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REPUBLIKA SLOVENIJA
SLUŽBA VLADE REPUBLIKE SLOVENIJE ZA RAZVOJ
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KONTAKT / KONTAKT

Rok Sunko

Skupina FABRIKA d.o.o.

Radomerje 14L, Ljutomer, Slovenija

+ 386 31 323 853	rok@skupina.-fabrika.com

Manfred Hotwagner

EEE GmbH

Europastraße 1., Güssing, Österreich

+ 43 5 9010 85050	m.hotwagner@eee-info.net

AVTORJI / AUTOREN

Rok Sunko	rok@skupina-fabrika.com	
Lilijana Grnjak	lilijana.grnjak@ljutomer.si	
Katalin Boedi	k.boedi@eee-info.net	
Andrea Fischl	a.fischl@eee-info.net	
Christian Doczekal	c.doczekal@get.ac.at	
Dr. Richard Zweiler	r.zweiler@get.ac.at	
Dr. Miran Lakota	miran.lakota@uni-mb.si	
Dr. Gregor Božič	gregor.bozic@gozdis.si	
Manfred Hotwagner	m.hotwagner@eee-info.net	

UVOD / EINFÜHRUNG

Obnovljivi viri energije predstavljajo strateški vir naše dežele. Premiki v globalni orientaciji gospodarstva in politike bodo v bližnji prihodnosti popolnoma spremenili razvojne vidike zelenih dežel okoli nas. Slovensko Pomurje in avstrijska Gradiščanska, nekoč izključno agrikulturni središči, brez energetskih resursov, bosta v prihodnosti postali pomemben vir obnovljivih virov energije – sončne in geotermalne energije ter biomase.

Dokument Energetski koncept pilotne lokacije je nastal v projektu PEMURES – Prodor na energetska tržišča z neizrabljenimi obnovljivimi viri energije na območju Pomurja in Gradiščanske, izvajan v okviru JR OP SI-AT 2007-2013, čezmejno sodelovanje Slovenija-Avstrija, Cilj 3 Evropsko teritorialno sodelovanje. Projekt je usmerjen v identifikacijo, vrednotenje in opredelitev trenutnih in potencialnih obnovljivih virov v dialogu s trenutnimi in potencialnimi dobavitelji ter porabniki tega vira oz. končne energije proizvedene na osnovi obnovljivih virov.

Ciljno območje koncepta je čezmejna regija južne Gradiščanske in Pomurja. Iz tega vidika je dokument strukturiran na vsebino čezmejnih primerjav, predlogov in ukrepov, čemur sledijo temeljita analiza in ukrepi za Pomursko regijo ter analiza in ukrepi za Gradiščansko regijo. Gre torej za dve temeljiti analizi na nivoju posameznih občin obeh regij ter primerjava obeh regij s čezmejnimi predlogi in ukrepi. Tako je del dokumenta, ki vsebuje analizo slovenskega dela, prikazan v slovenskem jeziku, del, ki vsebuje analizo Gradiščanske regije, v nemškem jeziku in začetni del koncepta (čezmejne primerjave) v angleškem jeziku. Dokument bo na voljo javnosti na spletni strani projekta PEMURES.

Erneuerbare Energieträger sind eine wesentliche Ressource für die Strategie unserer Region. Verschiebungen in der globalen Ausrichtung der Wirtschaft und Politik werden in naher Zukunft die entwicklungspolitischen Aspekte der ressourcenreichen, ländlichen Regionen völlig verändern. Pomurje und Burgenland, die früher ausschließlich landwirtschaftlich orientiert waren, ohne Energie-Ressourcen, werden in Zukunft eine wichtige Quelle der erneuerbaren Energien werden - Sonne, Erdwärme und Biomasse.

Das Dokument „Energetisches Konzept des Pilotstandortes" wurde im Rahmen des Projektes PEMURES erstellt – die Durchdringung des Energiemarktes mit bis jetzt ungenutzten erneuerbaren Energieträgern im Gebiet von Südburgenland und Pomurje. Das Projekt wurde im Rahmen des JR OP SI-AT 2007-2013, grenzübergreifende Zusammenarbeit Slowenien-Österreich, Ziel 3 die Europäische territoriale Zusammenarbeit, kofinanziert. Das Projekt konzentriert sich auf die Identifizierung, Bewertung und Definition der aktuellen und potenziellen erneuerbaren Energieträgern im Dialog mit aktuellen und potenziellen Lieferanten und Konsumenten der Endenergie aus erneuerbaren Energieträgern.

Der Zielbereich des Konzepts ist die grenzüberschreitende Region des südlichen Burgenlandes und Pomurje. Daher wird das Dokument in drei Segmente strukturiert: als Erstes der grenzüberschreitende Vergleich der beiden Regionen und der Vorschläge und Maßnahmen die sich daraus ergeben, danach die gründliche Analyse und Maßnahmen für die Region Pomurje sowie die Analyse und Maßnahmen der Region Burgenland.

Es besteht daher aus zwei eingehenden Analysen auf der Ebene der einzelnen Gemeinden in den beiden Regionen und einem Vergleich der beiden Regionen inklusive grenzüberschreitenden Maßnahmen und Vorschlägen. Demzufolge ist der Teil des Dokuments, der die Analyse der slowenischen Region enthält in slowenischer Sprache und die Analyse der Region Burgenland in der deutschen Sprache. Der Teil des Dokuments, der die grenzüberschreitenden Vergleiche enthält ist in englischer Sprache.

Dieses Dokument wird auf der Projekt-Website PEMURES öffentlich zugänglich gemacht.

