Concept of the Zlín Region (ÚEK ZK), a major part of consumed energy has been produced using natural gas (41%), solid fuels (37%), and electricity (22%). Solid fuels mean a mix of fossil fuels and firewood.

[1] Three long-distance heat supply systems in Slavičín, originally separate, were physically interconnected in November 2011 into a single system, primarily heated with biomass fuels.
[2] Based on numbers of households utilising specific sort of fuel.

Four major energy sources using biomass (i.e. wood chips and splinters) are operated in the region: two as municipal long-distance heat supply systems (in Brumov-Bylnice and Slavičín), another two in major industrial plants (Kloboucká lesní s.r.o.; JAVORNÍK – CZ s.r.o.). A list of major heating sources of the target region is contained in (ANNEX II).

Table 2: Annual Energy Consumption (MWh) in the target region (ÚEK ZK - 2001)

Municipality	Solid fuels[3]	Liquid fuels	Fuel gas	RES[4]	Electricity	Total
Bohuslavice nad Vláří	3 107	0	287	0	611	4 004
Lipová	2 265	0	0	0	687	2 952
Petrůvka	2 515	0	0	28	754	3 297
Rudimov	1 725	0	0	0	557	2 282
Slavičín	29 460	63	67 856	3	18 700	116 083
Šanov	2 635	0	1 618	0	789	5 042
Brumov-Bylnice	24 901	0	17 699	50	19 028	61 677
Jestřabí	1 288	0	736	0	732	2 756
Návojná	3 320	0	813	0	1 518	5 651
Nedašov	6 511	0	2 662	5	2 923	12 101
Nedašova Lhota	4 376	0	62	0	1 168	5 606
Y.tnice	4 498	0	187	0	742	5 428
Štítná nad Vláří-Popov	6 948	47	10 562	0	5 526	23 083
Total	**93 548**	**110**	**102 483**	**86**	**53 733**	**249 961**

Table 3: Annual Energy Consumption (MWh) in the target region (Bioregions survey 2011 & expert estimation)

Municipality	Solid fuels	Liquid fuels	Fuel gas	RES	Electricity	Total
Bohuslavice nad Vláří	3 004	0	278	0	625	3 907
Lipová	2 190	0	0	0	703	2 893
Petrůvka	2 432	0	0	29	771	3 232
Rudimov	1 668	0	0	0	570	2 238
Slavičín	28 488	59	58 983	6 637	19 130	113 297
Šanov	2 548	0	1 565	0	807	4 920
Brumov-Bylnice	24 079	0	14 216	2 949	19 466	60 710
Jestřabí	1 245	0	712	0	749	2 706
Návojná	3 210	0	786	0	1 553	5 550
Nedašov	6 296	0	2 574	6	2 990	11 867
Nedašova Lhota	4 232	0	60	0	1 195	5 486
Y.tnice	4 350	0	181	0	759	5 289
Štítná nad Vláří-Popov	6 719	43	8 743	1 470	5 653	22 628
Total	**90 462**	**102**	**88 097**	**11 091**	**54 971**	**244 723**

Starting from 2005, two important factors have had a major impact on the overall energy

[3] Mix of fossil fuels and firewood is used for heating in family houses, public buildings and private companies
[4] Renewable energy sources of heating (solar panels, heat pumps) and long-distance heat supply systems (major biomass sources)

situation in this region (and not only there):

First, the boom of the renewable energy sources boosted by guaranteed purchase prices for produced electricity (in particular from photovoltaic panels) and subsidised replacement of old solid fuel boilers with new boilers for biomass (the “Green Savings programme”). In addition to this, many households (and both municipal long-distance heat supply systems) have switched from natural gas to biomass due to increasing prices of gas; consequently, the decrease in consumption of natural gas (-14%) has for a most part been made up for by higher consumption of biomass. The share of biomass in home heating has therefore substantially increased, notwithstanding the nonexistence of an efficient and professional biomass market.

Second, energy consumption has dropped in general due to attenuation of heavy industry, energy efficiency measures introduced by industrial plants, and energy saving in heating of public buildings facilitated by grants (Environmental Operational Programme – thermal insulation & reconstruction of heating sources) as well as subsidies for citizens (the “Green Savings programme” – thermal insulation & introduction of RES). The total energy consumption in the region has dropped by 2.1% due to lower consumption of solid fuels (by 3.3%) and liquid fuels (by 7.3%). The drop in natural gas consumption has resulted from energy saving (thermal insulation of buildings) and, chiefly, the switch from gas heating to biomass heating. Consumption of electricity has increased as many households have been equipped with new electric equipment.

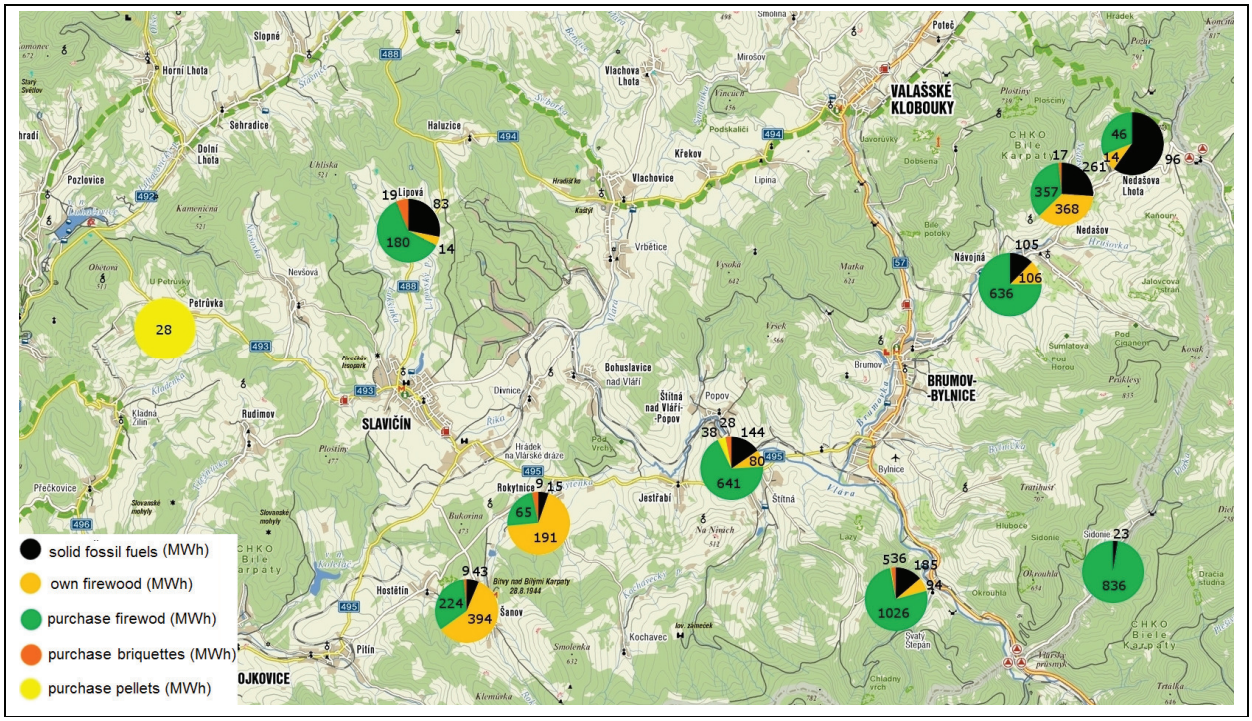


Fig. 3: Solid fuels used for home heating in the target region (Source: questionnaires by Bioregions 2011)

2.3. Survey of Existing Action Plans and Strategies Focused on the Region's Development

The future development of the region is influenced by international action plans and strategies referred to above in the introductory section, as well as concepts and policies adopted on the national level and examined in the following section. Several crucial documents adopted by the Zlín Region have both direct and indirect impact on the future development of the micro-regions of Brumov-Bylnice and Slavičín. These are, without limitation to them, the **Emissions and Immissions Reduction Strategy, Territorial Energy Planning Concept of the Zlín Region, Zlín Region's Waste Management Plan, Zlín Region's Tourism Development Programme, Traffic Master Plan of the Zlín Region, Strategy of Development of the Zlín Region for 2009-2020** and a closely linked **Programme of Territorial Development of the Zlín Region for 2010-2012**.

Czech municipalities often join together in micro-regions and associations of municipalities in order to strengthen mutual cooperation and facilitate drawing grants from available sources. Three micro-regions exist in the concerned area (Bojkovsko, Jižní Valašsko and Luhačovské Zálesí), with each municipality being a member of at least two, depending on their historical, ethnographic and economic links. The micro-regions have several common objectives set forth in their respective strategic development plans, in particular, development of the countryside (including utilising local biomass resources) and attracting tourism and investors including SMEs. To attain these objectives, the municipalities have founded the so-called **Local Action Groups (MAS)** participating in the **LEADER (LEADER+)** initiative. Currently, there are three active MASs in the region: Bojkovsko, Luhačovské Zálesí, and Ploština (which covers a greater part of the Jižní Valašsko micro-region), that may distribute grants to local development projects under separate calls for proposals.

In addition to the above, the towns of Brumov-Bylnice and Slavičín have their own strategic documents and plans and both of them are currently putting together new urban master plans – essential documents for their future development and planning. A draft of a new urban master plan for Brumov-Bylnice has already been submitted to the public and will be discussed late in 2011. As for Slavičín, a synopsis of the plan is being prepared. Hence, both towns have reached the moment where they can possibly adjust their respective urban master plans and harmonise them with this paper (e.g. set out a site for the planned Biomass Trading Centre). Besides the urban master plans, required by Czech law, both towns have strategic documents of their own. Slavičín has prepared the **Town of Slavičín Strategic Plan for 2011-2013** analysing the current circumstances (including the SWOT analysis of the town), presenting major visions and setting a global objective, which should be attained through 6 priorities: Economy and human resources; Transport, traffic and technical infrastructure; Development of social and health services; Tourism; Better quality of life in the town; and Environment in the town & vicinity. Preferring community planning, the town of Brumov-Bylnice prepared, in cooperation with the neighbouring town of Valašské Klobouky, the **Community Plan of Social Care and Services in the Districts of Brumov and Valašské Klobouky**. Besides the municipalities, numerous other players participate in implementing the Community Plan, including senior homes, regional institutions, NGOs, and citizens' associations. The Community Plan is primarily focused on social issues (elderly people, youth), but also on the employment

policy (an unemployment rate in the region is in excess of 14%) based on advising disadvantaged groups, establishing socially oriented companies, supporting tourism infrastructure, and providing affordable housing in the region. Educational projects developed as part of the Community Plan promote the principles of sustainable development, thus being in line with objectives of this paper.

2.4 Survey of Relevant National Plans (e.g. National Renewable Energy Action Plan, Biomass Support Plan)

The European Commission has adopted the **Biomass Action Plan EU (COM(2005)628)** to promote an efficient use of biomass (not only in the field of energy production), on which the **Biomass Action Plan for the Czech Republic**[5] is based. The current Action Plan for the period 2009-2011 is first and foremost focused on the production of energy from biomass and, marginally, covers also other issues like biofarming, nutrition recycling, and agriculture in general. Apart from other goals, the plan should help the Czech Republic meet its obligations in terms of the production of energy from RES, support of the countryside as a major supplier of biomass energy, promote the principles of sustainable development with respect to environmental limits concerning the processing of biomass and increasing the supply of biomass for energy in the domestic market.

The Biomass Action Plan for the Czech Republic introduces the following categories: agricultural, forest and residual biomass. Specific energy potential is specified for each sort of biomass, as well as possible limits of its use (e.g. competition with the food processing industry). The Action Plan further lays out a range of essential measures (mostly of administrative and legislative nature) aimed at improving the conditions of the use of biomass, and also refers to grants and subsidies from which to fund eligible projects focused on energy production from biomass.

Being one of the major producers of biomass for energy, agriculture can be funded from several sources. At present, farmers can profit from **direct payments** (so-called **SAPS** and a national supplementary **Top-Up** payment) for farmed land registered in the land registry system, support of farming in disadvantaged areas (**LFA**), and at **NATURA 2000** sites. Though such payments are primarily intended to promote food production and maintaining of meadows ecosystems, certain by-products (hay, straw) may be used for producing energy. Plants of fast growing trees are a specific exception for which farmers may receive direct payments, as they are defined in the Agricultural Act (Sect 3(i) of Act No. 252/1997 Coll.) as forest culture of a kind.

