SEBE – Sustainable and Innovative European Biogas Environment

Work Package 3: Legal Environment

Country: Slovenia

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS

%	Percent
A	year(s)
AD	Anaerobic digestion
CH_4	Methane
D	day(s)
RES	renewable energy sources
ReNEP	Resolution on National energy program/
CWWT	central wastewater treatmen
NUTS- 3	statistical regions
NUTS -2	cohesion regions
JEK	Nuclear plant Krsko
EU ETS	European Union Emissions Trading Scheme
TJ	Tera-joule
GDP	Gross domestic product
OVE	Renewable energy sources
QP	Qualified producers
CNG	Compressed natural gas
DDV	Value added tax
RET	Renewable Energy Technologies
CHP	Combined Heat and Power Generation or Co-generation
TPF	Third Party Financing
PPP	Public-Private Partnership
IPPC	International Plant Protection Convention

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Slovenia (officially the Republic of Slovenia) is an European country in the south part of the Central Europe and in the northest part of the Mediterranean. Slovenia has a population of 2 million and is divided into municipalities. It covers a surface of 20,273 km². Slovenia is one of the most diverse European countries. It lies on the junction of Alpine, Mediterranean and Pannonian landscapes. The natural conditions result in a high share of rural areas with large number of small settlements and specific land use. Forests cover about 60% of the entire Slovenian territory. The agricultural land is relatively scarce, especially arable land. More than 70% of agricultural land is located in regions with unfavourable conditions for agricultural production and is used mainly as permanent grasslands.

Slovenia has limited energy resources (mainly coal, lignite and hydroelectricity). Coal is of major importance in Slovenia both for heating and electricity generation. Slovenia has few indigenous resources of oil and gas. Therefore, it is highly dependent on energy imports, which amount for more than 50% of the total energy supply. In 2005 total consumption of natural gas in Slovenia was 1.1 million m³. Geoplin purchased this gas through long-term contracts form Russia (52%), Algeria (31%) and Austria (17%). Domestic production is negligible (0.3%). All Geoplin's gas sales are conducted under long-term supply contracts, most of which were renegotiated in 2007.
Total primary energy supply amounted to 90.11 TWh and an increase of +5.6% compared with 2007. Supply from domestic sources was higher by 6.3%. In the structure of TPES in 2008, dominates the share of petroleum products (37.2%), followed by nuclear energy (21.1%),solid fuels (19.7%) and gas (12.6%). The share of renewable energy from hydro power and NIO together amounted to 11.2%.

The Electricity production amounted 16,22 TWh in 2008. Most electricity in Slovenia is produced in nuclear power, while the dual ownership (half of Slovenia, half of Croatia), half the power belongs to Croatia. If this is taken into account, it is considered that in 2008 more than electricity produced from solid fuels (lignite and brown coal) 32%, followed by renewable energy sources 26%, nuclear 19,5%, and gaseous fuels 3%.

Renewable energy sources (RES) is an important source of primary energy in Slovenia. Increasing the share of RES in total energy consumption is one of the priorities of the energy and environmental policies. The RES are considered to be an important national strategic stock of energy; almost 50 % of primary energy has to be imported. Slovenia has a very good potential for RES use, because over 60 % of the country is covered with forests and because of high hydroelectric energy potential. According to the environmental indicators in Slovenia the consumption of RES is about 10 % of total energy consumption. The biggest share of RES represents woody biomass with 56,5%, then hydropower with 37 % and other RES with 6,5 % (geothermal, biogas, heating solar systems and PV). In 2007 the electric energy generated from RES was about 3,300 GWh or about 22 % of total electricity production. The share of RES in final energy consumption is around 15 % and it will have to be increased by another 10 % to meet the target of 25 % by 2020.

The share of electricity from renewable energy sources in Slovenia in 2008 was 26 %. The electricity generation from the renewable energy sources in Slovenia is highly depended of hydrology in the certain year. Still more than 90 % of electricity from the renewable energy sources is generated in hydro power plants.

In Slovenia there are currently 12 biogas plants (of which 5 are the result of Keter Organica development and knowledge) with a total power of 14.7 megawatts serving more than 40,000 households. According to analysis made by Agricultural Forestry Chamber, Slovenia has enough potential to make (in the most conservative scenario) 86 megawatts from biogas plants, and with the best scenario as much as 147 megawatts, without substantially interfering

with primary agricultural production. This would enable enough electricity to be supplied to more than 319,000 households. The largest agricultural potential for biogas production in Slovenia is the Pomurska and Podravska regions, followed by Central, Savinjska and Gorenjska regions. The lowest agricultural potential for biogas production is currently in Zasavje, Charintia and the Inner-Krast regions.

The main legal documents relevant for energy sector in Slovenia are: Energy Law, Action plan for renewable energy 2010-2020 (AN OVE), Resolution on National energy program /ReNEP/ (Gazette RS, Nu. 57/2004), (in preparation for the new) National action plan for energy efficiency for the period 2008-2016 /AN-URE/ and Operative program of decreasing greenhouse gas emissions till 2012 /OP-TGP/. ReNEP put out the preferential Slovenian energy policy goals, in accordance with strategic directives in the field of energetics in EU.

Because of the need to renovate National energy program (NEP), the Green book for NEO was prepared in 2009, with which the discussion on strategy of energetic development in Slovenia began and the preparation of new NEP, with a view till 2030.

1. INTRODUCTION

Slovenia (officially the Republic of Slovenia) is an European country in the south part of the Central Europe and in the northest part of the Mediterranean. The country borders Italy to the west, Austria to the north, Hungary to the southeast and Croatia to the east and south. The capital of Slovenia is Ljubljana. Slovenia has a population of 2 million and is divided into municipalities. It covers a surface of 20,273 km². It is located at the juncture of the Alpine, Mediterranean, Pannonian and Dinaric world. The Slovenian coast of the Adriatic Sea is 46.6 km long.
Slovenia has only few energy resources: sub-bituminous coal and lignite, and hydroelectricity are its only resources. There are brown coal resources in the country, which account for 95 percent of coal consumption. It is expected that the present level of domestic coal extraction will be maintained over the coming years. Coal is of major importance to Slovenia both for heating and electricity generation. Slovenia is also moving towards the use of gas.The gas distribution system is expanding rapidly, and Slovenia is in a good position to benefit of oil and gas and is therefore highly dependant on energy imports. Imports of these fuels make up over half of the total primary energy supply.
Because of the high percentage of forest areas there is a big potential to develop woody biomass as a renewable source of energy. Current forest cutting does not reach half the estimated annual increment leaving this energy resource largely unexploited.
Renewable energy sources (RES) is an important source of primary energy in Slovenia. Increasing the share of RES in total energy consumption is one of the priorities of the energy and environmental policies. The RES are considered to be an important national strategic stock of energy; almost 70 % of primary energy has to be imported. Slovenia has a very good potential for RES use, because over 60 % of the country is covered with forests and because of high hydroelectric energy potential. According to the environmental indicators in Slovenia the consumption of RES is about 10 % of total energy consumption. The biggest share of RES represents woody biomass with 56.5%, then hydropower with 37 % and other RES with 6.5 % (geothermal, biogas, heating solar systems and PV). In 2007 the electric energy generated from RES was about 3.300 GWh or about 22 % of total electricity production. The share of RES in final energy consumption is around 15 % and it will have to be increased by another 10 % to meet the target of 25 % by 2020. Hydropower is the most important RES in Slovenia and in 2007 it generated 96.7 % of all electric energy produced from RES. Production is divided between small hydropower plants that have up to 10 MW of installed power and large hydropower plants with installed power above 10 MW. The potential is Wind energy in Slovenia there are no large wind power plants. The installed electric power of small wind power

plants in 2008 was only 24.4 kW. They are mostly used to power remote areas that have no other sources of energy.
The largest part of the solar energy in Slovenia comes from hot water solar systems.
Production of electric energy from the sun in 2007 was 0.7 GWh that is 0.02 % of all electric energy produced from RES. In 2008 production of electric energy from PV increased by 150 % and rose to 1.5 GWh.

The potential of solid biomass is high, with over 57 % of land covered with forests. Biomass has recently started to penetrate the market. In electricity production it has the second biggest market shares of all RES after the use of hydro-energy. Use of biomass represents the market for the agriculture and forestry sector, new jobs and decrease in demography problems. The proper development is even more important for agriculture than for the energy. The traditional use of wood in households and wood residues in furniture industry represent the second most important share among RE in Slovenia. On the other hand the modern use of biomass in small individual and bigger boilers for district heating systems gives one of the best potential amongst all RES. Biomass produced heat is the main category of RE. Its growth rate exceeds that of solar thermal heat and geothermal heat. Biomass on-line trading portal Borzen is available from April 2004 and its goal is to contribute to a better and clearer overview of the biomass market. It is freely accessible and is aimed for companies and individuals working in this market, as well as the general public.

Biogas production started in Slovenia at the end of 1980th. First two biogas plants were for the anaerobic digestion on municipal plants – central wastewater treatment and big pig farm. Energy utilization of biogas from the anaerobic digestion sewage, manure or agricultural wastes and landfill gas is present in Slovenia, but it has at this moment a negligible impact on energy balance, while the important impact is the reduction of emission of greenhouse gases.
Use of biogas from central wastewater treatment (CWWT) is necessary, especially from the aspect of reducing methane emission. Energy of biogas covers partly the energy need of the wastewater treatment. The energy produced is used in the plant for heating the fermentors (digesters) and partly covers the electricity needs. In Slovenia exist eight central wastewater treatments (CWWT) installed systems for biogas production, but only four of them use biogas for production of heat and electricity (CHP). In others, the biogas is burned on torches. Total installed electricity power on sewage gas is less than 1 MW. estimated at about 9,000 GWh per year.At the moment there are no geothermal power plants in Slovenia. The geothermal energy in Slovenia is usually used for heating purposes. Geothermal heating is used in 29 locations with common installed heating power of 64 MW.
The biofuel production in Slovenia began in 2005 and reached 0.1 GWh in that year. The use of biofuels is not in line with the objectives set at the moment. The only biofuel in Slovenia is biodiesel. It was mainly sold as a biodiesel-diesel mixture, with less than 5 % being used as a pure biofuel, predominantly in the Ljubljana city buses (Civitas Mobilis project). The amount of biodiesel sold in 2005 represented 0.35 % of the energy value of the fuels sold. The target value for the said year, which was considered a test year, stood at 0.65 %, whereas the Decree on the Promotion of Use of Biofuels (2006) has envisaged a share of not less than 1.2 % already for 2006. The meeting of target values in Slovenia will be aggravated in particular by insufficient agricultural production areas. Production of the pure plant oil reached 8,000 t in 2007 and with the new plants planned should reach up to 50,000 t. /1/ /2/ /3/

2. COUNTRY OVERVIEW

2.1. Basic Information

Overview of the country

Slovenia (officially the Republic of Slovenia) is European country in the south part of the Central Europe and in the northest part of the Mediterranean. The country borders Italy to the west, Austria to the north, Hungary to the southeast and Croatia to the east and south. The capital of Slovenia is Ljubljana. Slovenia has a population of 2 million and is divided into municipalities. It covers a surface of 20,273 km². The population amounts over 2 million people. The largest city is Ljubljana, which is the capital of Slovenia. For the basic information, see Table 2-1.

Table 2-1: Basic country information /4/ /5/

Inhabitants	2,032,362
Total surface	20,273,00 km²
Density of population	99.1 inh. per km²
Capital (Inhabitants)	Ljubljana (261,700,00)
Largest cities	Ljubljana (261,700), Maribor (108,600), Celje (38,400), Kranj (39,400)
Currency	Euro
Languages	Slovene, in some nationally mixed areas also Italian and Hungarian

Around 40% of Slovenia's land mass is elevated land – mostly in the form of mountains and plateaus – which is located in the interior regions of the country. The highest point of Slovenia is the 2,864 metres (9,396 ft) high Mount Triglav, and the lowest point is the Adriatic Sea at 0 metres. Slovenia's largest lake is Lake Cerknišco, which covers 24 square kilometers (9.3 square miles) and, as a karst lake, fills and drains periodically. Slovenia also has seventy-eight mineral and thermal springs, mostly situated in the Pannonian Plain. The longest river in Slovenia is Sava **(**219 km). The majority of the population speaks Slovenian which is also the country's official language. Other official languages used locally are Hungarian and Italian.

Figure 2-1: Country map Slovenia with administrative regions /4/ /5/

Climate

The territory of Slovenia is geographically divided into four basic types of landscape - Alpine in the north, (42.1%), Mediterranean in the south-west (8.6%), Dinaric in the south (28.1%), and Pannonian in the east (21.2%). There are three different types of climate in Slovenia: continental in the central part, Alpine in the north-west and sub-Mediterranean along the coast and its hinterland.In 2009, in Slovenia the average yearly air temperature was 9.8 °C, -2.2°C in January and 19.4 °C in July. Spatial sorting of average yearly temperature is related to Slovenia's relief. The warmest is at the coast, in Vipava Valley and in Brda, where the average yearly temperature exceeds 12 °C. Warmer (10-12 °C) is also in the remaining Primorska region and in the lowlands of East Slovenia, while in the lower districts of Central Slovenia the average yearly temperature is between 8 and 10 °C. The coldest is in the mountains, where on the highest peaks the average yearly temperature doesn't exceed 0°C in December, the least in May and September. In Slovenia the highest average annual air temperature in 2009 was registered in Portorož (14.1°C) and lowest at Kredarica (-0.8°C), which is also the only meteorological station where the average annual air temperature was below 0°C. Average air temperatures in January were in 2009 higher than the freezing point only in Portorož, Bilje and Slap pri Vipavi. In the rest of Slovenia these temperatures were below 0°C, the lowest, of course, at Kredarica (-7.6°C).The lowest average air temperature in July was recorded at Kredarica (7.7°C) and the highest in Portorož (23.3°C).