CONTENTS

1. CROSS BORDER ENERGY CONCEPT: INTRODUCTION

A cross border energy concept (CBEC) can be created by having comparable data of both regions and by contrasting strengths and weaknesses, as well as opportunities and threats. As a result of this analysis, the CBEC can provide strategies and shape desirable measures in order to improve energy efficiency and the use of renewable and regional resources, based on an intensive exchange of information regarding best practice examples.

The individual energy concepts of the OEL and the Pomurje region are both based on the same methods of energy demand, energy savings and resources potential survey and evaluation. Geographically, climatically and in spatial distribution of settlements, the two concept regions do not differ very much and the conditions for biomass production and the use of solar energy are similar.

Pomurje region has a population of 119.942 inhabitants, living on 133.900 ha of land. On the other hand OEL is inhabited by 27.000 people on 31.917 ha land. The OEL has a significantly smaller area and fewer inhabitants than the Pomurje region, so for comparing both regions the use of key figures is necessary, mostly per-capita-values.

In general both areas are fairly similar with subtle differences. The most important difference is the proportion of land overgrown by forests which in Pomurje covers less than 30% of the land and in OEL it covers more than 40% of the land. However, in Pomurje there are significantly more agricultural areas. Particular characteristics of the regions can be found in the individual energy concepts, mainly produced by EEE, Güssing and Skupina FABRIKA, Ljutomer. These documents are available on the PEMURES website.

The current cross border analysis and cross border concept is a consequence of the cooperation of these Institutes.

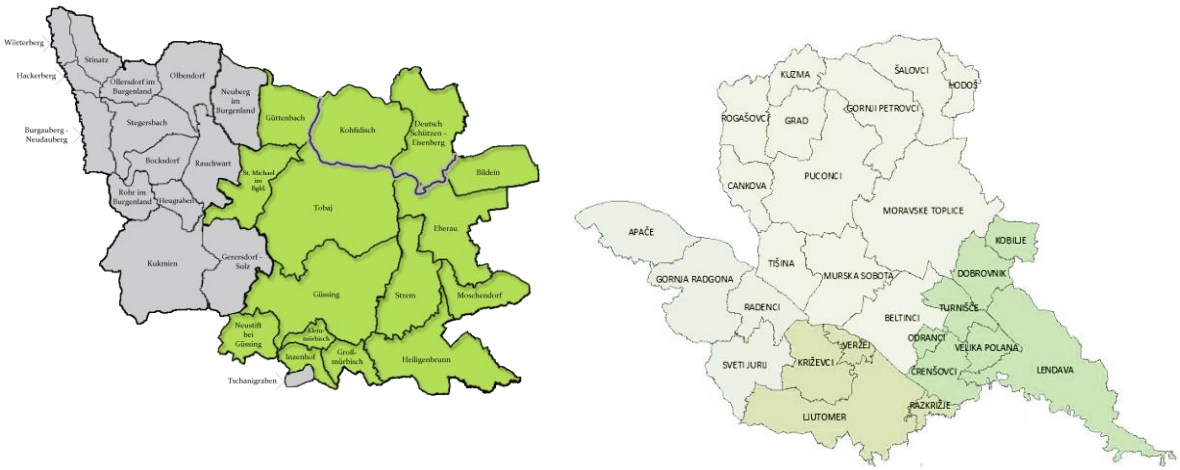

Image 1: The two concept regions and their municipalities. The Ökoenergieland to the left and the Pomurje region to the right.

2. OVERVIEW ON ENERGY DEMAND AND ENERGY SUPPLY

2.1 ENERGY DEMAND

Due to different size in areas and population and the economic sector, the energy demands in both regions cannot be compared directly. The energy demand of the Pomurje Region is fivefold higher than the energy demand in the OEL. In comparison to the higher population, this number is still larger than in the OEL.

2.1.1 STRUCTURE OF ENERGY DEMAND IN THE OEL

Demand group	Heat	Electricity	Traffic fuel	Total	Share
Households [MWh/a]	131.499	29.744	77.750	238.993	56%
Municipalities [MWh/a]	4.220	931	359	5.509	1%
Industry & services [MWh/a]	70.887	65.667	49.496	186.050	43%
Total [MWh/a]	**206.606**	**96.342**	**127.605**	**430.553**	
Share	*48%*	*22%*	*30%*		

Table 1: Structure of energy demand OEL

The most important demand group in the OEL are the households. The shares of energy carriers in households for heat supply are:

Energy carriers	Share
District heat	11,0%
Heating oil	30,0%
Fuel wood	42,2%
Coal and Peat	0,5%
Electricity	11,7%
Gas (natural, liquid)	1,8%
Solar & heat pumps	0,4%
Pellets	1,7%
Other/Unknown	0,5%
Total	100%

Table 2: Energy carriers for heat supply OEL

Most important energy carriers for heat supply in households are solid biomass and heating oil.

2.1.2 STRUCTURE OF ENERGY DEMAND IN POMURJE

Demand group	Heat	Electricity	Motor fuel	Total	*Share*
Households [MWh/a]	862.490	209.452	788.538	1.860.480	70%
Municipalities [MWh/a]	56.889	43.113	2.050	102.052	4%
Industry &service [MWh/a]	377.168	267.492	42.577	687.237	26%
Total [MWh/a]	**1.296.547**	**520.058**	**833.165**	**2.649.769**	
Share	*49%*	*20%*	*31%*		

Table 3: Structure of energy demand Pomurje

In Pomurje the most important demand group are also the households. The shares of energy carriers for heat supply in households are:

Energy carriers	*Share*
Coal and peat	1,21%
Fuel wood	48,34%
Heating oil	43,24%
Electricity	2,06%
Natural gas	2,23%
Liquid gas	0,80%
Solar energy	0,06%
District heat	1,54%
Other	0,52%
Total	**100%**

Table 4: Energy carriers for heat supply Pomurje

The most important energy carriers for heat supply in households are solid biomass and heating oil.