Furthermore, farmers may draw from the **Rural Development Programme for 2007-2013**. If an appropriate call for proposal is published, planting fast-growing trees may be funded from the programme (under the Measure I.1.1 – Modernizing of farms, Sub-measure I.1.1.3 – Planting of fast-growing trees for energy production). The Area *III.1.1 – Diversifying of non-farming activities* is focused on promoting construction of de-centralised enterprises for processing and utilizing renewable fuels and sources of energy (pelleting machines, boiler houses, heating

[5] Decree No. 47 of the Government of the Czech Republic of 12 January 2009

plants…). In the past, the Ministry of Agriculture also subsidised construction of agricultural bio-gas stations, but abandoned this practice by July 2011.

Other entrepreneurs and businesses may use grants under the **Entrepreneurship & Innovation Operational Programme (OPPI)** to build sources of energy produced from biomass. Legal entities (enterprises, municipalities, regions...) may apply for grants to fund installation or reconstruction of existing heating sources in combination with a co-generation unit fired with landfill gas or biogas (except agricultural biogas stations) under the **EFEKT Programme**. The resources of the EFEKT Programme are rather limited, though, as only CZK 30 million is annually allotted on the nationwide level to measures of all sorts (not only installation or reconstruction of heating sources). Non-business legal entities can build on the **Operational Programme "Environment"** (Ministry of Environment), which makes it possible to fund construction of biomass energy sources under the priority axis 3.

In the Czech Republic, renewable energy sources (RES) are promoted through a system of purchase prices and green bonuses (producer can choose between a fixed feed-in tariff or a premium payment) pursuant to **Act No. 180/2005 Coll., On the promotion of electricity production from renewable energy sources**. A dramatic increase in the installed capacity of photovoltaic power plants experienced in 2009 and 2010 resulted in rapid growth of electricity prices for end-consumers. Consequently, necessary measures were taken to reduce the volume of newly installed capacity of photovoltaic parks, which affected also other RES, though.

In August 2010, the Czech Government adopted the Czech Republic's **National Renewable Energy Action Plan**[6] (hereinafter referred to as NAP) in accordance with the Directive 2009/28/EC, focused chiefly on the production of electricity. Scenarios contained in the Action Plan were based rather on real-life trends than on a specific potential of respective RES. The Action Plan sets annual caps (ceiling) on a newly installed capacity for each RES. If a newly installed capacity is in excess of the pre-set cap in a given year, guaranteed purchase prices and green bonuses will not apply to new sources of the same kind installed in the following year. Nevertheless, this measure makes any further preparation of projects aimed at producing energy from biomass extremely uncertain, since it often takes several years before such projects are ready to implement. While the Action Plan predicts a 2.52-fold increase in the volume of production of electricity from solid biomass by 2020, the production of heat should only increase 1.38 times, which suggests that the Plan prefers less efficient combusting of biomass in power plants along with coal. If it happens, small heating plants will suddenly find themselves under severe pressure, because big customers (power plants) will become their competitors in the biomass market. To make things even worse, the NAP anticipates only a little share of energy produced from efficiently grown non-woody energy crops, while the use of wood biomass should almost double, which may cause significant competition with the wood-processing industry.

[6] Decree No. 603 of the Government of the Czech Republic of 25 August 2010

The National Action Plan on RES considers household waste as a renewable source,[7] largely thanks to its biological component, suitable to be extensively used for the production of energy in new-generation incinerators. The concept of distributing conditioned biogas via gas network with natural gas is very positive. In August 2011, **the Ministry of Industry and Commerce stopped promoting construction of biogas stations** formerly funded from the OPPI, as the installed capacity of the planned stations had allegedly been in excess of the limit set in NAP for this type of sources.

The Czech Parliament will discuss a **draft of a bill on promoted energy sources** in Autumn 2011, which should replace Act No.180/2005 Coll. The combined system of purchase prices and green bonuses will be substantially amended. Whereas small sources (up to 100 kW) will retain the option of choosing between the purchase prices and green bonuses, bigger sources as well as sources combusting biomass (household waste) in combination with other fuels will only get the green bonuses. The purchase prices are predetermined by the Energy Regulatory Authority, which must take into account costs of fuel in case of biomass and bio-gas power plants. A **suggested maximum price** for any renewable source is **CZK 6.00 per kWh**.

The draft of the bill further anticipates that, from 2015 on, combined combustion of coal and biomass will no longer be promoted. No purchase prices are predetermined for heating produced from RES and secondary sources, but the **sources must be connected to the network and heat must be distributed and purchased.**

Pursuant to the draft of the bill and in accordance with EU Regulations (2010/31/EU), any and all new buildings, and major reconstructed buildings, will have to use renewable sources from 2015, as long as it will be "feasible from the technological, economic and environmental standpoint". Another option will be purchasing the heat from a supplier that uses at least 50% of renewable sources for its production. The third option will be a zero energy house, which only will be exempted from the aforesaid obligation.

Table 4: Indicative preliminary plan (according to NAP) of a share of RES energy used for heating/cooling in 2010 –2020

Year	Biomass (TJ)			
	Total	Bio gas	Solid fuels	
				Out of this biomass used in households
2005	57 527	963	56 564	37 095
2010	73 646	2 219	71 427	45 929
2011	78 921	2 680	76 242	47 060
2012	83 736	3 182	80 554	48 232
2013	87 797	3 684	84 113	49 362
2014	90 686	4 145	86 541	50 577
2015	94 119	4 605	89 472	51 791
2016	96 631	5 108	91 565	52 879
2017	99 604	5 568	94 036	54 010
2018	101 488	6 029	95 459	55 182
2019	103 414	6 531	96 883	56 354
2020	105 382	6 992	98 390	57 569

[7] Directive 2008/98/EC

3. Bioenergy: Characteristics

3.1. Analysing the Bioenergy Potential

- Existing Bioenergy market
  - Bioenergy supplies

    Currently, bioenergy is supplied in the region in three different manners. First, self-supplying households collect firewood on their premises and plots (garden, orchard, forest) or, under certain terms and conditions, on municipal or state-owned plots (felled trees). As this is the cheapest way of securing firewood for citizens, municipalities make very little money but socially disadvantaged people have access to firewood and are not forced by circumstances to burn waste in their boilers. Firewood from felled trees costs from CZK 50 to CZK 200 (incl. VAT) per ton of wood[8] in this region, or CZK 300 (incl. VAT) per ton of wood if firewood is shipped to a customer.

    Second, suppliers sell biomass to households, SMEs or municipal buildings. The suppliers may be local companies (e.g. sawmills) or come from other regions (typically the suppliers of wood pellets and briquettes). Prices depend on the quality and volume of supplied biomass and on the current season (prices are different in summer and in winter). An average price of high-rate, 25 to 50 cm long beech logs is CZK 2,780 (incl. VAT) per ton of wood in this region.

    Third, large suppliers (sawmills, retail chains, logger companies) sell wood chips to municipal heating plants. A price fluctuates between CZK 1,100 and 2,000 per ton of wooden chips (incl. VAT), depending on quality, volume and distance of shipment.

  - Bioenergy consumption

    Two questionnaire surveys were performed as part of the Bioregions Project in order to determine current consumption of bioenergy in the region. A survey focused on large suppliers and consumers of biomass suggests that major operators of municipal long-distance heat supply systems combust 5,901.75 tons of wood chips annually; private companies burn ca 2,342 tons of wood splinters and cut-offs from sawmills. Nine of 13 municipalities participated in a survey conducted among owners of homes; 240 questionnaires were completed and returned in total. The survey suggests that an annual consumption of biofuels used for home heating in the region is 1,154.25 tons of wooden logs, 15 tons of pellets, and 24.5 tons of wood briquettes. Individual consumption of biomass in households is probably a little higher; however, it is not likely that those who failed to complete and return the questionnaires would be interested in joint purchasing of fuels in a near future.

[8] Volumes of biomass (firewood) are quoted in different measures and units (cubic meters, tons…). For convenience, the 2011 prices were recalculated to **CZK (incl. VAT) per ton**.

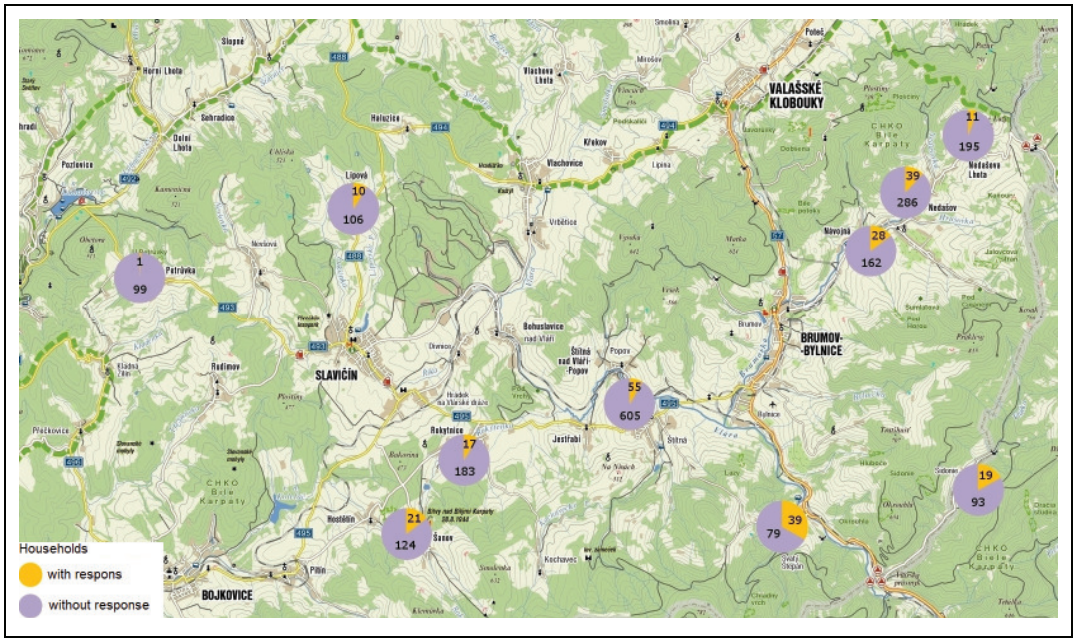


Fig. 4: Households participating in the Bioregions 2011 survey (amber – yes / magenta – no)

- Bioenergy potential
  - Biomass sources (forestry, agriculture, etc.)

    Forests covering a half of the area of the region are the most traditional source of biomass – and also the source with the largest potential for future growth in terms of exploiting twigs, boughs and residual wood (not more than 20% have been exploited until now); felled and logged wood, stumps and splinters after processing are already fully used. In agriculture, the possibility of growing non-woody energy crops and fast growing trees has virtually remained unexploited. As for livestock farming, it does not create much waste suitable for the production of energy, with the cattle being mostly grazed on pastures. Waste created by classical farming (mostly grass, organic waste, and straw) is currently not used for this purpose, either. Plenty of waste biomass comes from mowing meadows in the White Carpathians Reserve. Biomass coming from green areas in towns (public lawns and private gardens) is not yet fully used for the production of energy, either.

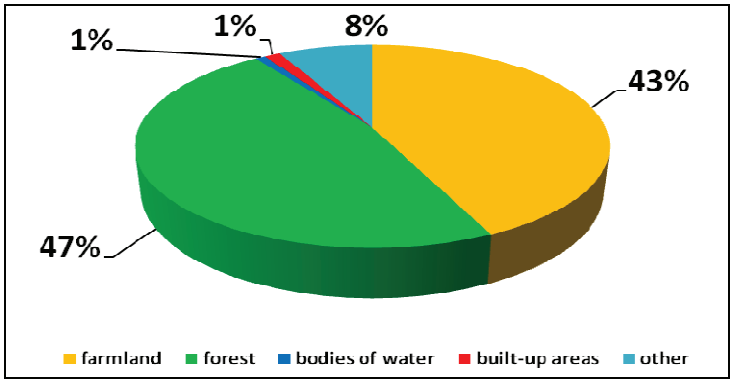


Fig. 5: Use of land in the region (Czech Statistical Office, 2010)

- Suppliers of biomass and technologies
  Besides current suppliers of biomass, some additional sources of biomass for energy production exist in the region, which have not yet been (fully) exploited. One of them is a number of agricultural companies, mostly focused on food processing, that might supply also straw and hay (e.g. in a form of pellets). JAVORNÍK–CZ s.r.o., a farming company, runs a sawmill and wood-processing plant, combusting splinters and cut-offs in a boiler heating the entire premises of the company. Other wood-processing companies sell most of the waste biomass outside the region to contract purchasers, mostly big customers, even though they could supply it to local customers in the future. Composting plants planned in both centres of the region may become another source of biomass for energy production, as they should take biomass from owners of gardens and orchards, who have hitherto burned it on their plots and premises, wasting it completely and polluting the air.