In 2009 the joint annual rainfall in Slovenia was 1,552 mm, 125 mm in January and 135 mm in July. The quantity of rainfall in Slovenia largely differs also from month to month. In Bovec, 20% of rainfall occurred in December. Changes in ground cover of Slovenia in the period 1993 – 2005 are showing the increase of wooden areas and decrease of rural areas. This kind of spatial sorting of rainfall is a consequence of the fact, that in Slovenia most of the rainfall occurs at weather situations. The biggest increase of wooden areas occurred in Coastal-Karst statistical region (for 40.7 %) and the smallest in the Carinthia statistical region (for 3.9 %). The biggest decrease in rural areas occurred in Goriska statistical region (for 51.0 %), and the smallest in Pomurska statistical region (for 9.2 %).Country is mostly elevated.

There are many woods and forests in Slovenia that cover more then half the territory, as much as 10,124 km2. Slovenia is homeland to more than 50,000 animal species and 3,000 plant species. Slovenia has 46.6 km of coastline- one inch per inhabitant, 26,000 kilometres of rivers and streams and some 7,500 springs of drinking water, including several hundred of first class therapeutic mineral springs. Approximately 8% of the Slovenia's territory is protected nature area. The caves of Škocjan were inscribed on the world heritage List at UNESCO in 1986 and the Sečovlje Soline (Sečovlje saltpans) is included in the List of Wetlands of International Importance. /4/ /5/

Demography and population

In 2010, Slovenia had an overall population of about 2,046,976 with 95 inhabitants per km², Slovenia ranks low among the European countries (compare with 320/km² for the Netherlands or 195/km² for Italy) The average age is 40.4 years: 14% under 15 years old; 70.2% between 15 and 64; 5.7% 65.

At the beginning of this year, every twenty-fifth resident of Slovenia was a foreigner. The population growth slowed somewhat in the second half of 2009. The increase in the number of foreigners was 70% lower than in the first half of 2009, while the increase in the number of citizens of Slovenia was nearly twice that of the first half of 2009. At the level of Slovenia the ageing index decreased by 0.3 of an index point and reached 117.7 at the beginning of 2010. On average the population of municipality Kostel was the oldest (48.7 years) and the population of municipality Gorenja vas - Poljane the youngest (36.9 years). The majority of the population was ethnically Slovene, a Slavic group. The official language is Slovene (91.1%), which is a member of the South Slavic language group. Serbo-Croatian 4.5% and other or unspecified 4.4%. Hungarian and Italian enjoy the status of official languages in the ethnically mixed regions along the Hungarian and Italian borders. According to the 2002 census the most of population (58%) are Catholics. Together there are 43 religious communities registered in Slovenia. Among the oldest is the Evangelical Church, most widely spread in the northeastern part of Slovenia.

Approximately 50% of the total population lives in urban areas, the rest in rural. The Notranjska-Kras statistical region has the lowest population density while the Central Slovenia has the highest. Approximately 51% of the population lives in urban areas and 49% in rural areas.Life expectancy in 2003 was 72.2 years for men and 80 years for women.

The educational structure of Slovenia is bettering, which positively affects the economic growth. The average studying period is getting longer and also the share of population with tertiary education is getting bigger. The data show the education structure of the population on the basis of highest achieved education between the age of 15 and 75 for 2009. The share of population without education is 4.2%, 21% with elementary school education, 24.3% with lower vocational education or secondary vocational education, 32.2% with professional high school or high school education and 18.1% with post-secondary or higher education. The data are captured from Statistical yearbook, which is collected by the Statistical office of the Republic of Slovenia.

The share of active people in the agricultural sector is 9.2% in 2009, according to data of Macroeconomic analyses office of the Republic of Slovenia.In 2007, the highest share of family farms dealing with other gainful activities was recorded in the Obalno-kraška (6.5%) and the lowest in the Spodnjeposavska region (1.0%). In 2007, the share of persons on family farms with agriculture as only or principal activity was the highest in the Koroška region (26.4%) and the lowest in the Obalna-kraška region (9.3%).

Most of the Slovenian municipalities and underpopulated (71%), while only Ljubljana and Maribor belong to the group of highly populated municipalities (1%). Other 54 municipalities belong to intermediate areas. Some intermediate areas are connected to the biggest urban cen-

ters, Ljubljana and Maribor, but mostly intermediate areas are isolated spatial units. Beside the Celje and Koper municipality, also a few other smaller municipalities belong to this category. They fulfill both measures for placing into intermediate areas: the measure of density over 100 inhab./ km^2 and the measure of position in the series of municipalities, for which the joint number is over 50 000 inhabitants.The sorting of municipalities according to the level of urbanisation is based on the people, household and housing census 2002 data, which is collected by Statistical office of the Republic of Slovenia. /6/

2.1.1. Politics and Administration

Very short overview about history of the country

Slovenia is a young country by global standards, having been independent since 1991. The ancestors of the Slovenes were Slavs who migrated from the Carpathians to the present-day territory in the 6th century, before a hundred years later founding the oldest known Slavic state, Carantania, although this did not last long. Until the 20th century Slovenia was under foreign rule, mostly by the Habsburg monarchy of Austro-Hungary. During this time the Slovenes emerged as a nation and forged their own identity, despite oppression and sustained pressure to assimilate. Slovenia became part of the Kingdom of Yugoslavia after the First World War, then part of the Socialist Federal Republic of Yugoslavia after the Second World War. After more than 70 years of living in Yugoslavia, the Slovenes built a consensus to strike out an independent path, almost 90% of the population voting for independence in the 1990 referendum. Slovenia joined the EU in 2004, and also became a member of Nato.The area that is present-day Slovenia had a rich and varied history even before being settled by Slavs. Here are the major historical developments, from prehistory to the present. /7/

Political system

The Republic of Slovenia is a parliamentary representative democratic republic since 25 June 1991. The present Constitution of the Republic of Slovenia was adopted on 23 December 1991, following the results of the plebiscite on the sovereignty and independence of Slovenia on 23 December 1990, when Slovenes overwhelmingly voted for independence. Under the Constitution, Slovenia is a democratic republic and a social state governed by law. The state's authority is based on the principle of the separation of egislative, executive and judicial powers, with a parliamentary system of government. The highest legislative authority is the National Assembly (90 deputies), which has the right to enact laws. Elections to the National Assembly are held every four years. The President of the Republic is the head of state and the Commander-in-Chief of the Armed Forces. He is directly elected for a maximum of two consecutive five-year terms. The President calls elections for the National Assembly, proclaims laws adopted by the National Assembly, proclaims documents of ratification for international treaties, and performs other duties defined by the Constitution.

The Prime Minister is elected by the National Assembly, at the proposal of the President of the Republic. Cabinet ministers are also elected by the National Assembly, at the proposal of the Prime Minister. The government is composed of 15 ministers plus one minister without portfolio. The Council of Ministers as a whole and each cabinet minister are accountable to the National Assembly. The government proposes laws, general acts, regulations and state policies to the National Assembly for all socio-economic and political areas, and supervises state administration through ministers. /8/ /9/

Regions and administration system

Slovenia is divided into 12 statistical regions . These regions have no administrative meaning and therefore no flags, though at least some of them may match historical regions. These 12 statistical regions (NUTS-3 level), are grouped in two cohesion regions (NUTS-2 level) The government, however, is preparing a plan for new administrative regions. The two cohesion regions are:

- East Slovenia , Pomurska, Podravska, Koroška,Savinjska, Zasavska, Spodnjeposavska, Jugovzhodna Slovenija

- West Slovenia, Osrednjeslovenska, Gorenjska, Goriška, Obalno-kraška.

The constitutional changes of June 2006 introduced provinces to the Constitution of the Republic of Slovenia. The provinces' tasks will include economic, social and cultural development, spatial development and environmental protection, traffic and transport links within the province, and providing public utilities of provincial significance. The government, however, is preparing a plan for new administrative regions. The Local Self-Government Act stipulates that a municipality is the basic self-governing local community, with at least 5,000 inhabitants; an urban municipality has at least 20,000 inhabitants. The National Assembly decides on the boundary of a municipality on the basis of a non-binding referendum of the inhabitants, usually acting in accordance with the outcome. There are now 210 municipalities in Slovenia. Among other things, municipalities have the authority to manage the municipality`s assets, facilitate conditions for economic development, plan spatial development. The authorities of a municipality comprise a mayor, a municipal council and a supervisory committee, with the municipal council being the highest decision-making body. The mayor, who is a directly elected official, represents and acts on behalf of the municipality, and presides over the municipal or town council. The supervisory committee supervises the disposal of municipal property and public expenditure. /4/ /6/ /10/

3. ENERGY SECTOR

3.1. Energy Framework

Energy resources

Slovenia has only few energy resources: sub-bituminous coal and lignite, and hydroelectricity are its only resources.There are brown coal resources in the country, which account for 95 percent of coal consumption. It is expected that the present level of domestic coal extraction will be maintained over the coming years. Coal is of major importance to Slovenia both for heating and electricity generation. Slovenia is also moving towards the use of gas. The gas distribution system is expanding rapidly, and Slovenia is in a good position to benefit from being a transit country for various gas pipelines.

Oil
Slovenia is heavily depending on imports of oil or oil products respectively. The country's only refinery (Lendava) ceased its activity in October 2000 (operational capacity of 12 000 bl/d).

Gas

The geographical situation of Slovenia enables the country to have a gas network connected to the most important international networks, coming from Russia and since 1992 from Algeria. In 2008 Slovenia imported 1.1 Gm3 of natural gas (50 % from Russia, 30% from Algeria, 14 % from Austria and 6 % from Italy).

Coal
There are brown coal resources in the country, which account for 95% of coal consumption.Two sub bituminous coal and brown-coal mines of a total capacity of 5 Mt/ are in operation. Coal is of major importance to Slovenia both for heating and electricity generation.
Lignite, as a domestic source of energy, significantly reduces the risks at supplying energy at extraordinary economic and political circumstances.

Nuclear energy:
In 1984, the first nuclear plant started operating in Slovenia – Nuclear plant Krsko (JEK). Since then nuclear energy presents an important source of electric energy, because it contributes a significant share at fulfilling needs for electric energy in the country (in 2007 the Slovenian share of plant was 26 %). In three years, the nuclear energy has significantly contributed to ensuring reliable and quality supply, to economics of electric energy production and to lowering greenhouse gas emissions in Slovenia. Professional-technical studies show that at JEK there are no limitations on principle for extending the life expectancy even after 40 years of operating with the same or even higher level of safety and with comparable operational indicators with a condition, that appropriate program for aging control is set and executed. A project for the construction of new nuclear plant by the existing JEK is in preparation. The facility was under consideration also in the framework of scenarios of Long-term energy balance of Slovenia 2006-2026 studies as a variant for covering electric energy consumption in Slovenia.

Renewable energy sources
The country's generation capacity of RES totaled 825 MWe, virtually all from Hydro. The argest contribution comes from the hydro power plants (large hydro power plants have more than 10 MW of installed power and produce 24.8% of energy in Slovenia, small hydro power plants have 10 MW or less installed power and produce 4.3% of energy in Slovenia) and biomass (wood and wood residues). With a share of 9.2% Slovenia has the fifth highest share of renewables in the primary energy balance. The average in the EU is 6%. The renewables contribute to the electricity production with a share of 30.6% placing Slovenia in the fourth place; the EU average is 13.9%. /2/ /11/ /12/

Total primary energy supply

Total primary energy supply (TPES) in 2008 amounted to 324.4 PJ which is and equivalent of 90,11 TWh and an increase of +5.6% compared with 2007. Supply from domestic sources was higher by 6.3%. Following the trend of decreasing energy dependence in the period 2003-2006, the energy dependence of Slovenia in the last two years and increases again in 2008 reached 55.3%. In the structure of TPES in 2008, dominates the share of petroleum products (37.2%), followed by nuclear energy (21.1%),solid fuels (19.7%) and gas (12.6%). The share of renewable energy from hydro power and NIO together amounted to 11.2%.Total primary energy supply is presented in table 3-1 and Figure 3-1. /13/

Table 3-1: Structure of TPES 2008 /13/

Fuel	Structure of TPES TWh

Hard coal	17,78
Cruide coal	(data not available)
Petroleum products	33,53
Natural gas	11,36
Nuclear	19,00
Hydro	4,03
* Other renewables	6,06
Electricity (Import-Export)	-1,61
Total	90,11