2.1.3 OVERVIEW ON ENERGY DEMAND IN BOTH REGIONS

Image 2 shows the distribution of the main energy forms in the regions. The differences are very small.

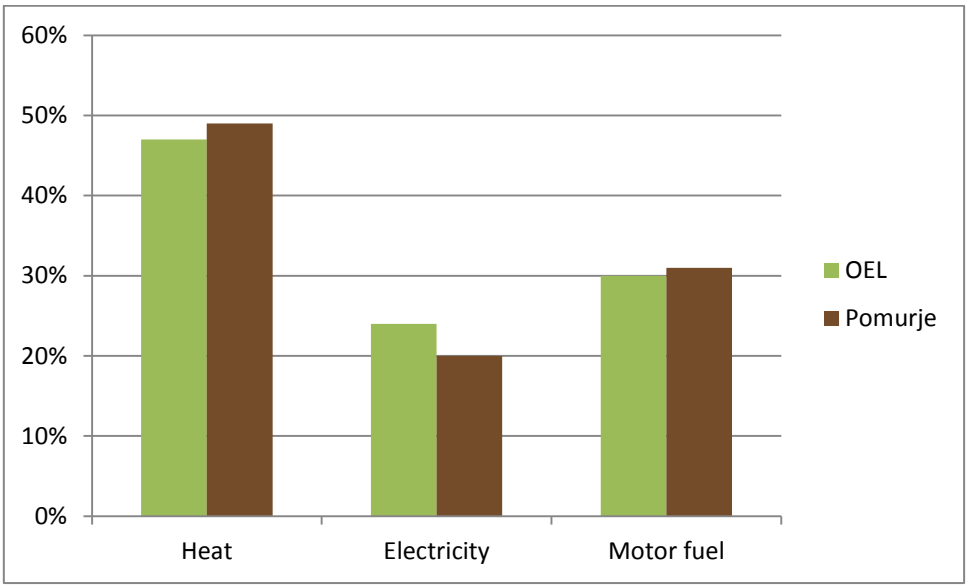

Image 2: Distribution of energy demand in the two concept regions by forms of energy

Image 3 shows the distribution of final energy regarding the main demand groups in the regions. In the Pomurje region households and municipalities consume a higher share of the overall energy demand than in OEL. Industry and service have a lower relative demand.

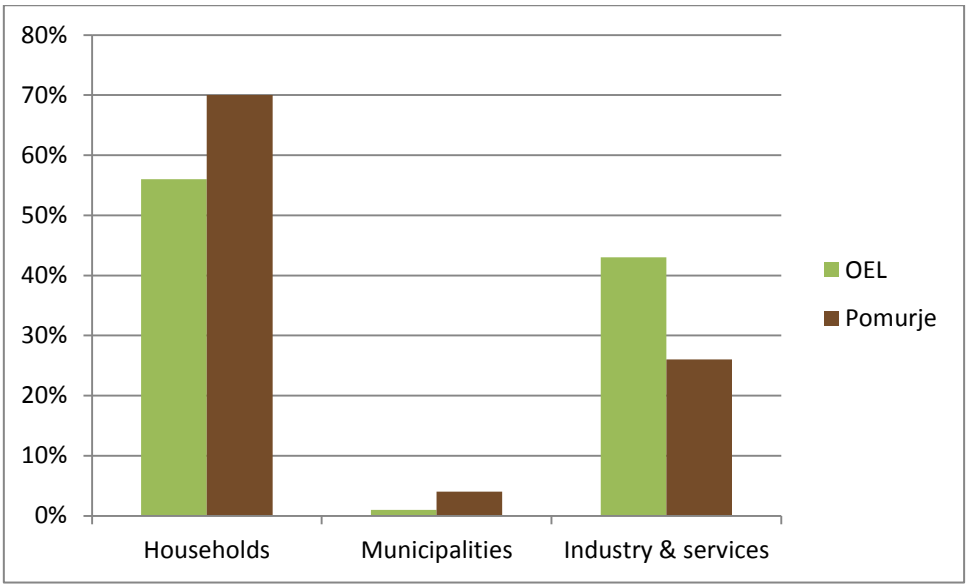

Image 3: Distribution of the final energy demand by demand sectors in the concept regions

The distribution of energy carriers for heat supply in households is demonstrated in Image 4. Solid biomass and heating oil are the most important energy carriers. District heat is in both regions generated by biomass.