  Several small sellers of biomass boilers operating in the region provide also expert installing and maintenance/servicing.

- Potential consumers of biomass
  During the questionnaire survey conducted among owners of family houses, 74 respondents showed their interest in purchasing firewood (out of this, 58 in the district of Brumov-Bylnice and 16 in the district of Slavičín). Coal currently used to produce heat in the region (240 TJ annually) could be replaced with biomass. Owners of public heating plants (municipalities, long-distance heat supply systems) as well as private companies (owners of company boiler houses) start to consider switching from natural gas to biomass.

- Promoting bioenergy (e.g. by financial incentives)
  Local municipalities, local and regional politicians, entities operating long-distance heat supply systems and major suppliers of biomass promote the idea of intense production of energy from biomass. Financial incentives consist in making use of agricultural grants for the production of biomass and landscape maintenance, EU and national grants for installing biomass boilers, and guaranteed purchase prices/green bonuses in case of electricity production (or combined heating/electricity production).

Table 5: Assessment of technological and economic potential of biomass in the region (including already exploited potential)

Sources of biomass	Energy potential (in TJ)
Forestry	35.016
Agriculture	118.660
Energy crops	111.011
Total	264.687

- Forestry

On the nationwide level, 60% of forests are owned by the state (government), 15% by municipalities, 21% by private owners and 4% by other owners. During the last decade, the

ownership structure has changed only slightly, both on the nationwide and local level. In separate cadastral areas of the region, a share of forests owned by private owners and municipalities is somewhat higher (28% and 24%, respectively) than the nationwide average, except for the districts of Brumov-Bylnice, Nedašov and Návojná. Approx. 47% of forests in the region are owned by the state.

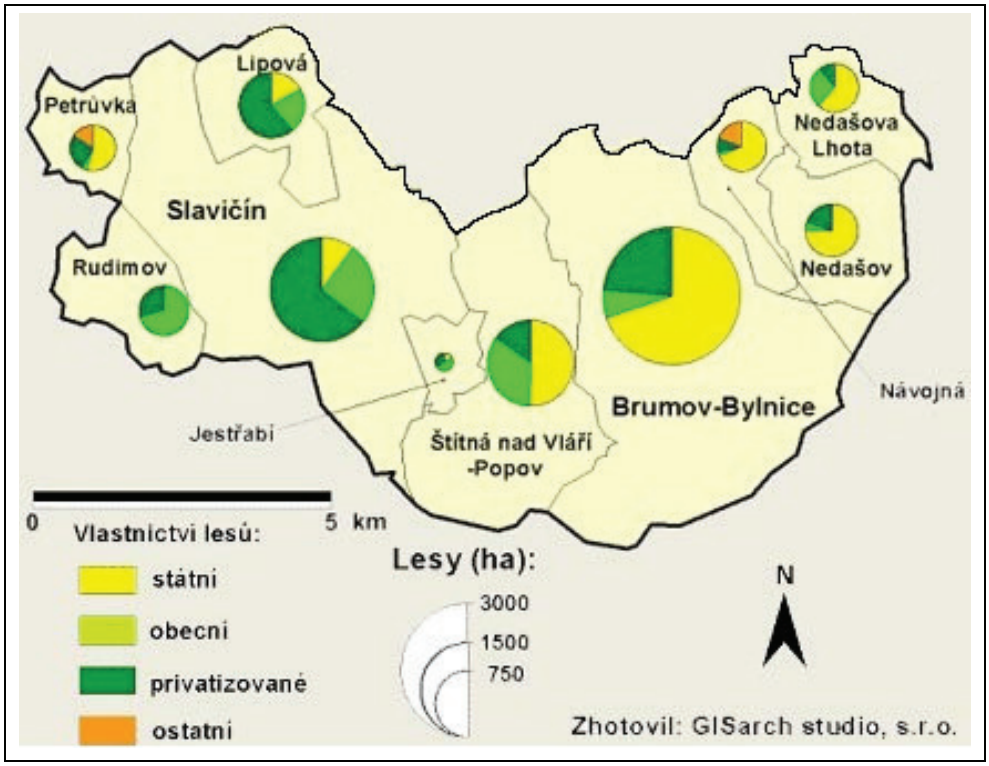


Fig. 6: Forestry ownership structure: state-owned / municipal / privatised / other (2001)

Private forests are managed and exploited by their owners, municipal ones by a mayor and an authorised individual, or by a forestry company (as a rule, one company manages forests for a number of municipalities). State-owned forests are managed by the Czech State Forests, public company, that sub-contracts the works to private companies. The management and exploitation of privately-owned and municipal forests whose area is less than 50ha is governed by officially approved guidelines setting limits on felling trees in a given location. Forests over 50ha and state-owned forests have their respective Forestry Plans.

The potential for coordination of activities performed by different owners is high. Such coordination may facilitate more efficient utilising of resources (technology, experts) and help the owners in better exploiting felling waste.

The whole area of the region is a part of the White Carpathians Reserve (CHKO). It is therefore necessary to abide by specific restrictions set for the exploitation of forests in different zones of the Reserve (see Fig. 7). So-called special purpose (protected) forests are mostly deciduous or of coniferous/deciduous mix (20% of the total forest area), while coniferous forests are mostly exploited for economic gains. A detailed structure of tree species in the region is shown in ANNEX III.

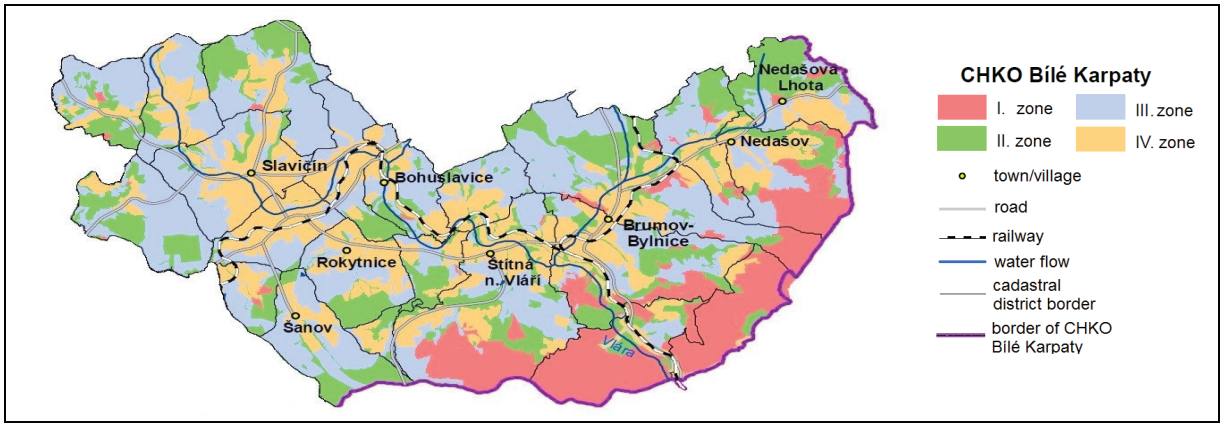


Fig. 7: White Carpathians Reserve (CHKO) with 4 zones of protection delineated

Table 6: Forest categories and rotation period in the region (National Forest Stocktaking as of 31 Dec 2010)

Forest category	Rotation period	Area	Stockpile		
			Coniferous	Deciduous	Total
		[ha]	1000 [m³] w/b[9]		
Exploited forests	30	0,12	0,00	0,02	0,02
	40	3,57	0,00	3,63	3,63
	70	87,04	7,02	4,88	11,90
	80	7,98	0,38	0,60	0,97
	90	46,47	8,76	2,45	11,20
	100	4 257,86	1 176,96	147,32	1 324,28
	110	1 191,61	305,37	61,63	367,00
	120	1 688,35	133,86	335,91	469,77
	130	336,15	22,26	73,24	95,50
	140	96,18	12,93	13,70	26,63
	160	51,72	0,94	13,66	14,60
	total	**7 767,07**	**1 668,47**	**657,04**	**2 325,52**
Average rotation period – exploited forests					**108**
Protected forests	70	0,19	0,00	0,04	0,04
	100	491,08	130,48	28,26	158,73
	110	161,52	34,49	10,35	44,84
	120	148,06	9,46	30,38	39,84
	130	1 046,00	99,89	253,34	353,23
	140	51,12	2,43	10,36	12,79
	160	59,96	3,19	11,22	14,41
	total	**1 957,93**	**279,85**	**343,88**	**623,73**
Average rotation period – protected forests					**120**
In total		**9 725,00**	**1 948,32**	**1 000,93**	**2 949,25**
Average rotation period – both categories					**110**

[9] Volume of wood **w**ithout **b**ark – **w/b**

- Potential of exploiting felling waste as biomass

About 150,000 tons of coniferous trees and ca 80,000 tons of deciduous trees are annually felled in the region. The intensity of felling and rotation period is regulated by law and depends on the age of trees; it cannot therefore be expected that more trees will be felled over the next decade, except for calamity felling. Biomass produced in this way is for most part processed at local sawmills that usually combust wood waste in their own boilers and use it for heating of their industrial premises. Some 95% of wood chips produced for energy production purposes is sold outside the region to contract purchasers. If waste wood biomass should be exploited more intensely, felling waste should be processed efficiently, e.g. using mobile wood chippers. From 50 to 70% of branch wood is currently routinely burned at site and hence wasted. The following table shows the energy potential of felling waste from a short-term and long-term standpoint. In order to ensure long-term stability of forest ecosystems, part of branch wood and felling waste should be left behind at site. Therefore the felling waste potential is examined from a long-term standpoint (4,377 tons of biomass annually = 35 TJ per year).

Table 7: Felling waste potential in the region (Carbon Map of the Czech Republic)

Municipality	Felling waste – short-term standpoint (forest management)			Felling waste – long-term standpoint (investment)			
	Weight at 60% humidity	Volume	Energy potential	Forest area	Share in total area of town	Weight at 60% humidity	Energy potential
	[t]	[m^3]	[TJ]	ha	%	[t]	[TJ]
Bohuslavice nad Vláří	123	127	0,981	219	32	99	**0,792**
Lipová	502	496	4,019	722	63	325	**2,600**
Petrůvka	237	242	1,894	361	52	163	**1,304**
Rudimov	409	442	3,273	537	54	242	**1,936**
Slavičín	799	838	6,389	1 268	38	570	**4,560**
Šanov	419	411	3,348	513	57	231	**1,848**
Brumov-Bylnice	1 065	1 040	8,519	3 125	56	1 406	**11,248**
Jestřabí	24	24	0,190	66	17	30	**0,240**
Návojná	361	361	2,887	408	51	183	**1,464**
Nedašov	178	184	1,420	474	38	213	**1,704**
Nedašova Lhota	252	247	2,014	390	42	176	**1,408**
Rokytnice	291	288	2,324	380	38	171	**1,368**
Štítná nad Vláří-Popov	468	479	3,741	1 262	32	568	**4,544**
Total	5 125	5 179	40,999	9 725	47	4 377	**35,016**

- Solid agricultural biomass (e.g. straw, grain, energy crops)

While examining a bioenergy potential of farming, we must not put at risk the food safety of the region. It is therefore advisable to exploit first and foremost already existing agricultural waste (straw, superfluous hay) before considering a possibility of growing energy crops. Statistical

data contained in the "Carbon Map of the Czech Republic" suggest that the total vacant (unused) area of farmland, which could be used for growing energy crops and trees to be used for direct combustion, producing biogas and liquid fuels from which energy can be produced, or producing bio-fuels for transport vehicles, is 977,000 ha in the entire Czech Republic (while another 2.070,000 ha of arable land is necessary to maintain the food safety) and no more than 1,108 ha in the concerned region.

If the food safety is to be maintained, a suitable source of biomass can be non-wood energy crops grown intentionally for this purpose (see ANNEX IV) and fast growing trees (FGT). Areas of land suitable for growing FGT can be found in cadastral areas of all municipalities of the region. However, growing of such crops and trees must be approved by the authorities of the natural reserve (CHKO), as the whole region lies within its boundaries.