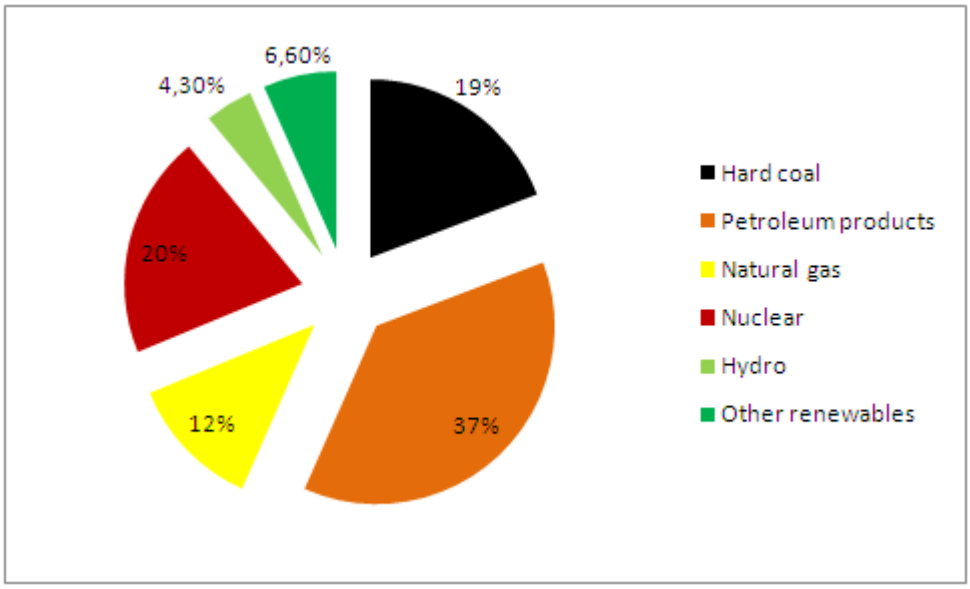

Figure 3-1: Structure of TPES in Slovenia in 2008 /13/

Electricity production

Electricity production amounted 16,22 TWh in 2008. Most electricity in Slovenia is produced in nuclear power, while the dual ownership (half of Slovenia, half of Croatia), half the power belongs to Croatia. If this is taken into account, it is considered that in 2008 more than electricity produced from solid fuels (lignite and brown coal) 33%, followed by renewable energy sources 26%, nuclear 19 %, and gaseous fuels 2,4% (see table 3-2 and Figure 3-2). /14/

Table 3-2: Electricity generation in 2008 /14/

Fuel	*Electricity production, TWh*
Hard coal	5,3 TWh
Cruide oil	0,02 TWh
Natural gas	0,4 TWh
Nuclear	6,2 TWh
Other renewables*	4,3TWh
Total	16,22 TWh

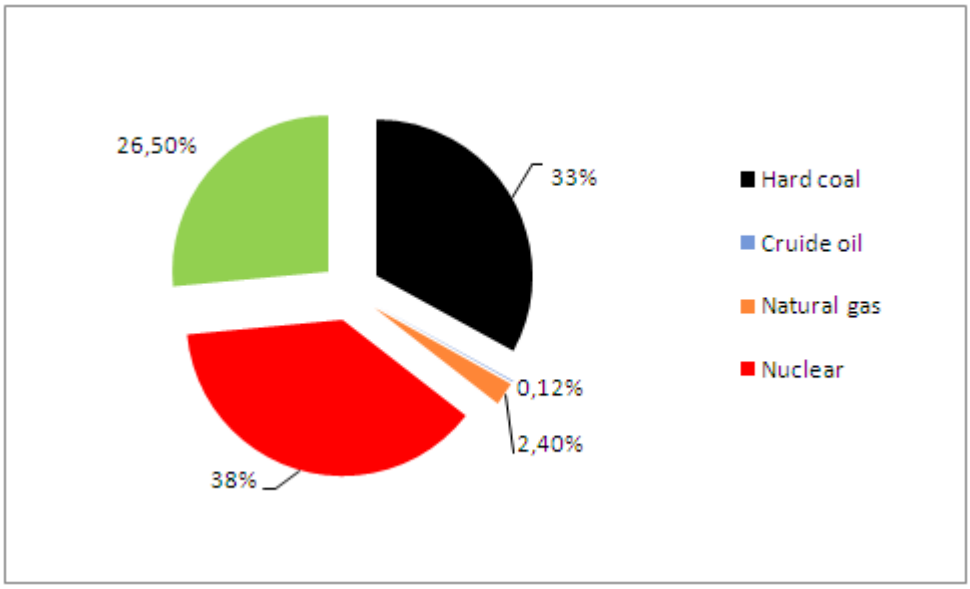

Figure 3-2: Structure of electricity generation in Slovenia in 2008 /14/

Destrict Heating

In Slovenia the distribution of heat is defined as a local optional public service, including the supply of heat or cold from the distribution networks, and the distribution system operato.r In the structure of used primary energy sources for the heat production, coal had a 61-percent share, natural gas had a 30.7 -percent share and heating oil had a 1.7 -percent share. Wood biomass and other primary renewable sources of energy had a 6.6-percent share in the structure of the energy sources.

For the purpose of heat supply, in 2008 licensed producers of heat for district heating and for the supply to industry, with the facilities' installed power of above 1 MW, produced 3082.8 GWh of heat and 816.5 GWh of electricity, or 609.72 GWh of electricity at the busbars of the cogeneration processes.

The largest share of heat – 1103.3 GWh, or 33.8 percent – was used for the supply to 115,685 household customers, while 1012 GWh or 32.8 percent of heat was used for the supply to industrial and other non-household customers. The difference between the produced and distributed heat, 0.646 GWh or 20.9 percent of the heat, was used for the producers' or distributors' industrial processes. Heat losses incurred during the distribution amounted to 14.8 percent of all the heat delivered to the distribution networks. Non-households, i.e., industrial customers, used 222.9 GWh or 9.5 percent of all the heat in the form of industrial steam. /15/

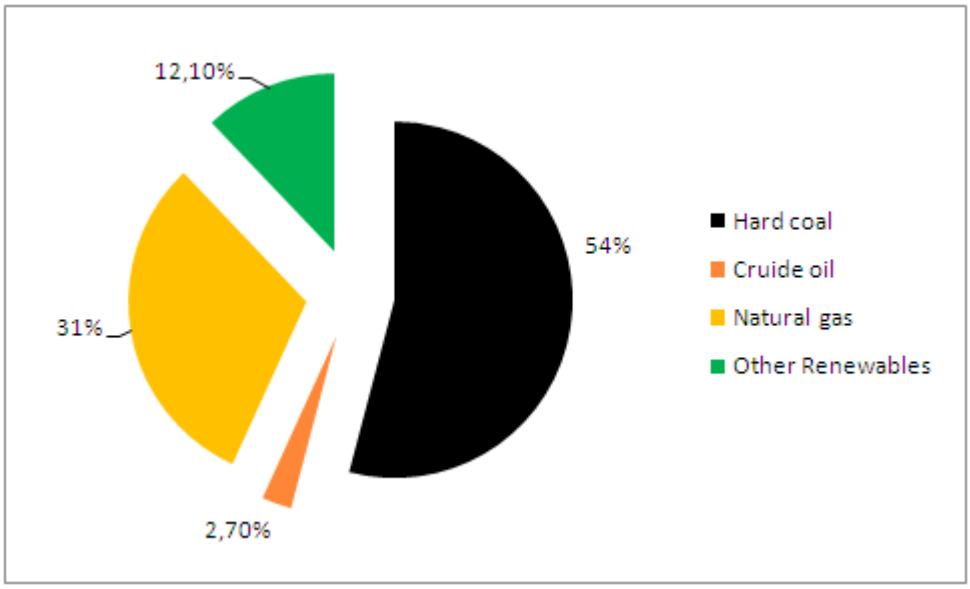

Figure 3-3: Structure of destrict heating in Slovenia in 2008 /15/

Imports or exports electricity

Table 3-3: Production, import and export of electricity, Slovenia, 2005-2009

	2005	2006	2007	2008	2009
	GWh				
Gross production-total	15,117	15,115	15,043	16,398	16,397
Import	7,234	7,071	6,140	6,218	6,156
Export	7,558	7,020	5,911	7,820	9,222

Source: SORS

Due to the reduced import of energy commodities in 2009, the energy dependency of Slovenia decreased to 51%.
Import of petroleum products lower than in the previous year According to provisional data of energy statistics, in 2009 compared to the previous year the imports of petroleum products significantly decreased, by as much as 15%. Thus, the estimated consumption of motor gasoline is lower by more than 8% and of diesel by as much as 16%.
Export of electricity greater than in the previous year A strong increase in electricity exports, which amounted to 9,222 GWh, was recorded; this is 18% more than in 2008.
Compared to the previous year the energy dependency of Slovenia decreasedAll this helped reduce the energy dependency of Slovenia to 51%, which is more than 4 percentage points less than in 2008.
Production of electricity the same as in the previous year In 2009 the gross production of electricity was 16,397 GWh. Most electricity was produced in thermal power plants (5,945 GWh), followed by the nuclear power plant (5,739 GWh) and hydro power plants (4,713 GWh). /6/

Kyoto protocol

ZN frame convention on climate changes has been valid in Slovenia since 29.2.1996. Kjoto protocol was ratified in Slovenia on 10.7.2002 and became valid on 16.2.2005. In accordance with it Slovenia has obligations to reduce emissions of greenhouse gases in the period 2008 – 2012 for 8 percent with regard to year 1986. Besides that Slovenia as an EU member state has to contribute its share also to realizing the set goals of EU in the field of climate changes.
Slovenia, as all EU member states, at this point does not yet fulfill the accepted obligations and goals in three key areas;

- emissions,
- renewable energy sources,
- effective use of energy.

For Slovenia, it is foreseen to reduce 1. greenhouse gas emissions for about 6 percent till 2020 regarding the emissions in 2005 by: reducing emissions from sectors for 21 percent, that are included in European trading scheme with emission rights (EU ETS sectors and for the maximum of 4 percent increases the emissions from sectors, that are not included in European trading scheme with emission rights (non ETS sectors), regarding emissions from this sectors in 2005.

Slovenia has to increase the 2. use of renewable energy sources till 2020 from current 16 percent of final energy to 25 percent of final energy in 2020. In the legislative package proposal the way of choosing renewable sources is left to member state, that's why Slovenia is going to endeavour to exploit the available energetic potential of rivers in the maximum extent possible (especially middle and lower Sava and small hydroelectric stations on lowland watercourses, like for example Savinja) and stimulate the use of forest biomass in the way that the used energetic potential of biomass will at least double till 2020. Regarding that 60 percent of country is covered with forests, it is in this renewable energy source where the great potential is hidden. Essentially Slovenia has to decrease the use of final energy, otherwise the goal regarding renewable energy sources will digress.

With bigger 3. energy efficiency the easiest is to lower greenhouse gas emissions and improve the durability and reliability of energy supply. It stimulates the economic development, creates now jobs and lowers costs of households and companies. The most important is the energetically economical construction. Second is road traffic (26 percent of European needs for energy). Production is also under microscope of EU (25 percent of European needs for energy). EU studied the energy efficiency of products and decided to initiate environmental standards for certain products. In the field of effective use of energy Slovenia is going to endavour for the smallest possible expenses at fulfilling the demands of energy-climate package, that's why it is going to put the effective use of energy measures into forefront, supported with financial stimulations. /16/

3.2. Renewable Energy

Slovenia has a very good potential for RES use, because over 60 % of the country is covered with forests and because of high hydroelectric energy potential.
According to the environmental indicators in Slovenia the consumption of RES is about 10 % of total energy consumption. The biggest share of RES represents woody biomass with 56.5%, then hydropower with 37 % and other RES with 6.5 % (geothermal, biogas, heating solar systems and PV).