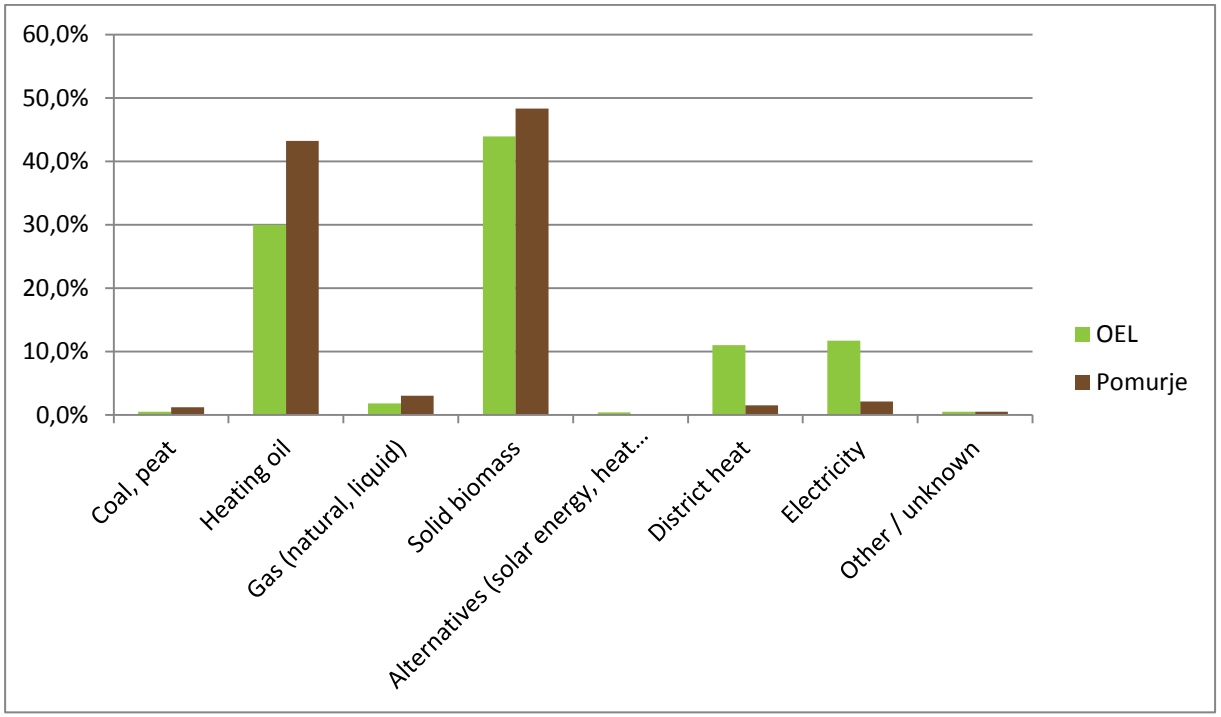

Image 4: Distribution of energy carriers for heat supply in households

2.2 POTENTIALS FOR ENERGY DEMAND REDUCTION IN THE REGIONS

The potential reduction of the energy demand can only be calculated for demand groups, which are statistically or directly well documented. This is the case for municipalities and households. The industrial sector is very heterogeneous in its demand structure and therefore cannot be included into a calculatory estimation. The energy demand reduction potential in both concept regions is as follows:

2.2.1 POTENTIAL FOR ENERGY DEMAND REDUCTION IN THE OEL

The total energy demand reduction potential for the OEL are about 29.300 MWh/a. In detail, the potential reductions are:

- Heat: 17.100 MWh/a
- Electricity: 4.400 MWh/a
- Motor fuel: 7.800 MWh/a

Realising the reduction potential, 7% of the total energy demand can be reduced. This is also shown in the detailed OEL energy concept in chapter 2.3.2.

2.2.2 POTENTIAL FOR ENERGY DEMAND REDUCTION IN THE POMURJE REGION

The total energy demand reduction potential for the Pomurje Region are about 408.500 MWh/a. The potential reductions in this region are:

- Heat: 298.200 MWh/a
- Electricity: 31.400 MWh/a
- Motor fuel: 78.800 MWh/a

Realising the reduction potential, 15% of the total energy demand can be reduced.

The potential energy savings are shown in image 5.

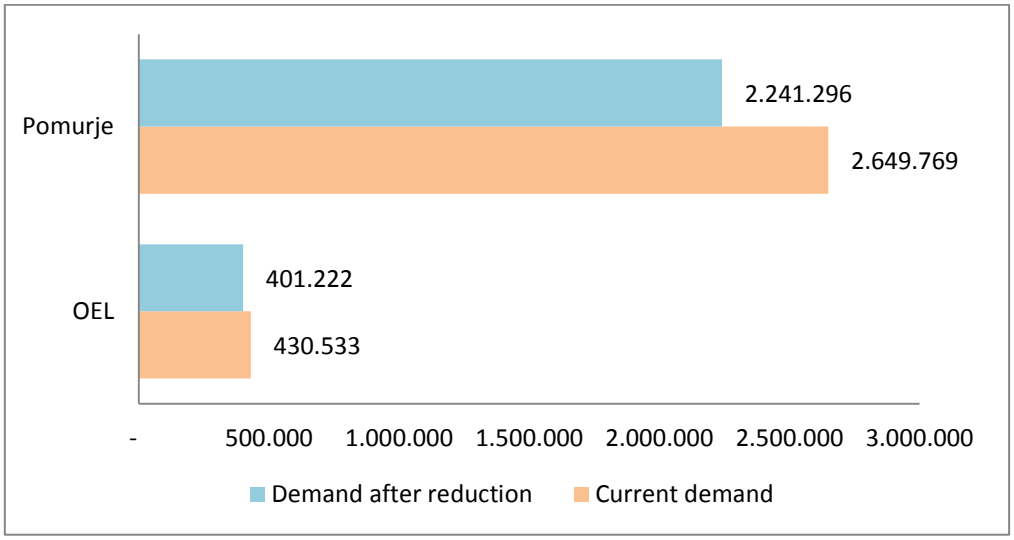

Image 5: Potential for energy demand reduction

3. STRUCTURE OF REGIONAL ENERGY PRODUCTION AND SUPPLY

3.1 ELECTRICITY PRODUCTION

3.1.1 ELECTRICITY PRODUCTION IN THE OEL

At present there are 5,4 MW_{el} installed and which these capacities the OEL is able to produce an average annual amount of 35.000 MWh of electric energy. This amount covers 36% of the current total electricity demand and more than 100% of the electricity demand of the households.

In case of a reduced demand 38% could be covered.