Fig. 8: White Carpathians Reserve (CHKO)

The White Carpathians Reserve (CHKO), is typical for its meadows that have to be mown regularly; failing this, meadows would perish with all the rare species. However, there is no demand for abundant hay, as numbers of livestock have been steadily decreasing throughout the Zlin Region and, hence, biomass piles up unused. A closest biogas station where such biomass could be processed is 25 km far and transporting biomass to the plant would be costly. The problem could be solved if the biomass can be processed into pellets using smaller pelleting machines and subsequently shipped to local customers.

- Liquid agricultural biomass (e.g. dung, manure)

Currently, livestock manure cannot be included into the energy balance, as the cattle is mostly grazed on pastures and no other sources are available.

- Liquid household waste (e.g. sludge)

Sewage waters from residential areas are treated in municipal wastewater treatment plants without further exploiting like combusting of the sludge or using it for biogas production.

Table 8: Potential of grown energy biomass and farming organic waste in the region (Carbon Map of the Czech Republic)

Use of land	Permanent grass pastures & meadows (PGP&M) = 5019 ha							Arable land = 3461 ha									
									Food safety 68%			Land used for energy purposes 32%					
									2353			1 108					
Sort of biomass	Total	Hay*			FGT**			Total	Straw***			FGT****			E&UC*****		
Share of energy biomass in the total area	100%	48%			2%			100%	50%			2%			88%		
	5 019	2 409			100			3 461	1 177			22			975		
Municipality	ha	ha	tons	TJ	ha	tons	TJ	ha	ha	tons	TJ	ha	tons	TJ	ha	tons	TJ
Bohuslavice nad Vláří	276	132	371	5,192	6	39	0,541	98	33	69	0,688	1	8	0,106	28	277	2,768
Lipová	219	105	294	4,112	4	31	0,428	115	39	81	0,807	1	9	0,124	32	324	3,245
Petrůvka	200	96	269	3,771	4	28	0,393	53	18	37	0,373	0	4	0,057	15	150	1,502
Rudimov	278	133	373	5,226	6	39	0,544	98	33	69	0,688	1	8	0,106	28	277	2,769
Slavičín	651	312	875	12,245	13	91	1,276	946	322	662	6,620	6	73	1,017	266	2663	26,632
Šanov	254	122	341	4,770	5	35	0,497	61	21	43	0,430	0	5	0,066	17	173	1,729
Brumov-Bylnice	1234	592	1659	23,221	25	173	2,419	554	188	388	3,876	4	43	0,595	156	1559	15,591
Jestřabí	141	67	189	2,644	3	20	0,275	134	46	94	0,941	1	10	0,145	38	379	3,787
Návojná	181	87	244	3,412	4	25	0,355	138	47	96	0,964	1	11	0,148	39	388	3,878
Nedašov	488	234	656	9,187	10	68	0,957	103	35	72	0,724	1	8	0,111	29	291	2,914
Nedašova Lhota	285	137	383	5,356	6	40	0,558	139	47	97	0,970	1	11	0,149	39	390	3,900
Rokytnice	168	81	226	3,158	3	23	0,329	362	123	253	2,533	2	28	0,389	102	1019	10,190
Štítná nad Vláří-Popov	645	310	867	12,140	13	90	1,265	659	224	461	4,611	4	51	0,708	185	1855	18,549
Total	5 019	2 049	6 745	94,435	100	703	9,837	3 461	1 177	2 422	24,225	22	266	3,721	975	9 745	97,453
Notes:		* yield 2.8 tons per ha energy yield 14 GJ per ton energy potential 39,2 GJ per ha			** free soil without BSEU category; 7 tons of dried wood per ha in average				*** energy yield 10 GJ per ton			**** Fast growing trees yield 10-15 t per ha energy yield 14 GJ per ton energy potential 150-210 GJ per ha			***** Energy & utility crops yield 10 t per ha energy yield 10 GJ per ton energy potential 100 GJ per ha		

3.2 Analysing Biomass Supply Chains

- Biomass supplies: current routines

  At present, energy biomass supplies are solved by each entity individually.

  Small customers (households) are usually self-suppliers, taking biomass from their own gardens, orchards or forests, or turn to major biomass suppliers at the beginning of a heating season depending on a current supply. Some municipalities make it possible for their citizens to collect biomass from municipal plots and land for reduced prices.

  Medium-sized customers (municipalities and entrepreneurs) secure supplies of biomass either ad hoc, always for a current heating season, or on a basis of medium-term contracts.

  Wood processing companies combust their own production waste to heat their industrial premises and sell superfluous biomass to municipal heating plants or to customers outside the region.

- Outages in biomass supplies, manners of utilising the potential

  Biomass consumers and suppliers look for each other individually and mostly operative, when necessary. Numerous consumers buy biomass outside the region due to the growing consumption of biomass by households and insufficient local supply. Furthermore, local companies supply only firewood, while wooden briquettes and pellets must be imported to the region. Larger quantities of biomass may only be supplied to the local market if biomass from local sources is exploited more efficiently – felling waste, solid agricultural/landscaping waste (hay, straw), new sources of biomass (municipal composting plants, growing energy crops and FGT) – and part of locally produced biomass is consumed in the region instead of being exported.

3.3 Survey of Major Entities (Potentially) Participating in Promoting Bioenergy in the Region

(The entities listed below are somehow associated with energy supply and/or bio-energy demand. Listed further are regional administrative bodies that may adopt the Action Plan and assume responsibility for its implementation.)

- **Farmers and forestry associations** – a potential source of biomass; there is demand for operating pellets machine (processing superfluous hay); selling energy biomass would create additional profits of such entities;
- **Larger cooperatives and owners of forests** – even today, forest owners occasionally sell branch wood to huge forestry companies that process it into energy wood chips. Larger farming cooperatives may grow energy crops and FGT on some of their arable land, provided that they secure long-term demand and sales of produced biomass;
- **Wood processing companies** – they purchase and resell biomass for energy production; waste biomass is for most part used by the companies themselves to heat

their industrial premises, while superfluous wood chips are currently sold outside the region;

- **Municipalities and regional self-governing bodies** – municipalities make every effort to improve economic stability of sources of heating (i.e. secure low prices of heat for citizens and homes), quality of environment (lower emissions from local sources of home heating), energy self-sufficiency, and local employment supported due to using local sources of biomass;
- **Providers of public services and operators of long-distance heat supply systems** – they maintain public areas and lawns and process home and municipal waste (the biological component of the waste is a potential energy source); operators of long-distance heat supply systems look for suitable substitution for expensive and imported natural gas – local sources of biomass;
- **Public** – home heating is a major regional player in the field of energy consumption, substantially affecting quality of air, in particular during a heating season; any large-scale exploitation of biomass is hampered by uncertainty in fuel supply (briquettes, pellets) and inevitable purchase of new boilers; waste biomass from private plots of land is virtually unused for energy production;
- **Local and regional politicians** – they devise and adopt strategies focused on improving competitiveness, standard of living, employment rate and energy self-sufficiency of the region; they are crucial players in the region due to their decision-making authority.

Other companies and institutions active in the services and business oriented on bio-energy:

- **Region's energy agencies and development agencies** – Energy agency of the Zlin region, o.p.s. (EAZK, advisory company)
- **Expert companies** – designers and technology suppliers

4. SWOT Analysis

The analysis examines regional opportunities, obstacles and threats, both short-term and long-term ones.

Table 9: SWOT Analysis

Strengths	**Weaknesses**
• Large potential sources (forestry, agriculture) of biomass for energy production; • New regional sources are promoted by preferential tariffs supporting the production of energy from biomass; • Support from municipalities; • Experienced suppliers of biomass for energy production; • Willingness of inhabitants to replace old boilers for coal with new ones for biomass; • New municipal heating sources combusting biomass.	• Costly technologies enabling the energy production from biomass cannot compete other energy-oriented technologies • Natural gas almost in every village; • Collection of biomass is poorly organised (uncertainty in long lasting supply) • Conventional attitudes toward traditional sources of home heating; • Lack of experience in long-term running of the energy biomass market; • Wood chips sold outside the region as a result of existing preferential tariffs supporting the production of energy from biomass; • No more sources of electricity can be connected to the public network.
Opportunities	**Threats**
• Raising prices of other energy commodities (natural gas!) make biomass a real and cheaper option; • Higher employment in the region • New technologies enabling the energy production from biomass (small units for combined production of heat and electricity); • Combination of landscaping – diversifying of farming activities – secured supply of locally produced RES; • Higher attractiveness of the region for (bio)tourism; • Relaunching of the national grant programme promoting installation of biomass boilers is still possible.	• Sources of solid biomass are used also by competing industries (wood processing); • Changes in legislation; • Biomass is exported to major customers outside the region; • Czech State Forests demand higher profits from felling and logging; • Raising prices of wood waste.

5. Setting Objectives for the Bioregion

5.1. Region's General Vision in Terms of Bioenergy

- **Maximum exploitation of biomass sources for the production of energy**
  One of crucial activities pursued by the bioregion is contacting biomass producers (agricultural and forestry companies, wood processing industry…) in an attempt of ascertaining a volume of biomass production and possible energy potential of its sources in the given region. The main objective is to exploit waste biomass, felling waste and purposely grown energy crops and FGT to a greater extent for the production of energy, with regard to pre-set limits (environmental, legal and technological, and also food safety). Securing biomass supplies will generate new jobs and the costs of fuels (price paid for biomass) will remain in the region, thus improving standards of living in this remote area.
- **Implementing bioenergy technologies**
  The main objective is to promote utilising of sophisticated technologies for securing, processing and exploiting biomass for energy production. As for waste biomass processing, such technologies include briquetting and pelleting machines and aerobic/anaerobic processing (composting and biogas production). As for biomass for energy production, installation of advanced biomass boilers (wood gasifying boilers, automatic pellet boilers) will be promoted. To make the process more efficient, new types of co-generation units for combined production of heat and electricity will be installed (if their running will be profitable); the units combust waste biomass, wood chips or purposely grown energy biomass (FGT).
- **Creating bioenergy market**
  By creating a local biomass market backed and guaranteed by local authorities and activities focused on installation of state-of-art biomass boilers in public buildings and family houses, exploiting of biomass for home heating will be promoted. Consequently, the region will no longer fully depend on imported fossil fuels (coal, natural gas) and air pollution during a heating season will be reduced. Operators of municipal long-distance heat supply systems and local SMEs will also be encouraged to exploit biomass on a larger scale.

5.2. Objectives in Terms of Bioenergy for Next 10 years (examples):

- 33.0% of produced energy (heat + electricity) comes from biomass;
- 42.3% of heat produced from biomass;
- 1.0% of electricity produced from biomass.

Considering changes in local energy consumption described in the second section of this document, it is not easy to estimate energy consumption in next 10 years, hence, the level of energy consumption in 2011 is set as a baseline. In case that the stated share of electricity produced from biomass will not be achieved, the required share of heat produced from biomass will be increased to fulfil the aim of 1/3 regional energy consumption covered by biomass.

Table 10: List (non-exhaustive) of planned biomass sources to be installed between June 2010 and June2020

Source	Operator	Location / Municipality	Thermal output [MWt]	Power output [MWe]
Biomass boiler	BTH Slavičín, s.r.o.	Boiler house K3 (Malé Pole housing estate)	1	0
Biomass co-generation unit (ORC technology)	Kloboucká lesní, s.r.o.	Premises of the company Kloboucká lesní (Bylnice)	1,2	0,93
Biogas station		Hrádek na Vlárské Dráze	0,6	0,53

5.3. Creation of Biomass Trade Centre

The main aim of the Biomass trade centre (BTC) is to serve as a mediator between local biomass potential and biofuels demand generated by bio-energy projects in the target region. A Biomass trade centre can also provide other services like operating of long-distance heat supply systems, consultancy for citizens and municipalities, implementation and running of energy management for public buildings and organisation of landscape management.

Furthermore, a BTC can cover whole biomass logistic from collection of raw biomass in forests to biomass processing (drying, woodchips or pellets producing) and marketing. On the one hand, a BTC can focus just on logistics and marketing of biofuels. On the other hand, a BTC can run biomass boiler and become local heat provider or power producer. Finally, a BTC can be created at existing heat or biomass (bio-waste) source to utilize existing infrastructure.