The share of electricity from renewable energy sources in Slovenia in 2008 was 26 %. The electricity generation from the renewable energy sources in Slovenia is highly depended of hydrology in the certain year. Still more than 90 % of electricity from the renewable energy

sources is generated in hydro power plants. The use of landfill gas and biogas for energy purposes is still increasing slowly.
In 2008, the total energy supply from renewables energy resources amounted to 10.02 TWh. The structure of energy production from RES in presented in Figure 3-4. The biggest share of RES represents woody biomass with 53%, then hydropower with 40% and other RES with 8,4 % . /17/ /18/

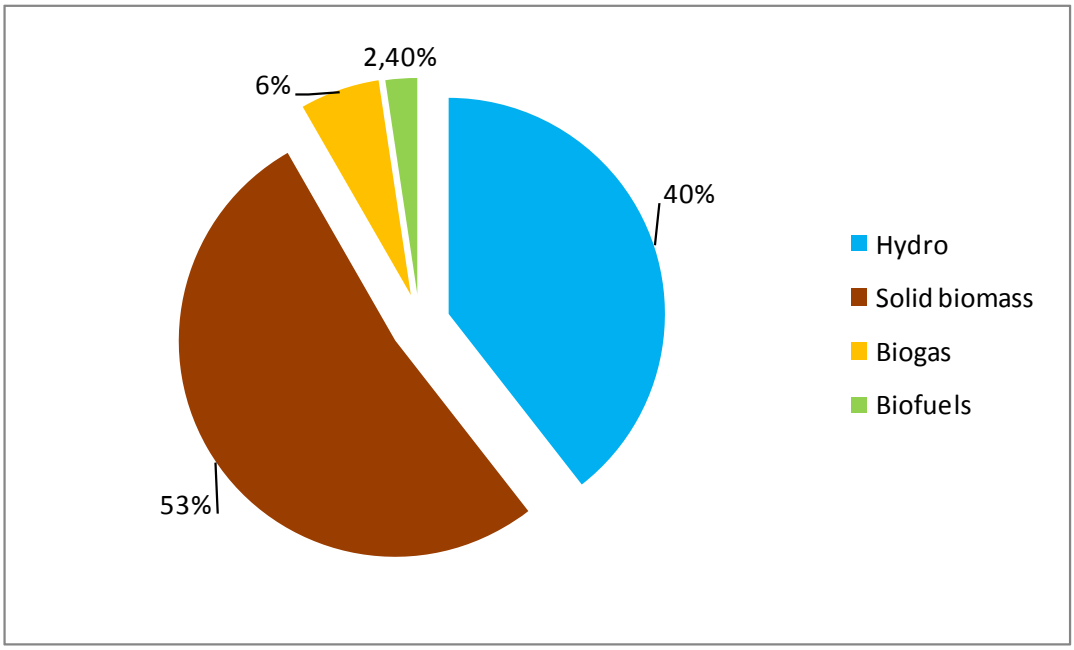

Figure 3-4: Structure of renewable energy production in Slovenia in 2008 /17/ /18/

Electricity production from RES
Electricity production from RES in 2008 amounted to 4,3TWh. The biggest share of RES represents hydropower plants with 93,3% or 3,9TWh, then wood and other solid biomass with 5% or 0,2 TWh and other RES (landfill and sewage treatment gas) with 1,3% or 0,056 TWh . The structure of energy production from RES in presented in Figure 3-5. /35/

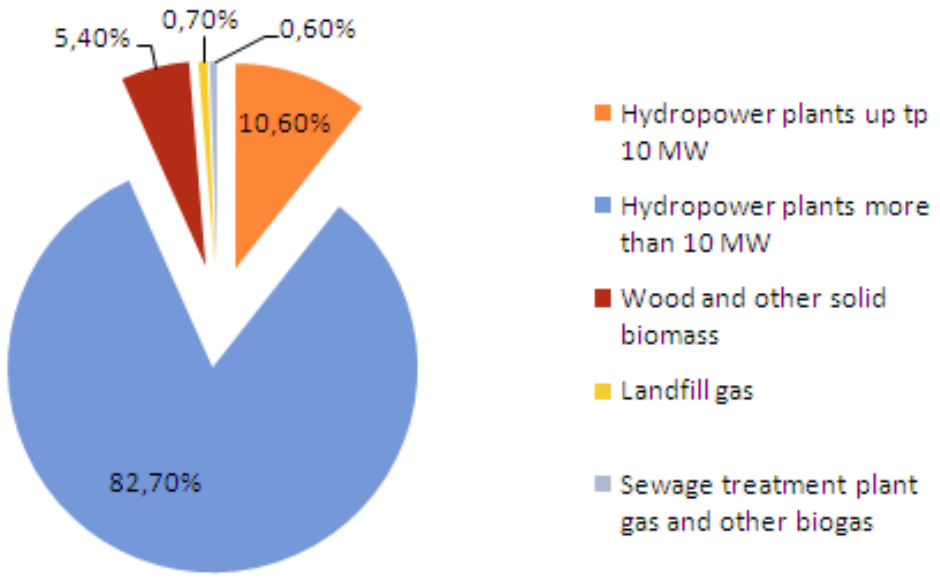

Figure 3-5: Structure of electricity production from RES in Slovenia in 2008 /35/

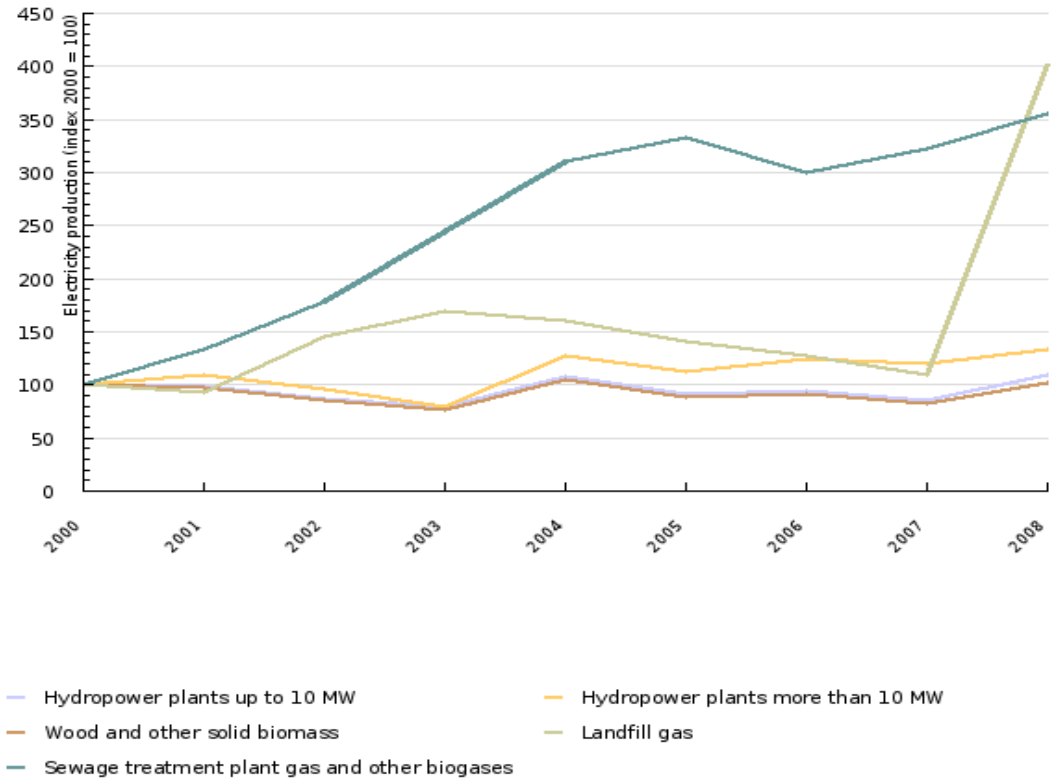

Figure 3-6: Trends of electricity production by renewable energy sources

Electricity production from wood and wood waste in 2008 was, with regard to 2000, more than 300 % higher, and with regard to the previous year 270 % higher. Such an increase is a result of the start-up of co-incineration of wood biomass in larger electricity and heat production units run on coal in the thermal power plant in Šoštanj, thermal power plant in Trbovlje and thermal power-heating plant in Ljubljana. Prior to that, biomass was used only in industrial CHP plants. Electricity production from other biogases, where agriculture prevails, increased in 2008 by 26 %. Since 2000, production has increased by almost 754 %. Such growth is a result of the good operation of the system of fixed redemption prices. A similar case applies to electricity production from the sun, which is not monitored by SORS. In 2008, it increased by 132 %, so that it amounted to more than 2 GWh. In total electricity production, solar energy represented 0.05 %. /35/

2. Gross heat production from renewables and waste (TJ), Slovenia, annually

Table 3-4: *Gross heat production from renewables and waste (TJ), Slovenia, annually /6/*

Gross heat production from renewables and waste (TJ), Slovenia, annually		
	2008	
	By main activity	**Autoproducers**
Gross production -Together	344	92
Geothermal	-	-
Solar heat	-	-
Industrial Waste (non renewable)	-	-
Municipal Waste (renewable)	-	-
Municipal Waste (non renewable)	-	-
Wood and others solid bio-mass	344	92
Landfill gas	-	-
Sewage gas	-	-
Total	436	

Heat generation from RES amounted 436 TJ in 2008, which is equal to 0.12 TWh. It comes mainly from wood and other solid biomass. Another sources has a minor meaning. /6/

Biofuels

In 2009, in traffic in the RS, powering fuels of mineral origin were substituted mostly by bio-diesel and by other bio-fuels in much lower extent, such as bio-ethanol and ETBE. Bio-diesel was used as a powering fuel as pure or 100% bio-diesel and in mixture with casual, fossil die-sel fuel. Most of bio-fuel was sold as a mixture of bio-diesel and diesel, at which the content of bio-diesel did not exceed 5%. On the basis of data from distributors the amount of bio-fuels (pure bio-diesel, added bio-diesel to fossil diesel and bio-ethanol or added ETBE* to motor gas) amounted to 34.000.316 kg in 2009 (from excise data: 31.644.725 kg). The share of put bio-fuels into market is increasing, but prescribed quotas are not yet reached. /36/

Table 3-5: Share of biofuels in transport fuels in 2008 and 2009 /36/

Fuels	Share of biofuels in 2008	Share of biofuels in 2009
- average percentage of biofuels in transport fuel (m/m%)	1,44	1,99
- average energy share of biofuels in transport fuel	1,20	1,70

3.3. Bioenergy and Biogas

The production of biogas in Slovenia is available from the 80ties of the previous century. The production of biogas from anaerobic digestion systems is available for biomass from central wastewater treatments (CWWT), breeding farms, green wastes from agricultural,

organic wastes from restaurants and households and industrial wastes. The utilization of landfill gas from municipal wastes is available on a few waste dumps. The utilization of biogas for heat and electricity production is available in six central wastewater treatments (CWWT) with total electricity power of 2.1 MWe. The total electricity power of CHP systems fuelled by landfill gas is 4 MWe. In operation are several biogas plants fuelled by agricultural wastes with the total electricity power of 3.6 Mwe.
In Slovenia there are currently 12 biogas plants (of which 5 are the result of Keter Organica development and knowledge) with a total power of 14.7 megawatts serving more than 40,000 households. According to analysis made by Agricultural Forestry Chamber, Slovenia has enough potential to make (in the most conservative scenario) 86 megawatts from biogas plants, and with the best scenario as much as 147 megawatts, without substantially interfering with primary agricultural production. This would enable enough electricity to be supplied to more than 319,000 households.. Currently operate 12 biogas plants in Slovenia and 3 of them are conditionally agricultural and others are agricultural. Most of biogas plants in Slovenia are 1 MW power and investment cost for this type of biogas plant is from 5 to 6.5 millions euro.

In the structure of individual bioenergy type dominates the share of renewable solid biomass (94%), followed by biofuels (4%), landfill gas (1,5%) and biogas form sewage plants (o,6%).
/18/ /19/

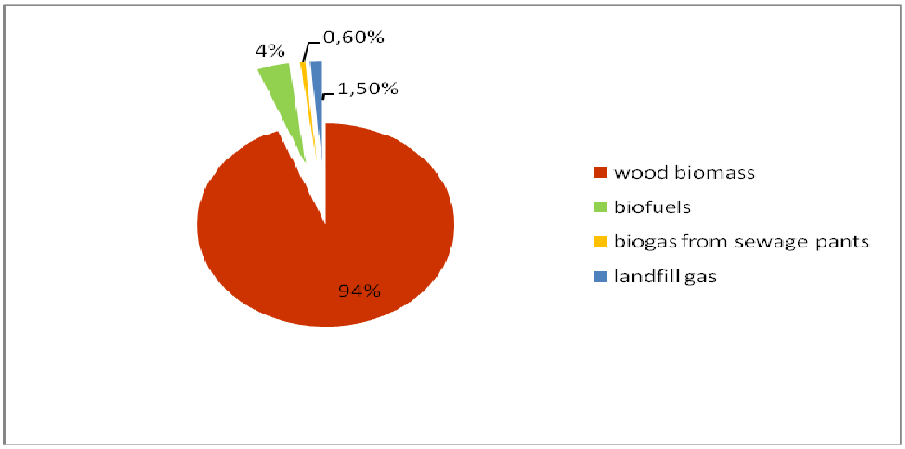

Figure 3-7: of individual bioenergy type in Slovenia in 2008 /18/ !19/

3.4. Energy Development Strategy

Main legal documents

The main legal documents relevant for energy sector in Slovenia are:
Laws:

- The Law on Energy (1999, amended 2000, 2002, 2004, 2005, 2007)
- Environment protection law, (Of. G. RS, no. 39/2006)
- The law for construction of objects (Of. G. RS, no. 102/04)

Implementing regulations:

- Action plan for renewable energy 2010-2020 (AN OVE); July 2010
- Resolution on National energy program /ReNEP/ (Gazette RS, Nu. 57/2004)
- National action plan for energy efficiency for the period 2008-2016 /AN-URE/
- Operative program of decreasing greenhouse gas emissions till 2012 /OP-TGP/

/20/

Future energy supply and demand

We expect further growth of consumption of the final energy. However, it is obvious disparity during the growth of energy use and GDP, as the growth of energy use in all levels lags behind GDP growth. By the year 2020 the final energy consumption in the lower scenario of economic development and taking the intensive introduction of energy efficiency will be increased by 12.2%. The growth of final energy will be mostly contributed of industry sector and remaining use, within households we expect even reduction of consumption.