The additionally needed capacities for covering the current electricity demand of all demand sectors in the OEL is 6,9 MW_{el} (in case of biogas).

3.1.2 ELECTRICITY PRODUCTION IN THE POMURJE REGION

The installed capacities for electricity production are 33 MW_{el}. With this capacity about 99.500 MWh can be produced per year. These capacities are able to cover about 19% of the current total electricity demand and about 48% of the electricity demand of the households.

In case of a reduced demand 20% could be covered.

The additionally needed capacities to cover the current total electricity demand of all demand sectors in the Pomurje region are 42,9 MW_{el}. To cover the demand of the households, the installation of 28,1 MW_{el} is necessary. (In case of biogas)

3.2 DISTRICT HEAT

3.2.1 DISTRICT HEAT IN THE OEL

District heat is provided by 10 district heating plants, running on solid biomass and two of these facilities are CHP plants. Additionally, two biogas plants are feeding their rejected heat into district heating grids. The annual amount of produced heat is about 47.000 MWh. The total installed capacity of district heating is 19,45 MW.

3.2.2 DISTRICT HEAT IN THE POMURJE REGION

District heating is provided by 4 small district heating plants, 2 of them running on solid biomass and 2 running on geothermal energy. The annual amount of produced heat is 2.300 MWh, the total installed capacity is 1,89 MW.

3.3 BIOMASS SUPPLY

3.3.1 BIOMASS SUPPLY IN THE OEL

The current annual biomass production in the forests of the region is about 86.000 m³. This amount equals 380.700 MWh and is about the four fold of the demand for biomass for heat supply in the households. The current share of energy wood from this biomass yield is 56%, and thus is able to cover the demand, and, additionally leaving a surplus of more than 100% of the heat demand of the households.

3.3.2 BIOMASS SUPPLY IN THE POMURJE REGION

The current annual biomass production in the forests of the region is about 153.500 m³. This amount equals 475.700 MWh and is slightly more than the demand for biomass for heat supply in the households. The current share of energy wood from this biomass yield is about 40% of the harvest. Theoretically, the harvest covers the demand.

3.4 MOTOR FUEL SUPPLY

3.4.1 MOTOR FUEL SUPPLY IN THE OEL

There is currently no motor fuel production in the OEL.

3.4.2 MOTOR FUEL SUPPLY IN THE POMURJEREGION

There is currently no motor fuel production in the Pomurje. Until 2007 there was one facility for biodiesel production with output capacity of 1.800 tonnes of biodiesel annually. The facility was destroyed by fire in 2007.

4. COMPARISON OF THE TWO REGIONS BY KEY FIGURES

In order to create the CBEC, it is necessary to make the regions comparable in their energy demand and –supply, as well as in their current use and remaining potential of regional resources.

To achieve this comparability, key figures must be developed. In the present study, these key figures are units per capita (e.g. kWh/cap, ha/cap etc.)

The key figures are calculated from the values provided in the two individual energy concepts of the regions.

4.1 COMPARISON OF ENERGY DEMAND

4.1.1 ENERGY DEMAND OF HOUSEHOLDS

Table nr. 5 gives an overview of the energy related key-figures of households in both regions.

Structure of energy demand	Pomurje	OEL
Persons per household	2,65	2,68
Average heated living space (m²)	93,32	117,53
Living space per person (m²)	35,21	43,89
Heat demand per household (MWh/a)	**19,06**	**20,68**
Heat demand per person (MWh/a)	7,19	7,72
Heat demand per m² heated living space (kWh/m²)	204,23	175,98
Electricity demand per household (MWh/a)	**4,69**	**4,68**
Electricity demand per person (MWh/a)	1,77	1,75
Traffic fuel demand per household (MWh/a)	**16,91**	**12,23**
Traffic fuel demand per person (MWh/a)	6,38	4,57
Total final energy demand per household (MWh/a)	40,67	37,59
Total final energy demand per person (MWh/a)	15,34	14,04
Share of heat	47%	55%
Share of electricity	12%	12%
Share of traffic fuel	42%	33%

Table 5: Key figures for households in both regions

In general the situation is similar in both areas. Nevertheless the living space per person in Pomurje is significantly smaller and the specific energy demand of heated living objects is significantly higher. The difference in needed energy for heating per square meter of living space in one year is 28 kWh. This leads to significantly higher potential energy savings in Pomurje.

Of particular interest is also the demand for energy from heating oil per capita and year in households. It is 3,27 MWh in the Pomurje Region and 2,36 MWh in the OEL. This was also demonstrated in previous chapters, as there is a significantly higher share of heating oil in the household heating in Pomurje than in OEL. In OEL this gap is filled by heating with electricity and district heating.

The annual demand for energy from renewable sources per capita is 3,78 MWh in the Pomurje region and 4,91 MWh in the OEL.

A significant difference can also be observed in the mobility parameters. Namely the total fuel demand per capita is significantly higher in Pomurje.

4.1.2 ENERGY DEMAND OF MUNICIPALITIES

Key figure	Pomurje	OEL
Number of street lights	6.845	3.916
Street lights per capita	0,06	0,23
Electricity per street light (kWh/a)	919,50	274,94
Key figure heat (kWh/m²)	175,72	174,30
Key figure electricity (kWh/m²)	113,80	126,70
Heat demand per capita (kWh/a)	474,29	243,91
Electricity demand per capita (kWh/a)	359,62	109,34
Motor fuel demand per capita (kWh/a)	16,59	22,08

Table 6: Key figures for municipalities in both regions

Regarding street lighting, Pomurje has fewer lamps per capita, but the energy demand is more than the three-fold of the electricity demand in the OEL for street lighting. There are high saving potentials for Pomurje in this area.