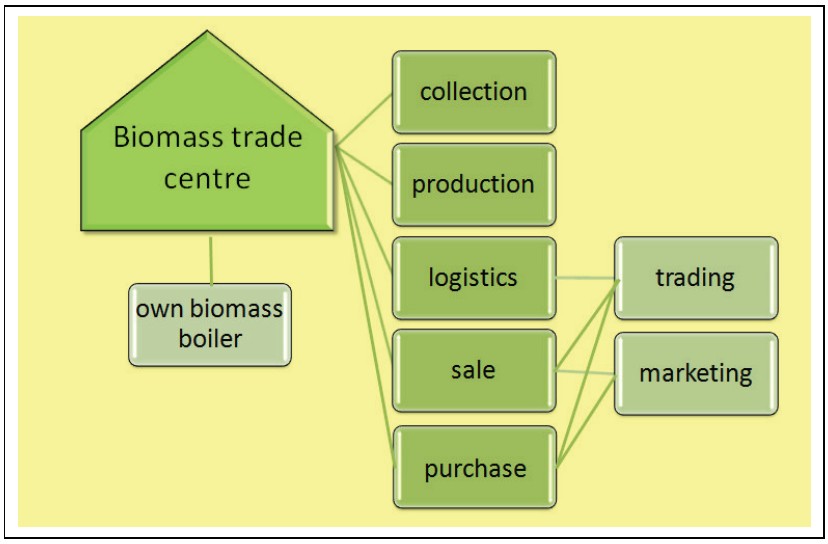


Fig 9 : Structure of superior vision of BTC with additional activities

Requirements for creation of BTC:

1) Storage capacity, technology and staff for manipulation with biomass and available space for further development.
2) Accessibility for potential suppliers/consumers of biomass and BTC services.
3) BTC has to have access to raw biomass and should be biomass consumer to buffer potential fluctuations on the local biomass market.
4) BTC has to have solid background – municipality guaranty, qualified personnel.

6. The Action Plan

6.1. Defining the Activities Based on the Objectives:

- ***Separated in target groups***

Farmers and forestry associations

1) Entering into voluntary agreements on supplying biomass for energy production. Establishing long-lasting contacts with this group to ensure communication and sharing of information, or even creating a voluntary association focused on the production of energy biomass.
2) Supplying produced biomass to the local bioenergy market organized by a new BTC.
3) If necessary, organizing purchase/lease of necessary technologies for biomass collection and processing.

Larger cooperatives and owners of forests

1) Mapping the potential of the biomass production and needs/demands of this group.
2) Subsequent explaining the benefits of participating in the emerging local bioenergy market to all concerned entities.
3) Entering into voluntary agreements on supplying biomass for energy production with assistance from a new established BTC.
4) Creating the logistics of collecting and transporting waste biomass (hay, straw, felling waste, branch wood) from a site of its origin to processing plants.
5) Providing expert consultancy (possibility of obtaining grants, technological & legislative issues) to owners of forests and, if necessary, also to cooperatives.
6) Evaluating possibilities of growing energy crops and fast growing trees in the region.
7) Getting the group members involved in educational and promotional activities in the bioregion (if they show interest in such events): seminars, educational excursions (biofuels processing and exploiting) and creating educational paths in the forests.

Wood processing companies

1) Getting wood processing companies (forestry companies, sawmills, biomass sellers) involved in the emerging local biomass market, and establishing cooperation with the planned Biomass Trading Centre by entering into voluntary agreements on supplying biomass for energy production. These (local) companies will provide know-how concerning energy biomass, from its production, to processing and storing, to its shipment to end users. The BTC will be a long-term transparent and reliable partner to the companies, and the only intermediary between them and dozens bigger and smaller of biomass producers (owners of forests, municipalities…), and consumers of biofuels (households, private companies, municipalities, public institutions…).

Municipalities and regional self-governing bodies

1) Participating in promoting the bioregion among its inhabitants, securing supplies and sales of biomass for energy production.
2) Towns and villages must set a legal framework (municipal regulations and directives, updates of the municipal ground plans).

3) Ensuring promotion, backing and coordination of the BTC.
4) Creating conditions for environmentally friendly exploitation of bio-waste – providing bio-waste bins, supplying composters to family house owners, municipal composting plants etc.
5) Declaring financial and administrative support to the BTC and regional biomass market, at least at the initial stage.

Providers of public services and operators of long-distance heat supply systems

1) Ensuring collection of waste biomass from small producers (e.g. from orchards and gardens) and its transport to the BTC.
2) Operators of long-distance heat supply systems will buy biomass from the BTC and, if necessary, provide the BTC with their technology and/or warehouses.
3) Cooperating in quality assessment of fuels (weighing, measuring of humidity).

Public – professionals (designers, suppliers of biomass boilers) and laymen will be motivated to get informed:

1) Launching information campaigns targeted on more intense exploitation of biomass for home heating.
2) Organizing training courses for all age categories; presenting and promoting achievements of the bioregion to the professional and lay public.
3) Promoting installation of (or replacement of solid fuel boilers with) biomass boilers (consulting, access to grants, coordinating of mass purchase if necessary).
4) Suppliers of technologies and services will submit their bids (pricelists, shipment terms) in a standardised form (to make reading easier for customers and end users); the bids will be published.
5) Offering a possibility of free disposal of waste biomass (garden trimming and maintenance, Christmas trees) to households and owners of small plots (gardens, orchards).

Local and regional politicians – publicly promoting the objectives and implementing the regional biomass market; creating a political and legislative framework (e.g. through municipal regulations) for more intense exploitation of biomass for energy production. Sharing experience with partner regions.

Region's energy agencies and development agencies

1) Providing consultancy in the field of producing energy biomass (access to grants, technologies and procedures focused on energy biomass acquiring, legislative framework).
2) Providing owners of forests and, if necessary, also cooperatives, with services of the newly created Biomass Trade Centre (production of wood chips/pellets/briquettes from supplied biomass; storing and drying of biofuel)

- ***Separated in long-term and short-term activities***

Short-term activities

1) No-cost measures: - organization changes only
2) Low-cost measures (with minimum costs):
   - organizing annual information campaigns
   - statistical evaluating of collected results and their presenting to representatives of municipalities of the region
   - organizing training courses for selected interest groups depending on their needs

Long-term activities

1) Changes of legislation
2) Activities oriented on developing the biomass market:
   - long-term cooperation with all target groups
3) Investment measures: - establishing the Biomass Trading Centre

6.2. Milestones (e.g. biannual activities)

Data concerning production, warehousing and sales/consumption of biomass will be collected on a continuous base as part of BTC activities. The data will be reviewed once every year with a help of external institutions (Czech Statistical Office, research institutes…). In the span of next 2, 5 and 10 years, the fulfilment of objectives of the project focused on establishing of the regional bioenergy market will be recurrently measured. The Biomass Action Plan is a "living document" and it therefore should be regularly updated (at least by the above deadlines) to reflect the current development of the region, Czech Republic and EU.

2 years
- Promoting the bioregion, collecting data and establishing contacts with biomass suppliers;
- Identifying subjects that may be interested in growing of FGT, defining areas suitable for their growing, and launching experimental growing of FGT;
- Encouraging local wood processing companies to participate in the project;
- Taking steps toward establishing the Biomass Trading Centre;
- Initiating the installation of new biomass energy sources;
- Laying foundations of the local biomass market with the participation of the concerned municipalities (biomass suppliers and consumers), wood processing industry, entities operating huge biomass & heat sources (long-distance heat supply systems, sawmills);
- Establishing municipal composting plants;
- Updating the Action Plan in case of major changes of outside conditions.

5 years
- Promoting the bioregion (evaluating the level of awareness of local inhabitants and major players about the bioregion, its objectives and past activities);
- Evaluating hitherto cooperation with biomass suppliers/consumers, suggesting possible improvements if necessary;
- Assessing past experience with growing of FGT or the first harvest (biomass

processing, selling processed wood chips), spreading the growing of FGT to other suitable plots of land if the outcomes are promising;
- Establishing cooperation with biomass (pellets) suppliers outside the region to mitigate possible fluctuations in the local market (prices, volume, shipment terms and deadlines);
- Intensifying the cooperation with local wood processing companies;
- Putting the BTC into the full operation;
- Improving conditions of receiving and storing of biomass energy by operators of long-distance heat supply systems (sheltered storage spaces, using a balance (scales) and moisture content indicator for testing of incoming biomass…);
- Assessing the implementation of new biomass energy sources (in private and public sector) and taking necessary preparatory steps to construe special new energy sources (biogas stations, production of energy from waste);
- Encouraging new participants, mostly small customers, to participate in the local biomass market;
- Updating advertising and promotional materials, intensifying awareness activities (creating educational paths, installing environment-oriented educational devices in the BTC, using biomass sources (forestry, bio-agriculture) for attracting tourists);
- Producing at least 20% of heat from biomass;
- Updating the Action Plan in case of major changes of external factors.

10 years
- Promoting the bioregion at local, regional, national, and international level (repeat the assessment of citizens' awareness at a local level and compare the outcomes with the previous research);
- Evaluating hitherto cooperation with biomass suppliers/consumers, suggesting possible improvements if necessary, sharing information with partner regions;
- Assessing past experience with growing of FGT and its future prospects in the region;
- Evaluating cooperation with biomass suppliers (inside and outside the region), defining a current level of energy self-sufficiency of the region;
- Evaluating activities of the BTC and identifying areas of future improvements;
- Evaluating the progress of biomass energy sources in the context of the general conditions in terms of energy consumption (renewable energy sources, fossil energy sources, energy saving resulting from thermal insulation, etc.);
- Assessing the efficiency of the local biomass market, outlining the possibilities of prospective development in future;
- Updating advertising and promotional materials, evaluating the bioregion's contribution to higher attractiveness of the area (tourism, employment, quality of environment etc.);
- Producing at least another 23% of heat and at least 1% of electricity from biomass;
- Extending the Action Plan for the future period (new objectives, extending the area of the bioregion …).

6.3. Specific Activities

Table 11: Activities proposed as part of the action

No.	*ACTIVITY*	*DESCRIPTION*	*TIME FRAMEWORK*	*TARGET GROUP*	*RESPONSIBLE BODIES*
1	Information campaigns	Actively promoting sustainable exploitation of biomass for energy production, objectives and achievements of the bioregion.	short-term/ long-term	All target groups	EAZK, municipalities, BTC
2	Training	Providing interest groups with expert training and educational excursions.	short-term/ long-term	Farmers, owners of forests, wood processing companies, municipal servants, political representation	EAZK, BTC, expert companies
3	Education and educational excursions	Permanently promoting exploitation of biomass through educational programmes.	long-term	Pupils and students	Region's elementary and secondary schools, EAZK
4	Developing the logistics and trading centre	Establish and operate regional Biomass Trading Centre as a base of the local biomass market.	short-term/ long-term	All target groups	Municipalities and operators of long-distance heat supply systems
5	Creating associations of forest owners and farmers	Sharing information more efficiently (incl. training courses), potential grants and mass discounts on modern technologies.	short-term/ long-term	Farmers, owners of forests, wood processing companies	EAZK, BTC, municipalities, local and regional politicians, farmers and forest owners
6	Promoting FGT	Promoting sustainable growing of FGT (or other energy crops) as a long-lasting and stable source of energy biomass.	long-term	Farmers, wood processing companies, municipalities	Municipalities, EAZK, BTC
7	Promoting sustainable farming/forestry	Promoting sustainable farming and forestry through guaranteed purchasing of waste biomass (hay, straw, branch wood), this purchasing will provide long-term stability for waste biomass producers. Public support for bio-tourism.	long-term	Farmers, owners of forests, forestry companies	Municipalities, local and regional politicians, BTC

Table 12: Activities proposed as part of the action (cont.)

8	Consulting	Expert consulting in the field of technologies, legislation and economy oriented on energy biomass collecting, processing and exploiting.	long-term	All target groups	EAZK, BTC, Expert companies
9	Installing biomass boilers at homes	Promoting installation of state-of-art biomass boilers through local regulations, mass purchasing of biofuel, local grants or zero-interest loans.	short-term/ long-term	Public	EAZK, BTC, Expert companies, municipalities
10	Installing biomass boilers in private sector, public buildings & heat supply systems.	Funding installation of modern biomass boilers from available sources (EPC, PPP, EU structural funds, grants). Installing small biomass co-generating units where feasible.	short-term/ long-term	Municipalities, small and medium-sized enterprises (all sectors), operators of long-distance heat supply systems	EAZK, BTC, Expert companies, municipalities
11	Experience sharing with partner regions	Sharing experience with other Czech Regions and Bioregion international partners.	long-term	Municipalities, public, politicians outside the region	EAZK, BTC, regional politicians
12	Collecting and evaluating statistical data	Collecting and evaluating statistical data concerning production, stocks and consumption of biomass for energy production in the region. Presenting the results regularly to the public (professional and lay).	long-term	All target groups	EAZK, BTC

6.4. Supporting Measures

Supporting measures focused on meeting the objectives of the Action Plan can be broken down according to the implementing entity:

Energy agency of the Zlin region, o.p.s. – preparing, organizing and evaluating campaigns in the course of the implementation of the Action Plan. The Energy Agency will provide expert consulting in the field of drawing funds from eligible sources, coordinating working conferences on different topics (e.g. biomass collecting/processing/shipping), organizing seminars (training) for representatives of key groups in the region. Due to its contacts throughout the region, the Agency will intermediate between different entities.