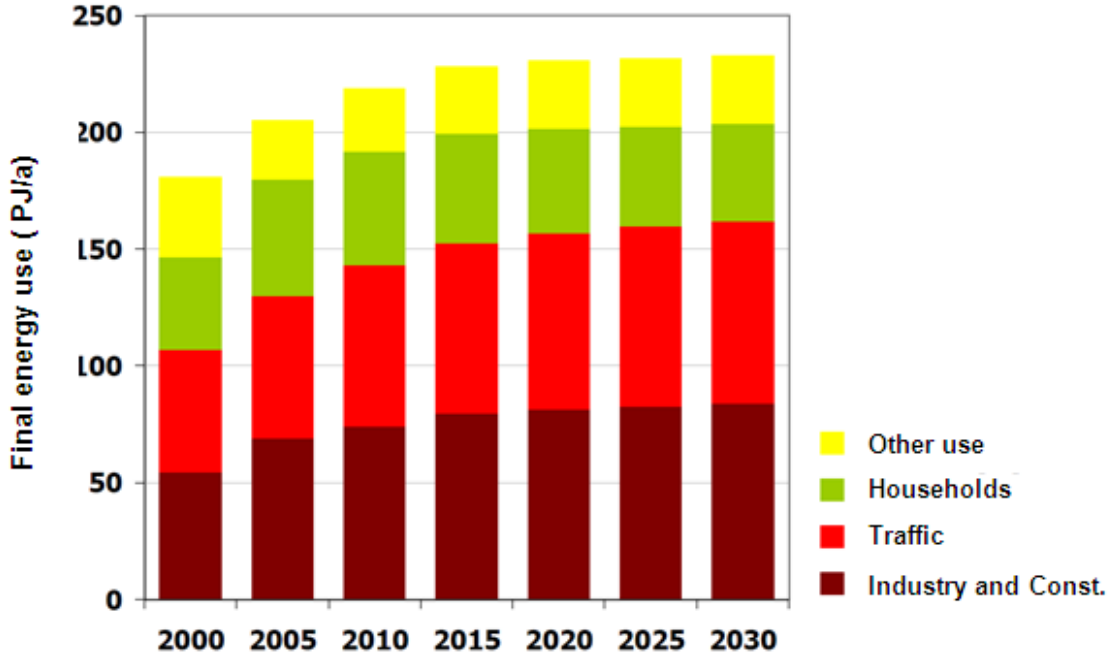

Figure 3-8: Final energy use according to sectors /21/

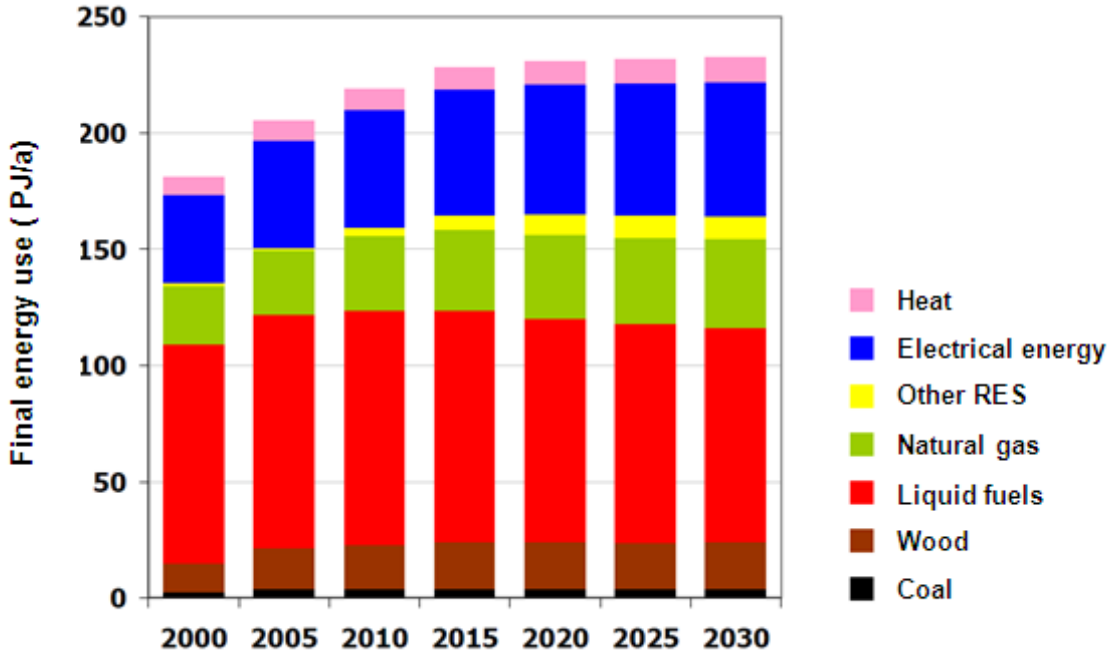

Figure 3-9: Final energy use according to fuels./21/

Use of electrical energy

Growth of consumption of electricity will continue, but with a slightly lower rate of growth than the present. We estimate that the current growth of 3.7% on average per year (between 2000 and 2005) by the year 2010 only slightly moderating. However, the final use of electricity till 2020 will increased by 22% or 2.8 TWh. In 2005 electricity consumption per capita was equivalent to 6379 kWh, which is more than 13% more than the average EU-27 (5614 kWh/inhabitant). By the year 2020 electricity consumption will increase to 7710 kWh/inhabitant and until the year 2030 to 7986 kWh/inhabitant. The projection of the indicators for the EU-27 average in 2020 is lower: 7101 kWh/inhabitant, in the year 2030, 7680 kWh/inhabitant, there is a development-oriented to much lower energy consumption than in Slovenia. /21/

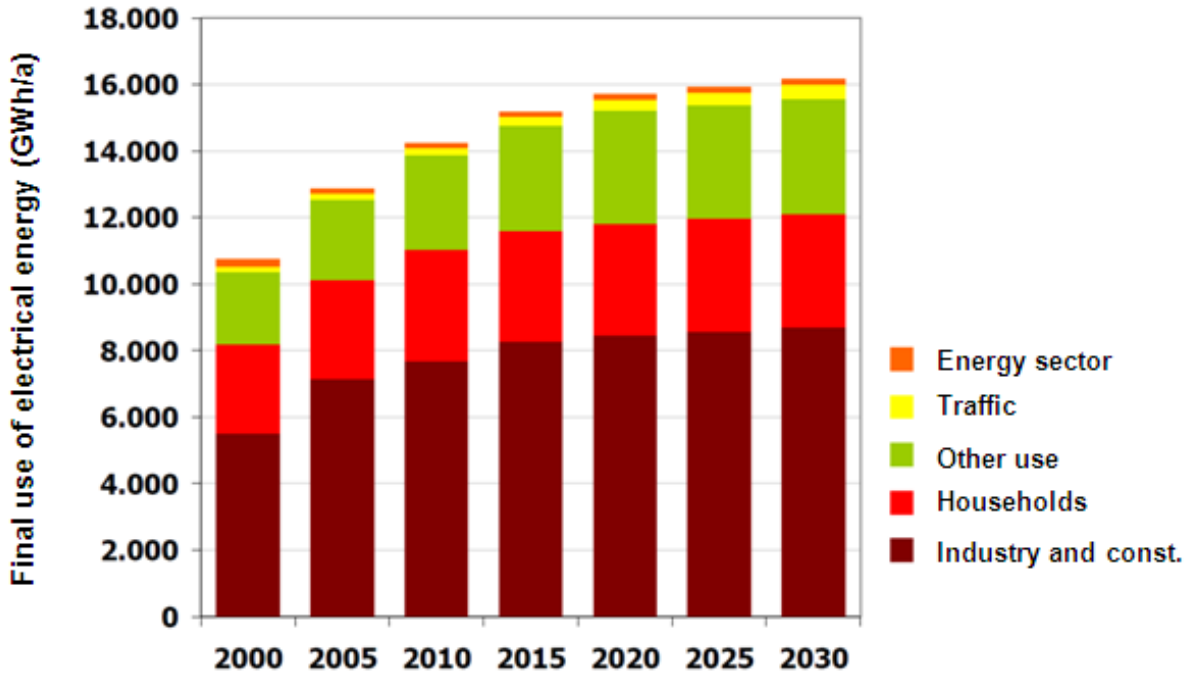

Figure 3-10: Final use of electrical energy according to sectors./21/

Targets for renewable energy

In the analysed balances done by Jožef Stefan Institute, we expect an increase in the use of RES by 2020, to 67 per cent compared to 2005. Sharing RES will thus increase by 32,3 PJ (peta joule 10^{15}) on 53,8 PJ. By 2020 the share of RES in energy consumption will be 22.1%. The direct use of RES in the final energy demand by 2020, depending on the situation in 2005 increased by 55%, in electricity generation by 67% and in district heating systems, even for 900%. We are convinced that by 2020 the RES use structure is following: 55.3% of the final use of RES, 40.3% of electricity production from RES and 4% use of RES in district heating systems. Most will increase the use of biofuels for the mandatory intermixture of 10% of biofuels in transport from the existing 0.2 PJ at 7.1 PJ. A significant increase in the utilization of wood biomass for 39% (at 6.7 PJ), hydropower nearly 42% (at 5.3 PJ) and other RES, even for the factor 2.5 up to 3.5 (with current 1 PJ at the 3.5 PJ) is anticipated.

In all energy strategies is assumed to be met the objective of achieving a 10% biofuels in final energy transport by 2020. The required quantities of biofuels, 0.2 mio t, very likely will not be possible to fully produced in Slovenia, Therefore with their imports, import dependency of Slovenia will increased. It is expected that there will be a lot of attention to devote in the fulfillment of this objective, necessary is sustainable production, as imports of fuels-and a priority focus on second-generation biofuels.

The objective of a 25% share of renewable energy sources by 2020, as defined in Directive 2009/28/EC for Slovenia, however, is an extremely ambitious. With the analysed balances Slovenia reaches only 22.1% of RES in final energy use. Achieving the target of RES, will be highly influenced by the movement of energy end-use efficiency and of course the intensity of the RES deployment. Scenarios of electricity supply to achieve 25% of the objective, have practically no impact, since in all (scenarios) we accelerated the construction of the hydroelectric plants.
The target share of 25% RES in the final energy is not reached, the objective is complex, the necessary additional activities so are to reduce end-use energy as well to increase the utilization of RES. /22/

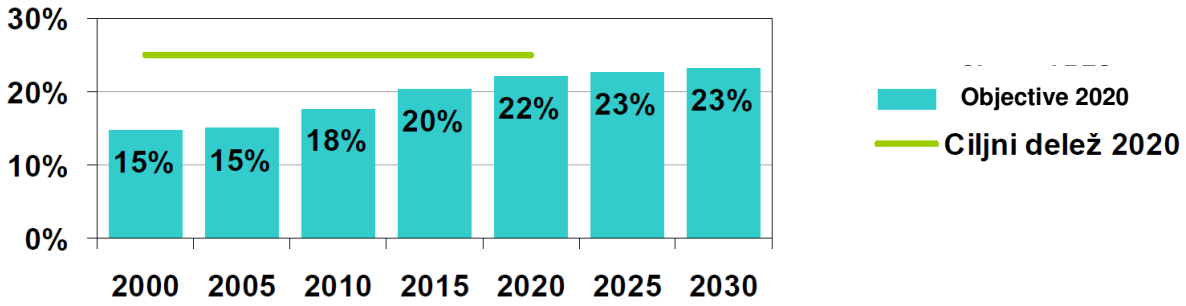

Figure 3-11: Share of energy from renewable sources and objectives./22/

Energy generation facilities

Utilization of hydro potential
Slovenian energy policy was already in the past decided to dynamically use the water potential in large facilities. Thus, accelerated on entrepreneurial basis builds a chain of hydroelectric plants on lower Sava. Projects to renovate and re-installation of existing units are completed.
In addition to the completion of construction of hydroelectric power station at the lower Sava is necessary to pursue the procedures to start work on the middle of Sava, which is probably the most prospects from the viewpoint of evaluation by using multiple criteria. It is necessary to solve the issues of proper place into space and the electricity system. The objective is to place the first two power plants until 2020.

In any case, it is necessary to continue the activities in the remaining locations (Mura, Idrijca, etc.), which are interesting from an energy point of view.

Hydropower is the most important renewable source for electricity production in this area, an important it is also technologically. Sustainable power generation strenghts, while providing jobs and technological development in the country. On the other hand, it is necessary to be aware of the fact that the electricity generation in hydro power plants depend on hydrological conditions, so the spare capacity, and save capacity are necessary.

To meet the requirements – a 25% share of RES in the final use in 2020 – the necessary continuing and accelerating the construction of large hydroelectric power stations, is among the most economically beneficial options for achieving this goal.

Thermal power plants
The renovation and the increase in the power of the existing thermal power plant is necessary. In the last ten years existing devices were better maintained to ensure availability of electrical power. Additional new resources in the last twenty years there has not been constructed, existing thermal power stations capacity are technologically outdated, before the end of the extended life and most of the provision for the closure of the already prior to the year 2016.

Shutdown of existing units in thermal power station Šoštanj is foreseen in accordance with plans to build a block 6, block 1 and 2 to quit regularly operate before the beginning of the year 2010, B3 and B4, will operate up to and including 2014, but then will be entered for one year in the cold reserve. In thermal power station Ljubljana capabilities with the gas steam unit (APU) in 2012 shall expand, existing units would be placed in the peak of the service. In thermal power station Trbovlje existing coal unit should stopped later in the period between 2016 and 2020. In thermal power station Brestanica blocks 1-3 are excluded from normal operation to 2015, but should continue to be ready for operation if necessary.

Is necessary to ensure the conditions for renewal and replacement of existing units with new ones. Decision on the replacement of existing facilities need also be considered from the perspective of security of supply. The renovation of the installations will contribute to greater competitiveness of production and also compliance with the European legal order and Slovene legislation, the protection of the environment.