The public transportation fuel demand in the OEL is exceeding the value for the Pomurje region by approximately 25%. Combined with findings from the previous chapter it seems that people in OEL use more public transportation whereas the population of Pomurje travels more individually.

4.1.3 ENERGY DEMAND IN INDUSTRY AND SERVICE

The key ratio of working places per inhabitant is 0,26 in the OEL and 0,31 in the Pomurje region.

The energy demand per working place is listed in table nr. 7.

Energy demand per working place in MWh/a	OEL	Pomurje
Heat	8,2	11,9
Electricity	4,4	6,5
Motor fuel	9,1	1,1
Total	**21,7**	**19,6**

Table 7: Key figures for industry and service in both regions

There are big differences between the values in both regions. Energy demand in the economy sector is depending on number, types and size of companies and therefore only a more detailed analysis of the structure of industry and service companies could give deeper insights.

Generally, the average total energy demand per working place is in Pomurje is affected by a 45% higher heat demand as in OEL. Similarly the electricity demand per working place is also more than 45% higher in Pomurje. On the other hand the motor fuel use per working place is considerably higher in OEL. This corresponds mainly to the different economy structure in both regions.

4.2 COMPARISON OF ENERGY PRODUCTION

Installed capacity per capita	OEL	Pomurje
Photovoltaic (kW_{el})	0,01	0,15
Biogas (kW_{el})	0,09	0,13
Solid biomass (kW_{el})	0,20	-
Hydropower (kW_{el})	0,01	-
District heat (kW_{th})	1,15	0,02

Table 8: Key figures for (electric) energy production in both regions

The Pomurje region is more advanced in the fields of Photovoltaic and Biogas, regarding the installed capacities per capita, but does not use solid biomass or hydropower for electricity production. On the other hand, the OEL has much more installed capacity in the field of biomass district heat. The overall production of electricity from renewable resources per capita in OEL is exceeding production in Pomurje by almost 60 times.

5. RESSOURCE POTENTIALS

5.1 CURRENT USE OF FORESTS FOR ENERGY PRODUCTION

5.1.1 CURRENT USE OF FORESTS IN THE OEL

The annual increment of wood biomass is currently 142.000 m³, about 123.000 m³ are harvested. The share of energy wood is 59 %, which equals about 225.000 MWh. The current biomass demand is about 221.000 MWh. Thus, the demand can be covered by the regional production and leaves a remaining potential for sustainable biomass supply of 72.000 MWh.

5.1.2 CURRENT USE OF FORESTS IN THE POMURJE REGION

The annual increment of wood biomass is currently 237.600 m³, about 154.300 m³ are harvested and the share of energy wood is 67 %. The energy wood harvested equals about 264.300 MWh. The current biomass demand is about 438.800 MWh which clarifies, that the demand cannot be covered by the regional production. This is important to take measures to efficiently use existing biomass potentials and to develop additional biomass sources in Pomurje.

In the sector of forests use we can observe large differences in both regions. OEL on one side can cover its needs in wood biomass in its own area and is sustainable self-sufficient in this sense. Pomurje on the other hand has a high own wood biomass demand for individual house heating which is significantly exceeding its own wood biomass potentials. Therefore it is advisable to efficiently use the biomass from forests in Pomurje region. This accounts to the whole forest biomass use chain. From efficient cutting of the forests where present trends show a long-term increase of forest biomass growth and increased planned cuttings due to insufficient cutting in the past/present to redirection of the biomass flow from Pomurje abroad. Namely a lot of biomass is currently exported in a low added value form (roundwood) abroad where its being used as firewood or as raw material for higher added value products (from pellets to furniture). And this involves activities for efficient use of firewood at the end consumer, where at present a lot of inefficient, old heating systems are used in not sufficiently insulated objects.

5.2 CURRENT USE OF AGRICULTURAL AREA FOR ENERGY PRODUCTION

5.2.1 CURRENT USE OF AGRICULTURAL AREA FOR ENERGY PRODUCTION IN THE OEL

Currently, there are 3 biogas plants producing energy. One runs completely on agricultural biomass, the other two plants run on animal manure and agricultural biomass. About 750 ha of agricultural land are used for biogas production, which equals 5% of the total agricultural land in the region.

5.2.2 CURRENT USE OF AGRICULTURAL AREA FOR ENERGY PRODUCTION IN THE POMURJE REGION

At present there are 10 biogas plants producing energy. The majority of them run on agricultural biomass and they need about 3.800 ha of agricultural land to cover their biomass demand. This is equal to 7% of the total agricultural land in the region.

There are fewer biogas plants in OEL, but more significantly, these are a lot smaller biogas plants (500kWel) than in Slovenia where individual biogas plants exceed overall biogas capacity in OEL. On the one hand this is the natural differentiation as the Slovene region is mainly covered by agricultural land on the other hand it is a consequence of relatively high feed in tariffs available for biogas plants in Slovenia.

At present efficient use of resources from this source is relatively low. This is of low importance for OEL which can cover its energy needs with other sources, but for Pomurje, as this is a very important potential energy source, it has to be treated with care (primary nutrient use and secondary energy use, use in compliance with existing regulation). The present awareness level on the potential of this source is low.

5.3 MINIMUM AREA DEMAND FOR FOOD PRODUCTION

For a theoretical estimation of biomass production from agricultural areas, the land demand for population nutrition needs to be excluded from the total potential of agricultural area. The remaining hectares could, theoretically be used for energy production. For nutrition are about 0,3 ha per capita required.