Municipalities and regional self-governing bodies – ensuring environmental-friendly disposal of biologically degradable waste through legislative measures (municipal regulations), e.g. ban on burning yard waste in open areas. Further, the municipalities will facilitate bio-waste collection from citizens and small entrepreneurs, e.g. by installing bio-waste bins and enlarging waste collection yards (or extending their hours of operation). The municipalities will also promote establishing of community composting plants (by means of financial contributions, urban master planning, or administrative measures), and subsequent exploitation of compost for energy production (fuel used in municipal long-distance heat supply systems). Up to 90% of eligible costs incurred by constructing such composting plants can be covered from the Operational Programme Environment (priority area 4.1: Improvement of waste handling practices). Towns and villages will also provide backing for the collecting branch wood from small-scale felling and thinning of private and municipal plots and its and processing into wood chips by companies participating in the local biomass market.

Providers of public services and operators of long-distance heat supply systems – the companies will cooperate with the municipalities and citizens in improving the system of bio-waste disposal. Operators of long-distance heat supply systems will prefer exploitation of local energy biomass in case of reconstructions or contemplating new sources of heat.

SMEs – regional enterprises will participate in the system of exploiting waste biomass (agricultural and forestry companies, small craftsmen…) for energy production. Training courses will be offered to employees in certain industries focused on using (waste) biomass for energy production.

Other entities – this group includes non-profit organizations, civic associations, research institutes, professional associations and agencies (development and energy agencies…) active inside and outside the region. Since activities pursued by these entities are often consistent with the objectives and visions of the Action Plan, it is desirable to cooperate with them in already accomplished and planned projects. Such cooperation may create new points of view with respect to regional issues, new experience, contacts and – last not least – sources of funding and human resources vital for creating and long-lasting and sustainable operating of the local biomass market.

6.5 Applying Criteria of Quality and Sustainability (with respect to all activities)

The criteria should ensure that any and all produced biomass should comply with the below regulations:

- *Standards issued by CEN (the **European Committee for Standardization**) setting forth criteria for the quality of fuels (EN 14961 and EN 15234)*

  Operators of long-distance heat supply systems do not currently insist on certifying supplied biofuels (wood chips). As long as such biofuel meet elementary parameters (size of particles, clean biomass free of any paints or varnish), the price and availability is the decisive criterion. Local operators of long-distance heat supply systems are disadvantaged against big producers of electricity from biomass (combusted along with coals) who make advantage of guaranteed purchase prices (feed-in tariff) and green bonuses. Consequently, the smaller operators of municipal heating plants blend biomass coming from a variety of sources to get an optimum heating (calorific) value for the best price from the end users' point of view. In future, storage spaces should be extensively sheltered and a balance (scales) and moisture content indicator used for testing of incoming biomass.

  Starting from 01 July 2010, the quality, categorizing and sales of biofuels are regulated by the Czech standard ČSN EN 14961 amended by the Czech standard ČSN EN 15234 (effective as of 01 Sept 2011) chiefly focused on detecting and proving the quality of biofuels across the entire supplier chain. Awareness of the certifying is quite low among the population of the region, except for the certifying of pellets for state-of-art biomass boilers. Parameters of the pellets comply with European (German) standards, since they are shipped for most part to Germany and Austria.

- *Any relevant criteria of sustainability*

  The entire area of the Region is part of the White Carpathians Reserve (CHKO) and, hence, any activity impacting the local landscape and its biodiversity must be approved by the CHKO Board which, in its statement, will approve or suggest specific measures focused with the sustainable use of a given location depending on a specific CHKO zone level (Fig. 7).

  Growing any plants used for food and energy production is governed by applicable law **(Act No. 252/1997 Coll., On Agriculture)** and in particular the **Act on the Protection of Agricultural Land (Act No. 334/1992 Coll.)** that sets forth terms and conditions of switching between the farming and non-farming use of land and of protection of soil against erosion. Farmers must further adhere to the **standards of the Good Agricultural and Environmental Conditions (GAEC)**[10] that govern the sustainable use of agricultural land.

  Exploitation of forest biomass is generally governed by the **Forest Act (Coll. 289/1995 Coll.)**, which defines rights and obligations of owners of forests, rules of haphazard and selective (intentional) felling, as well as obligations concerning restoration of forest. E.g., felling must be done in a manner minimizing any impacts on a forest ecosystem in a given location[11]. Further, the Act imposes a duty to prepare so-called **Forest Management Plans**[12] for all state-owned forests and other forests over 50 ha of wooded

[10] Council Regulation (EC) No. 73/2009 of 19 January 2009.
[11] Sect 33 of Act No. 289/1995 Coll., the Forest Act
[12] Decree No. 84/1996 Coll. of the Ministry of Agriculture, on forest management planning

area, and **Forest Management Schemes** for forests below 50 ha. Usually reviewed every ten years, these documents set forth binding limits on felling as well as a minimum required percentage for soil improving and reinforcing trees.

Sustainable forest management is defined as the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems. (Second Ministerial Conference on the Protection of Forests in Europe, Helsinki 1993)

Forest certification is one of most powerful market instruments of sustainable forest management. The Czech Republic has adopted and currently uses two most common certification systems used throughout the world – **FSC** (Forest Stewardship Council)[13] and **PEFC** (Programme for the Endorsement of Forest Certification schemes)[14]. Both systems have their respective national certification authorities and national versions of certification systems adapted to local conditions. The Czech State Forests, public company, which manages a half of the forests in the region, has made it a condition of entering into a contract that a private forestry company is certified under PEFC. The main purpose of such certification is tracing the flow of wood and/or timber all the way from the forest to the customer and making sure that wood/timber in question does not come from a doubtful source (illegal felling, theft…).

Any and all carbon dioxide generated by combustion of biomass for energy production is consumed by plants to make organic matter during the following vegetation period. Thus the total CO_2 balance is zero and, hence, exploitation of biomass is sustainable in terms of global climatic changes. Considering the long-lasting sustainable use of biomass for energy production on a local scale, we must also take into account the cycle of minerals vital for the growth of plants. When biomass is combusted, the minerals remain in ash that can be used as a soil fertiliser. The manner of use of specific ash depends on its chemical composition (contents of minerals, or e.g. heavy metals) in accordance with applicable law[15]. Biomass ash can also be used as raw material for preparation of compost pursuant to the Czech standard ČSN 465735 “Industrial Composts”. Ash from burned biomass can be used to fertilise farm soil as well as forest lands, in which case, in addition to supplying mineral nutrients, it also balances pH levels in areas affected by acid rains or the excess of conifer-dominated monocultures. Practical application of biomass ash on forest lands has been best proven in Scandinavia, while in the Czech Republic ash is not used for this purpose due to a total lack of experience.

- *Any related cases pursuant to EC Directive2009/28 for RES*

  Pursuant to Czech law[16], production of electricity from biomass (either by combusting pure biomass or in a mixture with fossil fuels) is promoted. The volume and nature of such promotion – in a form of guaranteed purchase prices or so-called green bonuses –

[13] http://www.czechfsc.cz/
[14] http://www.pefc.cz/
[15] Decree No. 474/2000 Coll., laying down requirements for fertilisers, or Decree No. 382/2001 Coll., the conditions for using treated sludge on agricultural land
[16] Act No 180/2005 Coll., On the promotion of electricity production from renewable energy sources

depends on a technology of electricity production (categories AF, P, O, and S) and origin of energy biomass (categories 1, 2, and 3). Biomass is broken down into categories depending on the suitability of its use for energy production, with regard to needs of other industries (particularly food processing and wood processing).

Table 13: Categories of biomass for electricity production

Category	Description	Biomass source	Minimum average heating value
AF1	Combustion of biogas in biogas stations	More than 50% of weight of the incoming dry matter consist of purposely grown energy crops used for production of biogas.	
AF2		Biomass not falling within category AF1.	
P1	Parallel combustion of biomass and fossil fuels (separate boilers, common steam header – power generator)	Biomass purposely grown for energy production and fuels produced of it.	7 MJ per kg
P2		Biomass not falling within categories P1 and P3.	
P3		Biomass usable as material and fuels produced of it.	
O1	Combustion of pure biomass	Biomass purposely grown for energy production and fuels produced of it.	7 MJ per kg
O2		Biomass not falling within categories O1 and O3.	
O3		Biomass usable as material and fuels produced of it.	
S1	Combined combustion of biomass and fossil fuels in a single boiler	Biomass purposely grown for energy production and fuels produced of it.	5 MJ per kg
S2		Biomass not falling within categories S1 and S3.	
S3		Biomass usable as material and fuels produced of it.	

Big producers of electricity may buy biomass for higher prices than local operators of long-distance heat supply systems due to guaranteed purchase prices and green bonuses, which results in undesirable “exports” of biomass from the region.

Target Region visit was undertaken by delegates of a Finish partner (VTT) from Bioregions project on 19-21 October 2011. Outputs of this visit are resumed in following recommendations:

- Woodchips quality is not currently important criterion for local operators of long-distance heat supply systems, because they have not tools for biofuel quality examination (measurement of weight and moisture) and installed biomass boilers can run on biofuel with variable heat value. Installation of weight and moisture measurement is recommended for existing local heat plants or at planned BTC to enable biofuel price determination according to its calorific value and to increase efficiency of biofuel utilisation. Construction of sheltered storage capacities is another recommendation.
- Quality monitoring of biofuels (firewood, pellets, briquettes) for small consumers (households, municipalities, SMEs) should be one of the services provided by BTC. The aim of this monitoring is to ensure higher calorific value and biofuels (pellets and briquettes) durability during their storage.
- Awareness raising in the field of quality and sustainability of biofuels ensured by promotion activities and training for the professional and lay public in the target region. These activities will be carried out by the EAZK and, afterwards, by the BTC.

7. Impact Assessment

The implementation of the Action Plan will have a number of intermingled impacts on the given region. Creating a sustainable local market for energy biomass will lead to the region's social and economic stabilisation (new jobs created in connection with biomass harvesting and processing, lower heating costs due to cheap local biomass) and higher energy independence. The money previously spent for fossil fuels will remain in the region, upholding local economy and, hence, also revenues of the municipalities. By participating in the local biomass market, regional companies (notably agricultural and forestry companies) can gather experience and diversify their activities, thus also improving the economic situation of the remote borderland area.

Exploitation of biomass as a renewable energy source will contribute to lower emissions of CO_2 and, consequently, help prevent global climatic changes. On a local level, the switch to biomass heating will result in an improved quality of air in the towns and villages, particularly during a heating season. Reliable supply of biomass for reasonable prices must be guaranteed, though, so that only fuels recommended by boiler manufacturers will be combusted in biomass boilers. Thanks to combined measures – collecting biomass from orchards, gardens and forests, and local regulations – the municipalities will restrict burning yard waste in open areas, thus reducing risks of fire and air pollution.

When exploitation of biomass for energy production is considered, some other aspect must also be taken into account, like food safety of the region, competition between sectors (wood processing industry), nutrients cycle, and maintaining biodiversity. If the food safety is to be maintained and competition between industries prevented, waste biomass must be exploited first, as well as energy crops and FGT grown on vacant lands. The energy crops must be grown in a proper manner to prevent erosion and soil exhaustion. Part of waste biomass (straw, branch wood) should be left behind after the harvest in order to maintain the balance of nutrients in the soil. Ash from burned biomass can be used for the same purpose, if it is returned as a fertiliser to the place of its origin. A proper selection of energy crops and manner of their growing can reduce risk of biodiversity loss. The maintenance of the landscape can, on the other hand, produce waste biomass (hay, branch wood) and help preserve the unique scenery of the White Carpathians. By maintaining the cultural landscape, promoting bio-farming, creating educational paths focused on local energy biomass, and promoting activities of the BTC, more tourists from the Czech Republic and abroad can be attracted to the region.

The aforesaid impacts of the Action Plan, both positive and negative, should be monitored and the results continually evaluated according to agreed-upon criteria (quality). The indicators of impact assessment with respect to establishing a local biomass market are listed below:

- Numbers of jobs preserved or newly created thanks to the biomass market;
- Volume of energy produced from bio-waste (TJ per year or MWh per year);
- Area (in ha) used for growing FGT;
- Volume of agricultural and forestry waste used for energy production (tons per year).