Recent analyses indicate that the renovation of the existing facilities at the sites will not be sufficient in thermal power plants, for the provision of reliable and high quality supply of a country with electricity. We will need to ensure adequate capacity in the country, too. The question of the new strategic orientation of the production of electricity in large production devices raises. In doing so, it is necessary to examine the competitiveness of the planned investment in the international market, except when it comes to achieving further objectives. One of the further possibilities for the development of increased use of nuclear energy in the world and in the EU is re-examining the ascent. Technological design of the new devices is improved with regards to the availability, security, environment and economics. Nuclear energy is treated as a domestic source of electricity and is produced at a competitive price.

Nuclear power plant Krško
In preparation is a project to build new nuclear power plant 2 at the existing nuclear power plant. Characteristics of a nuclear installation will be in particular: the size, the high investment costs and low operating cost, the duration of the build and risk. The developer, the State-owned company Gen-energy, has prepared a series of analyses, which comprise a feasibility study and other assessments. The financing of the project will be challenging, analyses show that could be carried out with the investment potential in Slovenia, but will also need to consider the possibilities for attracting more investors. The facility was discussed in the framework of scenario studies of long-term energy balance of Slovenia 2006-2026 as a variant of the coverage of the consumption of electricity in Slovenia.

The proposed facility of the size 1000 MW (resolution of the national strategic documents 2006-2023) is almost three times the unit from now the largest in the Slovenian electric power system, and will be taking the construction necessary to ensure adequate capacity for operational reserve. Greater use of nuclear energy, on the other hand, increased security of supply in the country with lower import dependence. Slightly changing diversification: the relationship between the sources for electricity production in favour of nuclear energy, but in particular on

account of increased exports. The facility will significantly contribute to the reduction of emissions of greenhouse gases.

Pumping power plants
Among the facilities for the electrical storage, pumping power plants are economically most eligible, although it is necessary to the development of attention paid to other projects. Further, the intensive construction of facilities used for power plants is very suitable as a prospect in the building of nuclear power plant Krško 2, because it would allow the sale of electricity in periods of higher prices of electricity.

From the projects, in addition to pumping power plant Avče, which entered into operation already in 2009, the longest project preparation, pumping power plant Kozjak was ranked well in the Resolution of the national strategic projects 2006-2023. Activitie is necessary to pursue, it is necessary also to other locations, such as Požarje, Matica on middle of Sava, and others.

Biofuels

Actual goal of Slovenia declares decree about quickening of biofuels use and other renewable fuels in traffic (Gazette RS, Nu. 103/2007), that determines share of annual amount of biofuels, given on market for motor vehicles propulsion; the objective was to increase share by 1 percentage point per year by 2010 and by year 2015 for the 0.5 percentage point a year, when the target value of 7.5%. The execution, goes not by the objectives of the regulation - since it was in 2007, the goal is realized only 41% and 1.1 percentage points less than the objective for 2007.

In Slovenia there is currently no significant production capacity for biofuels, and more than 90% of biofuels we buy in the EU and importing them from third countries. Most options in Slovenia is for biodiesel production, or pure vegetable oil (raw oil from the seeds of rape), currently there is no facility for the production of bio-ethanol and other biofuels, which are suitable for intermixture of biofuel to conventional fuel, there is also no refineries for intermixture of biofuel to conventional fuel of imported biofuels.

In order to achieve a 10% share by 2020, in the context of the climate-energy package the dynamics of increase in the percentage for at least 1 percentage point per year will also be necessary after 2010. The new directive on the promotion of RES (renewable energy sources) that target by electric drives, which use electricity produced from RES. The increase in the share of biofuels be encouraged with relief from the excise duty and on the other hand, through direct payments to producers, stimulates the production of crops for biofuels.
Slovenia will through obligations – 25% share of renewable energy in final energy use – by the year 2020 have to pledge very ambitious goal for the share of biofuels in transport. The appropriate goal would have been a 12% share of biofuels for Slovenia in the year 2020. The objective will be partially met by imports of Slovenia, partly with biofuels production in Slovenia.

A lot of attention in the fulfillment of this objective, it is necessary to sustainable production- both on domestic production and imports of fuel – and priority focus in second-generation biofuels. /24/

Predicted technologies of renewable energy sources in traffic from 2010 to 2020, Slovenia. (AN OVE, 2010)

Table 3-6: Predicted technologies of renewable energy sources in traffic from 2010 to 2020, Slovenia. (AN OVE, 2010) /24/

(ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

Bioethanol/bio-ETBE	3.9	4.1	4.6	5.3	6.4	7.6	9.2	11.1	13.2	15.7	18.5
Biodiesel	36.6	38.8	43.3	50.2	59.6	71.6	86.3	103.8	124.2	147.4	173.7
Hydrogen from renewable sources	/	/	/	/	/	/	/	/	/	/	/
Renewable electrical energy	5.4	6.0	6.2	6.5	6.7	7.0	7.5	8.2	9.0	9.7	10.5
Road traffic	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.5	0.7	0.9	1.1
Non road traffic	5.4	6.0	6.2	6.4	6.6	6.8	7.2	7.8	8.3	8.8	9.4
Other (like biogas, vegetable oil, etc....)	/	/	/	/	/	/	/	/	/	/	/

- *Investment in energy infrastructure (power supply system, natural gas distribution system*
- *Investment in electrical grid*

Investment of system operators is necessary in particular to improve the reliability of operation and quality assurance of supply of electricity. On a certain part of the network are additional investments needed mainly because of the increasing of the intended withdrawal in the respective geographic areas. Therefore it is necessary in the network to install the new substations and reconstruct existing equipment. For the reliability of the network is also important, since the age of the overhead line by more than half of the already exceeds the intended life span.

The transmission system operator networks Electro Slovenia, d. o. o., already start it with building the important links: 80 kilometers of 400-kV line Bericevo-Krsko, prepares to update the links to the new block of a thermal power plant in Šoštanj and the link with the Hungarian power grid. With these and certain other investments shall aim to ensure a high degree of reliability of operation and the operation of the electricity system in Slovenia.
Due to the rapid increasing of the number of production units on renewable sources and cogeneration plants should distribution system operator networks SODO, d. o. o. invest in systems of advanced measurement of electrical energy. This means replacing of classical counters with modern electronic counters by means of remote measurement of electrical consumption.

Investment in transmission and distribution electricity network in the year 2011 amounted to be € 275 million, in 2012, 253 million Euros.

- *Investment in natural gas distribution system*

Distribution of natural gas takes place in 72 municipalities in the country, through the distribution network more than 105000 customers is provided with a natural gas.
In 2011 the company Geoplin gas pipelines plans continue with the realization of gas pipeline projects from the investment programme. A group of five pipeline facilities, of those three will be under construction, two under planning. The construction of the 35 kilometers section Ceršak – Kidričevo will be completed and construction of two sections between places Rogaška Slatina and Vodice in the total length of 99 kilometers will be continued. For the other two projects Vodice-Thermal power plant Ljubljana and Trojane-Hrastnik will continue with the design.

Geoplin gas Pipeline Company in 2011, will seek to ensure a new connection to the distribution network and started to plan for a new connection to the distribution network in the communes of Rače-Fram, and Starše. Technological updates will also be made to increase the capacity of the existing system. Spatial planning, design and the preparation of economic detailed expert report will continue at all facilities of supply and transit (gas pipeline South stream), for which national spatial plans are in progress.

Amount 70 million euro's in 2011 will be spent for investment companies Geoplin gas pipelines.

Figure 3-12: Southern corridor of supply way with natural gas – Nabucco and South stream /23/

Investment in energy infrastructure will be captured in the new National energy program, which is still in the final phase, so at this point we cannot send data (publicly accessible after a month). The new National energy program, which is in the final phase of preparation and will replace the valid ReNEP approximately till the end of 2010, will define the energy policy goals till 2030 and the mechanisms for the implementation of goals, including the goals that Slovenia set in climatic energy counsel of EU till 2020 and with other international obligations, as well as investments.

Regional development

The new objectives of the climate-energy policy and the strategic providing reliable energy supply and the delays in the previous implementation of already agreed strategies dictate the preparation and implementation of the intensive development strategies of local energy, which will have one of the key roles in the transition to a low carbon society and achieve a high level of energy independence from imports. Based will be on the nature of the measures of the different energy sources and technologies, which will greatly improve the efficiency of energy use and increasing the scope of the use of renewable sources of energy, and security of supply. Ensured the development of local energy systems tailored to the particular needs of the population. Intensive development strategy of the local energy sector will help to change the attitudes of the individual to the problems of sustainable development of the society.
The objectives of the intensive development strategies of local energy will be consistent with the objectives at the level of the country, but upgraded ambitiously in accordance with local characteristics and opportunities. So it will be up to the year 2030, the proportion of renewable energy sources for heating increased to 50%, reduced the share of liquid fossil fuels from 43% to 15%; part will be replaced with natural gas and district heat. /23/

4. REGULATORY FRAMEWORKS CONCERNING BIOGAS PRODUCTION

4.1. Biogas Production

Laws and provisions concerning biogas production

The Law on Energy (1999, amended 2000, 2002, 2004, 2005, 2007);

The Energy Act (OJ RS, No. 26/05, official consolidated text – EZ-UPB1). Ensures stimulation of the RES use gives priority to efficient use of energy and RES instead fossil fuels and enables different ways for promoting production of energy from RES. It also defines qualified producers of electricity. Qualified producers are producers that generate electricity in an individual generating facility with a higher-than-average efficiency for heat and electricity cogeneration, or that use renewable energy sources in a manner which is in accordance with environmental protection. Also important here is the definition of electricity from renewable sources, this is as follows:

a) Electricity generated in power stations that use renewable energy sources exclusively
b) The proportion of electricity from renewable energy sources generated in combined power stations that also use fossil fuels, and
c) Electricity referred to in Points a) and b) of this indent that is used to fill energy storage systems, without using electricity generated from such systems. Renewable sources of energy are sources of energy that are preserved in nature and are fully or largely renewable, in particular energy from watercourses, wind and biomass and geothermal and non-accumulated solar energy. Biomass is the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and timber industries, as well as the biodegradable fraction of industrial and municipal waste, the use of which for energy purposes is permitted by waste management regulations.

• Regulation for the conditions to acquire the status of qualified electricity producer(G. RS, no.71/2007) The new Decree on the conditions for obtaining the status of a qualified electricity producer sets out types of qualified electricity producers in terms of primary source of electricity and nominal electrical power, conditions for obtaining the status of qualified electricity producer and the procedure for obtaining the status of a qualified electricity producer.

• Governmental regulation of rules for definition of prices and for purchase of electricity from qualified producers of electricity (Of. G. RS, no. 25/2002) This regulation sets out the rules and starting points for contractual relations between qualified electricity producers and the operators of the networks to which qualified power plants are connected, and the rules for setting prices and premiums for the purchase of electricity from qualified electricity producers.

• Decree on Prices and Premiums for Purchase of Electricity from Qualified Producers (Of. G. RS, no 8/2004, 25/2002, 75/2006) sets prices for produced and sold electricity to the grid kWh of RES-E.
• Decree on emission of certificates of origin (Of. G. RS, no 121/2005)
• Rules on electricity market operation (Of. G. RS, no. 30/2001, 118/2003)
• Decree on common conditions for supply and selling of electricity (Of. G. RS, no. 117/2002 (21/2003 - amended))
• Environment protection law, (Of. G. RS, no. 39/2006)

The law is legal basis for numerous instruments stimulation the use of RES, such as CO2 tax and emission trading. The law places the use of RES among the tasks that can be financed

from government budget for environment protection and from the sources of the Ecological fund

- Decree on environmental tax for air pollution with CO2 emission (Of. G. RS, no 43/2005, 58/2005, 87/2005, 20/2006)
- Regulation on waste management (Of. G. RS, no. 84/1998, 45/2000, 20/2001, 13/2003, 41/2004-ZVO-1)
- The law for construction of objects (Of. G. RS, no. 102/0

Building and operation biogas plant requires a set of official document and confirmation for building and operation of biogas plants. Permits and license are described chronologically. It has to be emphasized that not all permit are required for specific biogas plant since it depends on several factors. When you are building a plant that will be for your needs only than you need only building and operating permit. In case that you sell produced energy that you have to acquire also energy license for plant above 1 MW and energy permit. When using organic wastes for biogas production than plant operator has to acquire a permit for waste processing/ recovery. /25/

Remuneration schemes

The Slovenian government adopted a Decree (on 14 March 2002) on the price and premium for the purchased electricity from qualified producers or electricity from RES (**feed -in tariff**) - Uredba o pravilih za določitev cen in za odkup električne energije od kvalificiranih proizvajalcev električne energije , Ur.l. RS, št. 25/2002 *(Decree on the Rules for Setting prices and for purchasing electricity from qualified electricity producers, Official Journal of the Republic of Slovenia No 25/2002*). The new decree defines a fixed price and premium (feed - in tariff) for the purchased electricity from qualified producers (QP) of electricity from renewable energy resources (small hydro, biomass, wind, geothermal, solar, waste and all other RES for power plants – biogas plant). The current fixed price and premium for the purchased electricity from bio-energy sources in Slovenia is defined in the Decision on prices and premiums for the purchase of electricity from qualified electricity (Sklep o cenah in premijah za odkup električne energije od kvalificiranih proizvajalcev električne energije, Ur.l. RS, št. 65 in 98/2008 *(Decision on prices and premiums for the purchase of electricity from qualified electricity producers, Official Journal of the Republic of Slovenia No 65/2008 and amendment 98/2008)*. The last change in fixed prices and premiums for the purchased electricity from RES was in June 2008 and premium for electricity from biogas plants in October 2008. The prices and premiums are valid for biogas plants with status of qualified electricity producer which are connected to low or middle voltage of distribution electricity network. The prices and premiums reduce for 5% if the biogas plant is connected to the high voltage of electricity network, and for 5% and 10% after 5 years or 10 years of the start of operation of the biogas plant.