5.3.1 MINIMUM AREA DEMAND FOR FOOD PRODUCTION IN THE OEL

The minimum nutrition area for the OEL is 5.100 ha, which is about 33 % of the agricultural land.

5.3.2 MINIMUM AREA DEMAND FOR FOOD PRODUCTION IN THE POMURJE REGION

The minimum nutrition area for the Pomurje region is 36.000 ha. This is equal to 54% of the agricultural land.

Agricultural areas are an important and very major source of renewable energy in the cross-border region. Even more for Pomurje region where agricultural land covers half of the region. The potential for covering energy needs is very high and in a large proportion unexploited. The use of this source is also connected to use of reasonable proportions of land for energy use. Only 20% of the agricultural surfaces used for energy production or crop residues utilisation can represent significant contribution to local production of energy.

5.4 THEORETICAL PRODUCTION AREA FOR ENERGY CROPS

After the deduction of the necessary area for nutrition from the agricultural area, a theoretical potential for energy production is left. This area is 10.200 ha in the OEL and 30.500 ha in Pomurje.

Subtracting the area which is already in use for energy crop production, there are remaining 9.500 ha in the OEL and 26.700 ha in the Pomurje region.

According to experiences in the OEL, farmers are disposed to use about up to 20% of their farmland for energy crops. In case of the OEL this would be 3.100 ha and in case of the Pomurje region 13.300 ha.

5.5 RESSOURCE POTENTIALS FROM ORGANIC WASTE

Organic waste can also be regarded as a source for renewable energy. Depending on its composites and water contents it can be combusted directly or used in biogas plants.

The potential from organic waste is in the Pomurje region about 9.700 MWh/a, in the OEL it is about 1.400 MWh/a.

5.6 RESSOURCE POTENTIALS FROM AGRICULTURAL BY-PRODUCTS

The potential from agricultural by-products is regarding mainly straw from grain or maize production. They can be used as combustibles or as a substrate for biogas plants.

In the Pomurje region these resource potentials are at least 539.300 MWh/a, in the OEL they are at least 81.400 MWh, if used for biogas purposes.

5.7 RESSOURCE POTENTIALS FROM WIND POWER

There is no significant potential for wind power in both regions. On the basis of data currently available, the average annual wind speed in the cross-border region is not high enough to enable economic application of wind turbines. It would be advisable to analyse the potential of higher grounds in the region (areas as Jeruzalem, Radgonske gorice and Goričko have areas elevated more than 300m above sea level).

5.8 RESSOURCE POTENTIALS FROM HYDROPOWER

In the OEL the potential for hydropower is already fully tapped. In contrary, in the Pomurje region there is currently no use of hydropower, but the theoretical potential capacity of approximately 80 MW is high. It could provide 690.000 MWh of electricity per year.

The use of this source is connected to interventions in a delicate and protected Natura 2000 area. The exploitation of Mura River is therefore a topic of intense discussion between DEM (Dravske elektrarne, holder of concession for utilisation of the river) and local communities, environmentalists as well as civil society.

5.9 COMPARISON OF RESOURCE POTENTIALS

Structure of Potentials	Pomurje	OEL
General area per capita (ha)	1,11	2,33
Forest area per capita (ha)	0,33	1,02
Agricultural area per capita (ha)	0,43	0,72
Meadows and pasture land per capita (ha)	0,08	0,10
Generally usable area for agriculture per capita (ha)	0,48	0,84
Forestall energy production potential per capita (MWh/a)	1,72	4,33
Potential for short rotation coppices per capita (MWh/a)	1,16	4,33
Potential from agricultural by-products per capita (MWh/a)	4,50	4,78
Theoretical production area for energy crops per capita (ha/a)	0,22	0,56
Theoretical hydropower potential per capita (kW)	0,7	0

Table 9: Key figures for resource potentials in both regions

6. DISCUSSION OF KEY FIGURE COMPARISON

6.1 HOUSEHOLDS

Statistically, there are not many differences between the energy demands in the households of both regions. The observed differences are related to heated living space, the resulting heat demand per m² and energy demand for traffic. The average energy demand of the residential sector in Pomurje is slightly higher than in the OEL. Partially on behalf of higher specific heating needs and particularly, the demand for motor fuel in the households of the Pomurje region is noticeably higher than in the OEL.

6.2 MUNICIPALITIES

Heat demand in public buildings, regarding the demand per m² is not very different between the two regions. The per capita values for heat and electricity are very different and it can be said, that the per capita values in the Pomurje region are more or less the double of the values in the OEL. This means, that the specific space per inhabitant in the Pomurje region in municipal buildings is higher than in the OEL. But more importantly the heat and electricvity demand of municipal infrastructure in Pomurje region is significantly higher than in OEL. E.g. the heat demand of municipal infrastructure in Pomurje is almost twice as high as in OEL.

6.3 INDUSTRY AND SERVICES

The key figures regarding industry and services of both regions are hard to compare, because of the lack of a deeper analysis of the energy demand.

6.4 ENERGY PRODUCTION

In both regions electric energy is produced from renewable sources. The main focus in the OEL is on the production from solid biomass and biogas whereas the focus in the Pomurje region is on the production by photovoltaic and biogas. The present biomass plants are very developed and further extension in this sector could overstretch the available resources.

The role of district heat in Pomurje is currently not as big as in the OEL (especially regarding industrial processes), but there are big potentials to use the rejected heat of biogas plants for room heating or, even more for industrial.