8. Monitoring and Evaluation

To assess the progress of implementing the Action Plan, a number of parameters (impacts) must be systematically examined:

- Total production of agricultural and forest biomass (yearly harvest) – tons per year
- Production of energy biomass (energy crops, FGT, felling waste, waste biomass) – tons per year
- Production and price of biofuels (firewood, pellets, briquettes), use of storages and warehouses – tons per year
- Customers' demand for biofuels
- Energy production in the region (biomass, other RES, fossil sources) and its consumption (broken down per sectors) – TJ per year (or MWh per year)

The above data will be collected from the target groups and evaluated by EAZK, at least until the Biomass Trading Centre is launched, as the Centre will become the focal point of the regional biomass trading. The region's annual energy balance sheet will be based on these data, which will be presented to representatives of local municipalities at least once every year. More detailed research focused on the region's target groups will be performed after 2, 5 and 10 years and their outcomes, along with statistic data and annual energy balance sheets, will serve as background materials for the Action Plan Implementation Analysis. A review of objectives and activities based on current progress and developments will always be part of the Analysis.

As soon as approved by a majority of municipal assemblies, the Analysis and annual energy balance sheets will be made public on web pages of BTC, EAZK, and region's municipalities, along with other information on the region and developing the local biomass market in the given region.

List of Abbreviations and Acronyms

BTC	Biomass Trading Centre
BSEU	Bonited Soil-Ecological Unit
CHKO	Reserve (Protected Landscape Area)
CO2	Carbon dioxide
ČR	Czech Republic
ČSN	Czech National Industrial Standard
ČSÚ	Czech Statistical Office
EAZK	Energy agency of the Zlin region
E&UC	Energy & utility crops
EU	European Union
FGT	Fast growing trees
FSC	Forest Stewardship Council
ha	Hectare (unit of area)
kW	Kilowatt (unit of power)
LFA	Grants supporting farmers in disadvantaged areas
MAS	Local Action Group
MWh	Megawatt hour (unit of energy)
NAP	National Action Plan
OPPI	Entrepreneurship & Innovation Operational Programme
OPŽP	Operational Programme “Environment”
ORC	Organic Ranking Cycle –technology for common production of heat and electricity
RES	Renewable energy sources
PEFC	Programme for the Endorsement of Forest Certification scheme
SAPS	Single Area Payment Scheme (farming subsidies)
SWOT analysis	Analysis of Strengths, Weaknesses, Opportunities, and Threats of a specific project
TJ	Terajoule (unit of energy)
ÚEK ZK	Territorial Energy Planning Concept of the Zlín Region
UNESCO	United Nations Educational, Scientific and Cultural Organization
w/b	Unit of a volume of felled wood, **w**ithout **b**ark

ANNEX I

Expected progress of biomass energy production and consumption in 2010-2020 according to the National RES Action Plan (2011)

Heat produced from RES												
Year		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Biomass (home heating)	TJ	45 940	47 073	48 214	49 379	50 568	51 780	52 887	54 017	55 171	56 348	57 550
Biomass consumption	tons	*3 489 200*	*3 571 561*	*3 654 412*	*3 738 583*	*3 824 074*	*3 910 885*	*3 989 016*	*4 068 467*	*4 149 238*	*4 231 329*	*4 314 740*
Biomass (except home heating)	TJ	23 225	26 968	30 143	32 540	33 760	35 501	35 777	36 053	36 328	36 604	36 880
Biomass consumption	tons	2 245 213	2 693 494	3 018 232	3 245 040	3 377 403	3 545 395	3 572 235	3 599 075	3 625 915	3 652 755	3 679 595
Biodegradable component of solid household waste	TJ	1 599	1 494	1 494	1 494	1 494	1 494	2 185	3 241	3 241	3 241	3 241
Biological. component of waste	tons	*184 423*	*169 356*	*169 356*	*169 356*	*169 356*	*169 356*	*261 516*	*388 016*	*388 016*	*388 016*	*388 016*
Biogas	TJ	2 219	2 693	3 195	3 669	4 143	4 617	5 091	5 564	6 038	6 512	6 986
Installed capacity	MW	*202*	*237*	*269*	*300*	*332*	*364*	*395*	*426*	*458*	*489*	*521*
Biodegradable component of recyclable waste etc.	TJ	679	694	709	709	709	709	709	709	709	709	709
Electricity produced from RES												
Year		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Biomass (except households)	TJ	4 557	5 807	7 762	9 227	10 080	10 654	10 766	10 879	10 991	11 103	11 216
Biomass consumption	tons	984 154	1 321 912	1 915 629	2 303 440	2 506 258	2 643 446	2 676 606	2 709 766	2 742 926	2 776 086	2 809 246
Biodegradable component of solid household waste	TJ	143	379	379	379	379	379	422	641	641	641	641
Installed capacity	MW	2,9	42,8	42,8	42,8	42,8	42,8	57,8	81,3	81,3	81,3	81,3
Biological. component of waste	tons	*48 977*	*203 844*	*203 844*	*203 844*	*203 844*	*203 844*	*226 884*	*280 384*	*280 384*	*280 384*	*280 384*
Biogas	TJ	2 247	3 052	3 903	4 707	5 511	6 315	7 120	7 924	8 728	9 532	10 336
Installed capacity	MW	*113*	*147*	*177*	*207*	*237*	*267*	*297*	*327*	*357*	*387*	*417*

ANNEX II

Sources of heating in the region (REZZO 1,2,3).

Source of heating	Consumption of coal (t)	Sort of fuel	Installed heat output (kW)	Actual heat production (GJ)
Gas boiler house PV PLASTY - 8 x THERM DUO 48 kW boiler	0	Natural gas	96	1 213
Gas boiler house PV KOVO - 6 x THERM DUO 48 kW boiler	0	Natural gas	48	2 229
Valašskoklobouckés služby s.r.o. - boiler house ÚPV Štítná	0	-	140	0
Javorník-CZ-plus s.r.o. - boiler house Dubečky2 x LUMEX 11 - 200 kW each - natural gas	0	Natural gas	200	1 643
Javorník-CZ-plus s.r.o. - boiler house management	0	Firewood	800	5 667
TVD - Technická výroba, a.s. – sources of heat	0	Natural gas	360	2 584
BONAVIA servis a.s. - boiler house Slavičín	0	Natural gas	600	645
BTH Slavičín s.r.o. - boiler house K 1 (elementary school)	0	Natural gas	3 220	12 709
BTH Slavičín s.r.o. - boiler house K 4 (dormitory)	0	Natural gas	435	2 154
BTH Slavičín s.r.o. - boiler house K 5 (department store)	0	-	464	0
BTH Slavičín s.r.o. - boiler house K 6	0	Natural gas	208	898
BTH Slavičín s.r.o. - boiler house K 22 (gymnasium)	0	Natural gas	348	576
BTH Slavičín s.r.o. - boiler house K 23	0	Natural gas	213	1 009
BTH Slavičín s.r.o. - boiler house K 3	0	Natural gas, Biomass - wood chips	8301	63 443
BTH Slavičín s.r.o. - boiler house K 24	0	Natural gas	524	1 041
BTH Slavičín s.r.o. - boiler house K 37	0	Natural gas	304	2 046
ČR - MO, VUSS Brno - boiler house Slavičín	0	-	2 910	0
KOMAS s.r.o. CVP Galvanika Slavičín	0	-	150	0
KOVOS s.r.o. Slavičín	0	Natural gas	700	718

Source of heating	Consumption of coal (t)	Sort of fuel	Installed heat output (kW)	Actual heat production (GJ)
AH ENERGY s.r.o. - boiler house Slavičín	864	Brown coal powder, natural gas	5 926	15 571
Slavičín sports clubs – sports arena	0	Natural gas	125	1 324
Secondary & Vocational School, Slavičín	0	Natural gas	90	2 569
SV Slavičín s.r.o.	0	Natural gas	116	1 770
ZÁLESÍ a.s. - AG Slavičín	0	-	1 150	0
REMERX s.r.o. - GALVAN CZ s.r.o. Slavičín	0	Natural gas	420	3 805
EC - TECH a.s. – Slavičín plant	0	Natural gas	1 150	2 410
Kloboucká lesní s.r.o. - boiler house Brumov-Bylnice	0	Firewood	1 500	17 526
OBZOR, housing cooperative- gas boiler house Brumov-Bylnice = 3 x BUDERUS GB 162-80, 84 kW each	0	Natural gas	85	767
VADEO VALACHIA s.r.o. - boiler house Hliníky - out of operation	0	-	335	0
TRYON, s.r.o. - gas boiler house-3 x PROTHERM 77 kW each	0	Natural gas	77	854
Public Utilities of Brumov-Bylnice, p. o. – central heating source, Brumov-Bylnice- 2010 - 2x KVDE 160 - 1200 kW - natural gas;- HRK - 2000+1000 kW - biomass;	0	Biomass - wood chips, Natural gas	4 200	23 299
Total			**35 195**	**168 470**

ANNEX III

Tree species represented in forests of the region (National Forest Stocktaking as at 31 Dec 2010)

Tree	Grown-up area		Stockpile		Average age
	[ha]	%	1000 [m^3] w/b	%	
Common spruce	3 449,46	35,47	1 194,45	40,50	58
Exotic spruces	0,49	0,01	0,00	0,00	6
Silver fir	184,78	1,90	77,12	2,62	68
Giant fir	2,43	0,03	0,88	0,03	17
Pine	1 555,03	15,99	517,15	17,54	80
Mountain pine	0,00	0,00	0,00	0,00	0
Larch	397,75	4,09	158,67	5,38	66
Douglas fir	12,64	0,13	5,75	0,20	57
Other conifers	0,00	0,00	0,00	0,00	22
Oak	923,39	9,50	238,74	8,10	76
Red oak	0,97	0,01	0,15	0,01	37
Beech	2 257,66	23,22	622,00	21,09	70
Hornbeam	373,44	3,84	56,48	1,92	64
Ash	100,17	1,03	17,99	0,61	48
Maple	103,09	1,06	16,52	0,56	38
Elm	2,92	0,03	0,74	0,03	43
Locust tree	1,95	0,02	0,29	0,01	64
Birch	89,47	0,92	9,88	0,34	38
Lime tree	58,84	0,61	12,09	0,41	52
Alder	111,35	1,15	17,25	0,59	55
Aspen	6,81	0,07	1,03	0,04	43
Poplar	3,89	0,04	1,03	0,04	53
Willow	6,81	0,07	0,15	0,01	21
Other deciduous	9,73	0,10	0,59	0,02	33
Coniferous trees	5 602,09	57,61	1 948,32	66,26	65
Deciduous trees	4 050,95	41,66	1 000,93	33,75	67
Trees in total	**9 653,04**	**99,26**	**2 949,25**	**100,00**	**66**
Bare land	71,97	0,74			
TOTAL	9 725,00	100,00			

ANNEX IV

Sorts of phytomass that can be used for energy production (Carbon Map of the Czech Republic)

			English names of crops	Botanical Latin names	Grain (corn) / tubers (nodules)	Straw	Harvest weight (seeds, tubers)	Harvest weight fresh, in the maximum growth period (end of August)	Costs of odt* ha per year	Costs (CZK per odt)	phytomass at harvest (tubers)	Overlap with conventional use**	Sowing sensitivity	Yield sensitivity	Harvest & storage sensitivity	Administrative processes	Kontroverznost plodiny	Sowing	Sowing	Harvest	Harvest	Number of consecutive harvests
UNIVERSAL CROPS	Energy production	1	Jerusalem artichoke	*Helianthus tuberosus*	7	5	30	25	65 700	**5 475**	**2 190**	3	2	2	3	0	2	14	16	3	13	10
	Industrial use	1	Rapeseed	*Brasica napus*	2,8	7	3	8	19 520	**1 992**		2	1	2	1	0	1	34	36	27	29	once per 4 y.
		2	Potato	*Solanum tuberosum*	6,5		25		81 250	**12 500**	**3 250**	5	2	3	2	0	0	15	17	37	40	once per 4 y.
		3	Triticale	*Triticosecale*	4,7	7,5	5	8	17 100	**1 402**		3	1	2	1	0	0	36	38	30	32	once per 2 y.
		4	Sugar beet		10		50		42 050	**4 205**	**841**	2	2	2	2	0	0	14	16	41	44	once per 4 y.
ANNUAL THERMOPHILOUS CROPS	Energy production	1	Broomcorn	*Sorghum vulgare var. technicum*		10		30	17 200	**1 720**		2	2	3	3	0	0	17	19	38	45	3
		2	Sugar sorghum	*Sorghum vulgare var. saccharatum*		7		21	16 300	**2 329**		2	2	3	3	0	0	17	19	38	45	3
		3	Sorghum Sudan grass	*Sorghum vulgare var. sudanense*		12		36	17 600	**1 467**		2	2	3	3	0	0	17	19	38	45	3
		4	Safflower	*Carthamus tinctorius*	2,5	5	2,5	6	12 890	**1 719**		2	2	3	1	0	0	11	13	35	37	once per 2 y.
		5	Cannabis	*Cannabis sativa*		9		12	17 380	**1 931**		2	2	2	3	3	4	16	18	35	42	4
	Industrial use	1	Grain maize	*Zea mays*	6,2			6,5	22 100	**3 565**		3	2	2	1	0	2	16	18	37	41	3
		2	Silage maize	*Zea mays*		9,5		35	24 980	**2 629**		4	2	2	1	0	2	15	18	39	43	3
			Chin. silver grass-rhiz.			12		48	10 400			1	3	2	2	0	1	13	15			15