(determining prices of electric energy for assured redemption)

(1) For OVE production devices, which receive supports in a form of assured redemption of produced electric energy, prices for assured redemption are valid, stated in Annex II, which is a constituent part of this Ordinance.

(2) Prices for assured redemption of electric energy are at the same rate as the referential costs for individual production technologies and size classes.

3) Price in contract of assured redemption, at which the incoming energy source does not present expense, constitutes only of fixed part of price, at OVE production devices, at which the incoming energy source presents expense, also of variable part of price in every relation as the fixed and variable part of referential expenses are.

(4) Price for assured redemption from Annex II, which applies for electric energy from individual OVE production device, is determined in contract of assuring supports on the basis of data from provision on support assignment

Determining prices of assured electric energy redemption
Prices of assured redemption are regarding to OVE used and size class of OVE device the same as referential expenses, determined in Annex I and constitute of two parts:
1. fixed part of price of assured redemption is the same as fixed part of referential expenses and does not change the whole time of contract of assured redemption;
2. variable part of price of assured redemption is the same as variable part of referential expenses, if determined, and does annually or more frequently adjust after the announcement of referential gas prices.
For OVE production units, for which the variable part of price of assured redemption is not determined, only the price of assured redemption is quoted.

Price of assured electric energy redemption from OVE production devices – biogas
If heat annually effectively wears out in the extent of more than 15 % of incoming biogas energy, the OVE production device is eligible to bonus payment in the amount of 10 % of operational support for this OVE production device. Heat from biogas plant, which is used up for acquiring biogas, is not considered as useful heat. If dung and compost annually represent the volume of more than 30% of substratum for acquiring biogas, the OVE production device is eligible to bonus payment in the amount of 10% of operational support for this OVE production device.

If dung and compost annually represent the volume of more than 30% of substratum for acquiring biogas, the OVE production device with specified electric power up to 200 kW is eligible to bonus payment in the amount of 20% of operational support for this OVE production device.

1 Prices of assured electric energy redemption from OVE production devices on biogas, produced from biomass

Table 4-1: *Prices of assured electric energy redemption from OVE production devices on biogas, produced from biomass /24/ /26/*

Size class of production device	Fixed part of price of assured redemption (EUR/MWh)	Variable part of price of assured redemption (EUR/MWh)	Price of assured redemption (EUR/MWh)
micro (< 50 kW)	118.72	41.33	160.05
small (< MW)	111.75	44.00	155.76
medium (to 5MW)	96.18	44.59	140.77

2. Prices of assured electric energy redemption from OVE production devices on biogas, produced from biologically decomposable waste

Table 4-2: Prices of assured electric energy redemption from OVE production devices on biogas, produced from biologically decomposable waste /24/ /26/

Size class of production device	Price of assured redemption

	(EUR/MWh)
micro (< 50 kW)	139.29
small (< MW)	139.29
medium (to 5MW)	129.15

3. Prices of assured electric energy redemption from OVE production devices – gas from dust of waste water cleaning devices

Table 4-3: Prices of assured electric energy redemption from OVE production devices – gas from dust of waste water cleaning devices /24 /26/

Size class of production device	Price of assured redemption (EUR/MWh)
micro (< 50 kW)	85.84
small (< MW)	74.42
medium (to 5MW)	66.09

If heat annually effectively wears out in the extent of more than 15% of incoming gas energy from dust of waste water cleaning device, the OVE production device is eligible to bonus payment in the amount of 10% of operational support for this OVE production device. Heat, which is used up for acquiring gas, is not considered as useful heat.

4. Prices of assured electric energy redemption from OVE production devices – biologically decomposable waste

Table 4-4: Prices of assured electric energy redemption from OVE production devices – biologically decomposable waste /24/ /26/

Size class of production device	Price of assured redemption (EUR/MWh)
micro (< 50 kW)	99.33
small (< MW)	67.47
medium (to 5MW)	61.67

If heat annually effectively wears out in the extent of more than 15% of incoming biologically decomposable waste energy, the OVE production device is eligible to bonus payment in the amount of 10 % of operational support for this OVE device.

5. Prices of assured electric energy redemption from OVE production devices – biologically decomposable waste

Table 4-5: Prices of assured electric energy redemption from OVE production devices – biologically decomposable waste /24/ /26/

Size class of production device	Price of assured redemption (EUR/MWh)
micro (< 50 kW)	/

small (< MW)	77.44
medium (to 5MW)	74.34

If heat annually effectively wears out in the extent of more than 30 % of incoming biologically decomposable waste energy, the OVE production device is eligible to bonus payment in the amount of 10 % of operational support for this OVE device. /24/ /26/

Nitrate vulnerable zones

In accordance with the fifth paragraph of Article 3 of nitrate directive, Slovenia has in 2001 with Ordinance on changes and replenishments of ordinance on input of dangerous substances and vegetal nourishments into the ground (gazette RS, Nu. 35/01) defined the whole area of Slovenia as vulnerable area. With this a decision was accepted, that the operative program on water safety from pollution with nitrates from rural production will be carried out on the territory of the Republic of Slovenia.

The capacities of storehouses for cattle manures

The storehouses for cattle manures have to suffice for the period of storage, which corresponds to the period, when dunging with organic manures is not allowed and additionally for the period, when weather circumstances make dunging impossible. Storehouse capacities are further calculated with regard to animal category and climate area, in which rural economy is. In coastal area the storehouse capacities for cattle manures have to suffice for 4 months and for 6 months in continental part of Slovenia. In accordance with the Rulebook on execution of good practice in dunging (gazette RS, Nu. 130/04) it is obligated to ensure at least 35 m^2 of dunging plate for stable dung storage, 2 m^3 of dunging cave for liquid manure storage and 8 m^3 of lagoon for compost storage, for one GVZ. At calculation of content of vegetal nourishment in cattle manures the losses of the entire nitrogen are considered, that occur because of the storage. These amount to 10% at compost and liquid manure and 25% at stable dung. In 2004 and 2005 the construction of storehouse facilities for cattle manures for 123.600 GVZ was co-financed with means from »Support for execution of EU standards on rural economies« measure in the framework of Program for countryside development for the Republic of Slovenia 2004-2006, which represents less then 30 percent of the entire status of domestic animals in Slovenia. By doing so, the agriculture contributes significantly to the reduction of nitrate input into the environment, to favourable nourishment balance and to improvement of the chemical state of water. /27/

Biogas plant approval procedure

Building and operation biogas plant requires a set of official document and confirmation for building and operation of biogas plants. Permits and license are described chronologically. It has to be emphasized that not all permit are required for specific biogas plant since it depends on several factors. When you are building a plant that will be for your needs only than you need only building and operating permit. In case that you sell produced energy that you have to acquire also energy license for plant above 1 MW and energy permit. When using organic wastes for biogas production than plant operator has to acquire a permit for waste processing/ recovery.

Chronological review of permit acquirement for biogas plants:

- Plan for land use – Permit to build

Building any kind of object is allowed only on building land set in Municipal spatial plan. If

the potential location of the biogas plant is not addressed as building land than the category of that area should be changed. In many cases municipality asks also for town planning scheme. Both plans can be obtain by the municipality. The whole procedure is normally long lasting and complicated. It usually takes around 6 months.

○ Energy license

The energy license is required for power plants above 1 MW. Agency for Energy approves the license based on the application for period 5 years. It is relatively easy to obtain the license and it takes around one month and costs around 20 €. More information and application is available on the following website:

○ Energy permit

The investor must obtain energy permit for power plants above 1 MWe before applying for the building permit. With this permit it is set:location and area of the plant,type of the plant, conditions for performing energy activities on the plant, conditions related to the plant commissioning

○ Permit for waste processing/recovery

In case of using organic wastes for biogas production the plant operator must obtain per mit for waste recovery. Ministry for spatial planning sets with the permission:

- source and quantity of the wastes that can be treated on the plant,
- procedure of processing,
- objects and devices for waste recovery.

Nevertheless, it is possible to process the wastes without the permission in case of:

- non hazardous wastes,
- the processing is on the location of source of the wastes,
- processing only own wastes and
- meeting all requirement for waste recovery.

○ Building permit

For biogas plants it is necessary to obtain building permit

○ Operating permit

Operating permit represent permit for using the plant and it should be obtained before the first start of the operation of the plant.

Capture and energy use of landfill gas (status: implemented; gas: CH4) The Rules on waste disposal require all landfills to arrange the capture and appropriate management of landfill gas by the end of 2005. An incentive for the capture and energy use of landfill gas has also been provided in the form of a reduction in the waste disposal tax if the landfill is equipped with facilities for the capture and incineration or energy use of biogas. /28/

4.2. Electricity Production

Incorporation of producer of electric energy onto a distribution network is necessary to sell electric energy to network manager. Before incorporation of power plant onto the distribution network, the user of distribution network has to acquire the concordance for incorporation onto network from system operator of distribution network, which contains conditions for incorporation onto energy network. The procedure and conditions for acquiring concordance for incorporation onto distribution network are determined in Rule book on systematic operation of distribution network for electric energy and in General conditions for the supply and take away of electric energy from the electric energy distribution network.

The application for issuing the concordance for incorporation in accordance with General conditions for the supply and take away of electric energy from the electric energy distribution network contains:

- network user data;

- Indicate if there is a priority access for renewable energy producers and if the grid operator is obliged to connect the renewable energy producer name and address (location) of object;
- definition of power plant kind;
- definition or application is referring to incorporation for determined or undetermined time (the duration time of concordance validity);
- power subscription;
- expected incorporation date;
- regime of power and energy emit;
- data on generators and protection, if there is a production of electric energy;
- prove of ownership or of right for object's disposal, if not registered in land register;
- other technical data and evidence, necessary for issue of concordance, which are determined by systematic operation instructions for distribution network;
- ideal plan for object (on request from concordance issuer)

Concordance for incorporation onto electric network is issued by SODO, if technical possibilities are met, which are determined by short contact flow, network impedance, fueling quality and the possibility of concording user devices without endangering the fueling reliability and inadmissible recurring influences on network at planned burdening and operation mode at takeover-sale places. After completed installation, fulfillment of conditions from concordance for incorporation and deposited application for incorporation the overview of installation is followed and signing of the contract of incorporation and incorporation onto distribution network. The conditions for incorporating onto distribution network are determined by act, which manages the general conditions for supply and take-away of electric energy.

In Articles 64.k and 64.l of Energy law it is noted that systematic operator of distribution network must not reject the issue of concordance for incorporation because of unproportionate costs, and that systematic operator of distribution network has to in the framework of balancing the system's operation and dispatching in accordance with system's possibilities give priority to power plant on OVE and SPTE. The costs of all analyses for issuing the concordance for incorporation onto network are covered by network system operator. The costs of manufacturing the connection cable from production device to connection to system operator's network are covered by investor of the device for production of electric energy on renewable sources or with high efficiency co-production. If the investor of the production device, which is connected to the network on the basis of the second paragraph of Article 64.j does not acquire the declaration for the production device within six months after the start of regular operation of the production device, he must return the costs of strengthening the network and other costs to the system operator, which system operator had with strengthening the network because of incorporating the production device. /29/

4.3. Biogas to Biomethane

Until now Slovenia doesn't have facility for upgrading biogas to biomethane. Keter Group is developing technology for cleaning and storage of biomethane, isolated from biogas and also company ENOS LNG d.o.o. Jesenice working on biogas upgrading.

Supplier of natural gas in Slovenia is company Geoplin d.o.o. Gas is bought in Russia and Algeria. Geoplin is also in charge of international gas transport to Slovenia and operates national gas pipeline. Company supplies almost all gas distribution companies.

For local distribution of gas various public companies in bigger cities (such as Ljubljana, Maribor, Celje and others) and private companies based on issued concession are in charge.

The Geoplin gas pipes company manages the Slovenian transferable gas pipe system, as the system operator. Gas pressure in gas pipe is 3 bars. When we decide to incorporate the bio

gas plant onto a pipeline, the device is treated as a natural gas supplier. The manager of the plant has to contact the Geoplin gas pipes company, if the conducting point is in the transferable pipeline. In opposite case he has to contact local distribution companies. The supply of refined biogas is located, where the special station for measuring and control of gas quality and characteristics is built. If these conditions are not met, the supply is stopped. In accordance with Articles 22 and 23 of SON or with Articles 4 and 5 of General conditions the system operator has to transport gas with such chemical and physical preferences, as he takes it over at the entrance point. Chemical and physical preferences are determined.

The system operator is obliged to accept only natural gas with following preferences into transfer: /29/ /30/

4.4. Biogas as Vehicle Fuel

The goal of Slovenia is to achieve 5.75-percent share of biofuels in the entire fuel quantity for powering motor vehicles till 2010. New goals will be formed till 2020, the share of renewable energy sources in fuels for powering motor vehicles will have to exceed 10-percent. Currently there are no significant production capacities for biofuel in Slovenia, that is why more than 90 % of biofuels are bought in EU and imported from third world countries. In Slovenia, most possible is the production of biodiesel or pure vegetal oil (oil's raw material out of oil rape seeds), currently there are no plants for production of bioethanol or other biofuels, that are appropriate for mixing into motor gases, as well as no refineries or plants for mixing imported biofuels into motor gases.