The potentials of biomass fired district heating projects in Pomurje are vastly unexploited. There are only two wood fired district heating systems and there are no cogeneration systems based on wood biomass in this area. The situation is complex as on the one side there are very good boarder conditions in Slovenia (very high feed in tariff, low biomass price, undeveloped market) and a lot of the roundwood is exported. The present high use of heating oil in rural areas with no connection to natural gas pipelines and consequently high energy price also speaks in favour of new biomass fuelled district heating projects. On the other side there are high administrative barriers for new projects, the area is reluctant to foreign investments and local authority frequently lacks the political strength or consensus to implement such investments. The existing legislation, which involves a lot of administrative tasks and which bounds local authorities to any district heating project of considerable size (obligatory decrees and issuing of concessions) is in reality not helping.

6.5 RESSOURCE POTENTIALS

Both regions are still carrying resource potentials in the case of biomass. These resources are in both regions sufficient to replace the heating oil consumption in households by biomass. This holds for forest and for agricultural biomass sources.

The use of solar energy for electricity production is well developed in the Pomurje region, and is still carrying potentials, whereas the use of photovoltaic in OEL is still underdeveloped. Both regions use the potential of solar thermal applications is still on a very low level and a further use of solar heat can be enforced.

Also the Pomurje region has a big potential in the field of hydropower, if gentle and near-natural technologies are used which do not intervene drastically into precious natural areas.

7. SWOT ANALYSIS OF THE REGIONS

Strengths	Weaknesses
• Existing biomass resources for energy use and good conditions for the use of the sun-energy	• Relatively low research and development rate
• More than 50% of the energy is already coming from renewable energy sources in OEL	• Low consideration in the field of mobility as a major energy consumer
• Clear visions and aims regarding the use of renewable energy on national level	• Retrogression in agriculture
• Strong efforts on regional level to implement renewable energy	• Quite difficult and confusing funding systems
• Trade: RE-energy production, building service engineering, environmental technology, LED – light technology	• Low rate of biomass mobilization for energy purposes
• Cross-border energy projects and – concepts	• Dispersed settlements and negative demographic parameters
• Best practice projects in both regions	• Complicated administrative processes and low political consensus on large RES projects in Pomurje
• Strong will to promote further cooperative processes regarding renewable sources.	
Opportunities	**Threats**
• Expansion and promotion of the concept regions as best practice models	• regional perspectives of communities and districts are not always in line with general focus of the region
• Further development of the cross - border perspective	• Conflicts with nature conservation
• Development of the renewables in the line with nature and landscape: ‘‘with nature to new success‘‘	• Low investment rates in renewable energy by households
• The regions as lighthouse for similar cross-border renewable energy projects and projects of energy efficiency in Europe	• Price level of competitive fossil energy sources could be lowered in the forthcoming years
• New jobs , new technologies	• Unstable political border conditions could arise and threaten investments
• Consciousness change of mobility: E-mobility, gas cars	
• High saving potential: electricity consumption, Insulation of buildings, traffic improvement	

Table 10: Cross border SWOT analysis

8. CONCLUSIONS AND RECOMMENDATIONS

The two concept regions are very similar in the structure of residential energy demand. Regarding the energy demand of municipalities there are differences, indicating a big potential for energy efficiency management in both regions. The industry & services sector seem to be very different in structure. This assumption is suggested by the significant difference in the key figures for energy demand. Regarding regional resources both regions are also showing similarities, except the hydropower potential which is fully tapped in the OEL because of the lack of big rivers. The big potential in the Pomurje region could be harnessed by innovative nature-near technologies.

8.1 CROSS BORDER STRAGTEGY

Because of the similarities in both regions and their immediate vicinity, a joint strategy for inter-regional development, based on energy efficiency and the use of regional resources for energy supply is recommended. To enforce a cross border strategy a platform for the interaction of promoters, stakeholders and other actors needs to be created. Harmonization of the dimensions of energy demand and energy supply is suggested to be the core point of the cross border strategy. The measuring value for this effort should be the key figures of demand and supply, as calculated and presented in the previous chapters of this current concept. The harmonized strategy should lead to, in the best case same but at least similar, optimum key figures in energy demand, energy efficiency and energy supply in both cross border regions. In detail, the joint strategy has to bundle the following goals:

8.1 1 INFORMATION AND COOPERATION

On the decision-making side, it is necessary to create of a cross border platform for the main actors in responsibilities, information exchange and harmonisation of measures, as well as for the formulation of further goals in development. On the operative side the cross border platform needs to provide energy monitoring tools to find and analyse best practice examples (probably obligatory) on municipal level (public buildings, street lighting etc.) but also (on a voluntary base) for private households and industry.

Another focus of the information and cooperation level must be on the monitoring of implementation steps. This and the recommendations of the Whitebook will reveal existing barriers, which must be reduced during the prospective years of implementation.

8.1.2 ENERGY EFFICIENCY

Energy demand should be reduced by increasing energy efficiency and thus an increase of cost efficiency in municipalities. A rise of awareness for energy efficiency must occur in the population by communicating successful municipal efficiency projects to the inhabitants. The focus should be laid on cost reduction, disseminating information and energy efficiency on household level. Information must be passed across the border on best practice regarding energy efficiency.

8.1.3 ENERGY SUPPLY

Regional or local energy supply should be optimized by using, or preparing to use, up to now unused energy potentials, as for example „waste-heat“ of industry production processes or currently unused heat as by-product of electricity-generation. Energy production and energy supply should gain a higher impact on the regional added value. Plans to mobilize the big potentials of forestal and agricultural biomass have to be developed and implemented as well as plans to use organic waste from households, municipalities and industry for energy production. Mutual support and assistance in planning and construction of efficient energy supply facilities. There should be an enforcement of the use of solar thermal energy in households, municipalities and industry. The heating oil should be replaced by regional or local biomass, preferably in combination with solar heat.