			English names of crops	Botanical Latin names	Grain (corn) / tubers (nodules)	Straw	Harvest weight (seeds, tubers)	Harvest weight fresh, in the maximum growth period (end of August)	Costs of odt* ha per year	Costs (CZK per odt)	Costs per ton of fresh phytomass at harvest (tubers)	Overlap with conventional use**	Sowing sensitivity	Yield sensitivity	Harvest & storage sensitivity	Administrative processes	Kontroverznost plodiny	Sowing	Sowing	Harvest	Harvest	Number of consecutive harvests
PERENNIAL THERMOPHILOUS	Energy production	1	Chinese silver grass -seedling	*Miscanthus sinensis*		12		48	19 450	**1 621**		1	3	2	2	0	1	20	28	3	14	15
			Chinese silver grass -rhizomes			12		48	10 400			1	3	2	2	0	1	13	15			15
EASILY GROWN CROPS	Energy production	1	Sorrell	*Rumex patientia x tianschanicus*		8		9,5	8 300	**1 038**		1	2	2	1	0	2	15	27	30	36	10
		2	Reed canary grass	*Phalaris arundinacea*		7		25	7 800	**1 114**		1	1	1	2	0	0	11	15	3	13	8
		1	Permanent growth of grass (meadows 1 mowing)			2,5		11	7 500	**3 000**		4	1	1	2	0	0	11	15	26	36	
		2	Permanent growth of grass (meadows 2 mowing)			2,3		11,5	8 240	**3 583**		2	1	2	1	0	0	36	38	21	25	
						1,9		9,5	5 380											28	35	
	Industrial use	3	Cereal rye	*Secale cereale*	4,3	7	4,5	8	16 450	**1 456**		2	1	2	1	0	0	36	38	32	35	

Note: Where "X" is in column G (phytomass yield for perennials), it is taken for February/March where losses of phytomass are encountered following the winter season. In the maximum growth period, yields will increase by ca: 25% (Chinese silver grass and reed canary grass); 40-50% (knotweed and sorghums), and 30-40% Jerusalem artichoke.

* - odt = "oven dry ton" i.e. processed phytomass containing 10% of water

** 1 – Energy crops only, inedible; 2 – Energy crops that can be partly used by humans or, to a small extent, by livestock; 3 – Almost no use for humans but edible for livestock; 4 – Largely used as fodder; 5 – Extreme overlap – mostly and primarily used and/or consumed by humans

ANNEX V

Activity implementation time table

No	Action	Activity	Responsible	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Creation of a bioenergy region	adoption of the Biomass action plan and its updating	municipalities (EAZK)											
		promotion of bioregion												
		> publicity materials, press releases, web pages of municipalities and EAZK	EAZK, municipalities, BOC											
		> survey focused on citizen's and stakeholder's foreknowledge of the aims and activities of the Bioregions												
		collection of data about potential, production and consumption of biomass in the target region	EAZK, BOC											
		new biomass sources for energy use												
		> feasibility study of FGT growing	EAZK											
		> identification of farmers and their parcels suitable for FGT growing	municipalities											
		> pilot plantation of FGT	BOC, farmers											
		> energy use of agricultural residues (hay, straw)	BOC, farmers											
		> promotion of effective forest residues utilisation	BOC, EAZK											
		establishing of local biomass market												
		> building and running of community compost plant	municipalities											
		> involvement of local biomass supplier, municipalities and private biofuel consumers	municipalities, BOC											
		> enhancement of biofuel (pellets) supplies for BTC clients	BOC											
		establishing, if necessary, of local associations of forest owners or farmers	EAZK, municipalities, BOC											
		biofuels quality and sustainability trainings	EAZK, BOC			at least once a year								

No	Action	Activity	Responsible	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
2	Biomass trading centre (BTC)	feasibility study of BTC	EAZK											
		establishment of BTC in Brumov-Bylnice	municipalities, SMBB											
		full operating of the BOC (inc. environmental education activities)	SMBB, EAZK											
		feasibility study of BTC in Slavičín	EAZK, BOC, municipalities											
3	Renewable energy sources (RES)	initialize of new RES instalation utilizing local biomass	EAZK, municipalities, BOC											
		instalation and running of biomass boiler in DHS Slavičín	town of Slavičín, BTH, EAZK											
		biofuel quality increase for DHS boilers (storage capacity overroofing, fuel quality input control)	BTH, SMBB, BOC											
		design (construction) of new bioenergy projects (e.g. Biogas plant)	EAZK, municipalities, BOC											
		consultancy providing	EAZK											
notes		**BTH** - BTH Slavičín, spol. s r.o.; **EAZK** - Energetická agentura Zlínského kraje, o.p.s.; **SMBB** - Služby města Brumov-Bylnice, p.o.; **FGT** - fast-growing trees; **DHS** - district heating system												

ANNEX

ADOPTION OF THE ACTION PLAN

Excerpt from resolution of the IX. regular session of Town council of Brumov-Bylnice on 26.4.2012

Regional Networks for the development of a Sustainable Market for Bioenergy in Europe – Biomass Action Plan
Resolution number 14/9/2012/122

Town council of Brumov-Bylnice

a) takes cognizance of
Documents elaborated in the frame of international project Bioregions:

1. Analysis of Biomass Trade Centre establishment in the Zlin region listed in Annex P1,
2. Biomass Action Plan listed in Annex P2,

b) approves
Documents elaborated in the frame of international project Bioregions:

1. Analysis of Biomass Trade Centre establishment in the Zlin region listed in Annex P1,
2. Biomass Action Plan listed in Annex P2,

Preamble:
Project Bioregions supports creation of "bioenergy regions" in European rural areas. The aim of this project is to support energy self-sufficiency by getting at least one third of energy supply from regional sources of sustainable biomass. Furthermore, the project aims to stabilise the level of local energy prices and employment rate and to improve air quality in the region. The project is implemented by the Energy agency of the Zlin region and representatives of towns Brumov-Bylnice, Slavičín, villages (Bohuslavice nad Vláří, Jestřábí, Lipová, Návojná, Nedašov, Nedašova Lhota, Petrůvka, Rokytnice, Rudimov, Šanov, Štítná nad Vláří-Popov) and local SME's. The project is also concerned with experience sharing (transfer) between best practice regions and target regions. The lead partner of the Bioregions project is WIP-Renewable, Germany; Partner 2 EVIROS, Czech Republic; Partner 3 VTT Technical Research Centre of Finland, Finland; Partner 4 Agricultural University of Athens, Greece; Partner 5 Bioenergy Centre Achental, Germany; Partner 6 LTC, Sweden; Partner 7 Ekodoma, Latvia; Partner 8 Westmeath Community Development limited, Ireland; Partner 9 Energy Agency of Plovdiv, Bulgaria; Partner 10 AMENAGEMENT SYNDICATE OF TRIEVES, France; Partner 11 Energy agency of the Zlin region, Czech Republic; Partner 12 Capital Connect, Greece; Partner 13 ELARD – European Leader Association for Rural Development, Belgium. The Bioregions project duration is May 2010 to May 2013.

Václav Bližňák
Vice-mayor

Town of Slavičín

Slavičín, 7th May 2012

SECTIONAL EXCERPT FROM RESOLUTION

XI. regular session of Town council of Slavičín on 25th April 2012

Resolution n. XI/6/2012	**Biomass Action Plan**

Town council of Slavičín

takes cognizance of
involving Town of Slavičín into the Bioregions project.

approves
Documents elaborated in the frame of Bioregions project – Biomass Action Plan as amended by Annex n. 0662-12Z-P1 and Analysis of Biomass Trade Centre establishment in the Zlin region as amended by Annex n. 0662-12Z-P2.

Ing. Jaroslav Končický
Mayor

Výpis z usnesení z IX. řádného zasedání Zastupitelstva města Brumov- Bylnice ze dne 26. 4. 2012

Regionální sítě pro rozvoj udržitelného trhu s bioenergií v Evropě – Akční plán pro biomasu

Usnesení číslo 14/9/2012/122

Zastupitelstvo města Brumov-Bylnice

a) b e r e n a v ě d o m í

dokumenty vytvořené v rámci mezinárodního projektu Bioregiony :

1. Analýza pro vytvoření obchodního biomasového centra ve Zlínském kraji uvedenou v příloze P1,
2. Akční plán pro biomasu uvedený v příloze P2,

b) s c h v a l u j e

dokumenty vytvořené v rámci mezinárodního projektu Bioregiony :

1. Analýza pro vytvoření obchodního biomasového centra ve Zlínském kraji uvedenou v příloze P1,
2. Akční plán pro biomasu uvedený v příloze P2,

Důvodová zpráva:
Projekt Bioregions podporuje vytváření „bioenergetických regionů" ve venkovských oblastech Evropy. Cílem tohoto regionu je podpořit energetickou soběstačnost, tím, že se bude získávat alespoň třetinu dodávek energie z regionálních zdrojů a z udržitelné biomasy. Dále podpora stabilizace ceny energie, zaměstnanosti a zlepšení stavu ovzduší. Projekt je realizován Energetickou agenturou Zlínského kraje a zástupci měst Slavičín, Brumov- Bylnice, obcí (Bohuslavice nad Vláří, Brumov-Bylnice, Jestřabí, Lipová, Návojná, Nedašov, Nedašova Lhota, Petrůvka, Rokytnice, Rudimov, Slavičín, Šanov, Štítná nad Vláří-Popov) a podnikatelů. Projekt je o přenosu zkušeností vyspělých zahraničních partnerů a partnerů, kteří se od nich učí. Vedoucím partnerem projektu je WIP-Renewable Energies, Německo,Partner 2: ENVIROS, Česká republika,Partner 3: VTT Technical Research Centre of Finland, Finsko,Partner 4: Agricultural University of Athens, Řecko,Partner 5: Bioenergy Centre Achental, Německo,Partner 6: LTC , Švédsko,Partner 7: Ekodoma, Lotyšsko,Partner 8: Westmeath Community Development limited, Irsko,Partner 9: Energy Agency of Plovdiv, Bulharsko,Partner 10: AMENAGEMENT SYNDICATE OF TRIEVES, Francie;Partner 11: Energetická agentura Zlínského kraje, Česká republika,Partner 12: EHM International, Spojené království,Partner 13: ELARD aisbl – European Leader Association for Rural Development, Belgie. Aktivity projektu jsou realizovány v období květen 2010 až květen 2013.

Václav Bližňák
místostarosta

MĚSTO 2 BRUMOV-BYLNICE

město
Slavičín

Ve Slavičíně 7. května 2012

ČÁSTEČNÝ VÝPIS USNESENÍ

XI. zasedání Zastupitelstva města Slavičín konaného dne 25. dubna 2012

Usnesení č. XI/6/2012	Akční plán pro biomasu

Zastupitelstvo města Slavičín

b e r e n a v ě d o m í

zapojení města Slavičín do projektu Bioregions

s c h v a l u j e

dokumenty vytvořené v rámci projektu Bioregions – Akční plán pro biomasu ve znění dle přílohy č. 0662-12Z-P1 a Analýzu pro vytvoření obchodního biomasového centra ve Zlínském kraji ve znění dle přílohy č. 0662-12Z-P2

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Osvobození 25
763 21 SLAVIČÍN

Ing. Jaroslav K o n č i c k ý
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