Technological development for production of biomethane from biogas is carried out in company ENOS LNG d.o.o. Jesenice. At the moment the main focus of their interest is in biogas from landfills of municipal wastes and from waste water treatment plants. They have a device for natural gas liquefying, and this is the only device of this type in Central Europe.

At the moment in Slovenia we do not have special legislation for the field of upgrading biogas for vehicle fuel. The developers are using foreign technical standards for biogas upgrading.
In company ENOS LNG d.o.o. they cooperate with car sellers, who distribute cars on methane as vehicle fuel. They also actively cooperate with two local car remodelers that modify cars from benzene drive to methane drive.

The use of biogas as vehicle fuel needs strong promotion from the gas companies (e.g. build new filling stations) and the state support (e.g. taxes, reduced taxes to car owners, etc.). Additional, municipalities or major enterprises can play an important role promoting biogas to their buss fleets (e.g., using local regulations, public awareness, corporate social responsibility).
In Slovenia have been already installed the first filling devices for CNG of small capacity, which stand in Ljubljana, Maribor, Kranj and Jesenice. The filling devices are the result of a join project of Slovene energy companies Enos Jesenice, Energetika Ljubljana, Energetika Maribor, Energap Maribor and Domplan Kranj. In Slovenia are in use first cars on CNG, but until now there is no usage of biogas as vehicle fuel.

In Slovenia, the use of biogas as vehicle fuel is not established and because of the small quantities of produced biogas in country is not expected to be in the near future the use of biogas as vehicle fuel increased.

Digestate Management Which laws and regulations need to be respected when bringing digestate to (agricultural) land? Is digestate classified as waste or as fertilizer?
Please also describe the general attitude of biogas plant operators to this topic (are regulations regarded to be very strict, very bureaucratic, etc.) /31/

4.5. Digestate Management

The use of processed substrates depends on their components. Substrates composed from animal manure, slurry, liquid manure, maize silage, agricultural and vegetal wastes and other uncontaminated green wastes may be applied in agriculture as fertilisers. In case the substrates contain too high quantities of heavy metals such exploitation as fertiliser for agricultural products is not possible, however they can be applied for ornamental plants.

The applied used substrate (rotten mud) as a manure from biogas devices is allowed on all pieces of land, irrespective of area where land is, or irrespective of land usage if:
1. The measured values of dangerous substances in the entire sample of compost or rotten mud do not exceed the highest values, defined for placement into the 1. class of enviro mental quality from annex 2 in Ordinance on handling biologically decomposable waste,
2. the share of organic substances in compost or rotten mud exceeds 30% of dry mass;
3. is handled in a way that all microbiological demands are fulfilled regarding hygienisation from Ordinance on handling biologically decomposable waste.
The application of used substrate or rotten mud, which ranks into 2. class of environmental quality, is limited. For input of such substrate into or onto the soil, for improving their ecologic state according to handling procedure with R1030 sign, it is obligatory to obtain environment-safety permit in accordance with law, which regulates environment safety. For environment-safety permit issue, it is necessary to fulfill conditions, which are stated in Ordinance on handling biologically decomposable waste (Article 26).
Ordinance on handling biologically decomposable waste forbids input of compost or rotten mud, which ranks into 2. class of environmental quality, into or onto the soil on:

- water protection areas, determined in accordance with regulations, which regulate water,
- soil, where fruits and vegetables grow, with exception of fruit trees,
- surfaces, intended for growing fruits and vegetables, which are usually in direct contact with the ground and are usually eaten raw, for the period of 10 months before bringing in the harvest or during it,
- gardens or pastures, except in autumn after the last mowing or pasture,
- lands, saturated with water, and on snowy or frozen lands,
- leaning lands, where the danger of surface ablution is possible,
- farms with fodder field crops, except after the last mowing or pasture,
- areas of wetlands and forest lands.

Used substrate, which ranks into 2. class of environmental quality, can be unlimitedly used as a manure of ornamental plants in residential or business buildings, on gardens, in garden centers and tree nurseries and on lands of parks, lawns or surfaces, intended for sport or recreation.
The manager of biogas device, who acquires environment-safety permit for input of used substrate into or onto the soil, has to send annual report on this input to Ministry till March 31 at the latest.

5. SPECIFIC ASPECTS

5.1. Country Characteristics

Slovenian energy policy gives advantage to use of renewable energy sources in all strategic documents, more important primary energy sources for Slovenia and present strategic re-serves«. The goals of Resolution on national energy program (ReNEP) should increase renewable energy sources in primary energy balance to 4.0 PJ in comparison to the year 2002, from this, 0.4 PJ should be bio-gas. The main moving force at development should pump from

Kjot protocol. in expectation of problems, which will hit Slovenia at lowering CO2 omissions, which represent the kjot goal, we introduced tax on CO2. The tax is paid by users of fossil fuels, except those in traffic (where fuel is subject to high excise). Scheme of massive tax exemption on CO2 for electric production, industry and public services is in place.

Government accepted a decree (14.3.2002) on price and premium for purchase of electricity from qualified producers (or electricity from OVE). New decree determines a new fix price and premium (a tariff for electric energy suppliers in the system) for electricity, purchased from qualified producers (QP) of electricity from renewable energy sources (bio-gas, small hydro plant, bio-mass, wind, geothermal, solar, waste and other OVE for power stations with capacity up to 10 MW). Uniform prices and uniform premiums do not include DDV.

Potential from animal waste on farms is 1.1 PJ/year for electricity production. Economic potential till 2010 on communal bio-gas devices and bio-gas devices on farms is estimated at value up to 30 MW.
Biogas production started in Slovenia at the end of 1980th. First two biogas plants were for the anaerobic digestion on municipal plants – central wastewater treatment and big pig farm. Energy utilization of biogas from the anaerobic digestion sewage, manure or agricultural wastes and landfill gas is present in Slovenia, but it has at this moment a negligible impact on energy balance, while the important impact is the reduction of emission of greenhouse gases. Use of biogas from central wastewater treatment (CWWT) is necessary, especially from the aspect of reducing methane emission. Energy of biogas covers partly the energy need of the wastewater treatment. The energy produced is used in the plant for heating the fermentors (digesters) and partly covers the electricity needs. In Slovenia exist eight central wastewater treatments (CWWT) installed systems for biogas production, but only four of them use biogas for production of heat and electricity (CHP). In others, the biogas is burned on torches. Total installed electricity power on sewage gas is less than 1 MW. Biogas production is available on three farms. The total power capacity of installed gas motors on mentioned farms is 0.577 MW. The utilization of landfill gas has been in only three waste dumps: Ljubljana, Maribor and Celje. The landfill gas is used for electricity production in gas CHP systems. The power capacity of all installed plants is 3.5 MW. The production of biogas from sewage and agriculture farms was about 240 TJ in 2003 (221 TJ of landfill gas and 19 TJ of biogas). There are not still existing biogas plants in food industry. Now in Slovenia there are in construction three biogas plants on farms. Small number of biogas plants on Slovenian farms can be explained by several reasons:
Non interest in investment on biogas plants in past in time of cheaper energy from fossil fuels
- Many small size familiar farms were in past without possibilities in investment in new technologies due to lack of money
- Lack of state subventions in past for biogas plants on familiar farms
- Lack of equipment supplies and know how on the Slovenian territory in biogas technologies.

5.2. Summary of Positive Aspects

- ***The Law on Energy*** *(1999, amended 2000, 2002, 2004, 2005, 2007);*
The Energy Act (OJ RS, No. 26/05, official consolidated text – EZ-UPB1). Ensures stimulation of the RES use gives priority to efficient use of energy and RES instead fossil fuels and en bles different ways for promoting production of energy from RES. It also defines qualified producers of electricity. Qualified producers are producers that generate electricity in an individual generating facility with a higher-than-average efficiency for heat and electricity cogeneration, or that use renewable energy sources in a manner which is in accordance with environmental protection. Among qualified power plants belong bio-gas devices, which produce electric energy and use rural waste as input energy (animal dung, rural waste...), or use other kind of renewable energy as input energy.

- Governmental regulation *of rules for definition of prices and for purchase of electricity from* qualified producers of electricity (Of. G. RS, no. 25/2002)
Feed-in tariff system
The electricity production from renewable energies is supported trough the feed-in tariff system. This system is foreseen for independent qualified producers from which distribution companies have to buy electricity on fixed prices electricity from qualified producers of electricity (Official Gazette RS, no. 25/02) and with Decree on prices and premiums for purchase of electricity from qualified producers (Official Gazette RS,no. 75/06). Uniform purchase prices are valid only for power plants with status of qualified producers of electricity.

- ***Introduction of certification system of electricity origins****;* Decree on emission of certificates of origin (Of. G. RS, no 121/2005); confirmation of origin, prove of production of certain amount of electric energy from renewable energy sources or in co-production;

- Connection to a grid**;** Annexation of electric energy producer to distribution network is necessary for electric energy sale to network manager. Prior to annexation of electric plant to distribution network, a user of distribution network has to obtain concordance for annexation to network from distribution network system operator, which includes conditions for annexation to energy network. Procedure and conditions for obtaining concordance for annexation to distribution network are determined in Rule book of system operation of distribution network for electric energy and in General conditions for supply and consumption of electric energy from electric energy distribution network.

- Guarantee of sale electricity supplied to the grid.
According to Energy law definitions, the system operator of electric energy distribution network is bound to ensure the redemption of all electric energy from qualified producers, who are connected to his distribution network at a price, determined by the government of the RS. /34/

5.3. Summary of Negative Aspects

- ***Market barriers***

There is somehow lack of knowledge and information not only to the farmers but also to the industries (owners) and the general public about the possible energy exploitation of wastes and their final uses (e.g. electricity, heat, injection to the grid, transport fuel).

- ***Financial barriers for biogas implementation***

Financing investments of renewable energy systems remains a major concern. It will improve as costs fall and Renewable Energy Technologies (RET) become more competitive because many investors are willing and anxious to enter the energy sector. They are supported by new financial instruments that use private-sector banks to create green investment funds with lower interest in commercially viable technologies. What is needed is clear and stable financial conditions and environment.
There are many possibilities for investment in biogas plant. Two of these possibilities are Third Party Financing (TPF) and Public-Private Partnership (PPP).
Barrier to use TPF or PPP lies in people themselves. In practice it is in many cases impossible to reach an agreement between two (or more) farmers to build a common biogas plant. Reaching an agreement with public entity (for example municipality) is even harder.
However, there are several farmers that are interested in the TPF and are searching for investors since they are not able to invest on their own. /9/

Potential investors that are already thinking about biogas plant have made contact with domestic companies offering services (consultant or even building a whole plant) and also with foreign (especially from Austria, e.g. Agrinz GmbH). In general knowledge on biogas technology is relatively good concerning bigger investors and quite poor on the individual – farmer level.

- ***Social barriers***

Beside these barriers there are others. One of them is for example the fact that it is rather hard to reach an agreement among neighbors to work together in building a common biogas plant. They would rather build one for each. Cooperation among farm owners and potential investors is more likely but in these cases farmers' profits are much lower. Farmers are no longer interested in giving the manure for biogas plant for having a final output as better fertilizer. They expect getting a payment for their manure. According to the Ministry of Environment and Spatial Planning biogas plants are bound to (depending from feedstock and its quantity, which is rather low) IPPC regulation. This means an additional permit and time needed. This is a counterproductive and unnecessary measure as it penalises the farmer who wants to improve environmental output of the farm trough converting manure into environmentally friendlier digestate whereas his neighbour using the same amount of manure and not processing it trough the biogas plant does not have to do anything
Communities often are not supportive of the use of innovative technologies because they are unwilling to assume risks associated with testing and use of these schemes in their neighbourhoods. Strengthening of social acceptance (sensitisation, information, participation, etc.) is needed.

Public acceptance and of such schemes are relatively poor. Environmental awareness taking into account the global change and the reduction of land and water pollution is still weak.

- ***Economic barriers***

There were no major market reforms in last few years. The main mechanism that is driving the market development is uniform purchase price. Currently this price is not very promising and it is expected that the Ministry for economy will publish new uniform purchase prices for biogas plants. Price will also distinguish between biogas plants (smaller up to 500 kW, bigger up to 1 MW and big biogas plants above 1 MW) where price for smaller will be much higher in order to stimulate biogas plants on bigger farms instead of having few large ones In spite of raising interest for biogas plant building in Slovenia there is still a considerable lack (or it is not widespread enough) of knowledge about factors that influence the process of biogas production. The same is true also for the economical part of biogas plants and with environmental-veterinary-sanitary regulation on treating of input and output substances of the biogas process. One needs to understand that it is extremely difficult to provide the kind of the general cost estimates for the investment or for the operating cost.
Therefore, the detail planning of the process, the costs and revenues estimation with all due respect to the local circumstances is a must before the final decision about the project realization is made.

- ***Legal & Administrative barriers***

Permitting processes for implementing biogas technologies involve numerous levels and are time intensive. /34/

5.4. Further Topics

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7. ANNEX

7.1. ANNEX 1: Supplementary Figures and Tables

- Forecasted electricity production can be seen in the picture below:

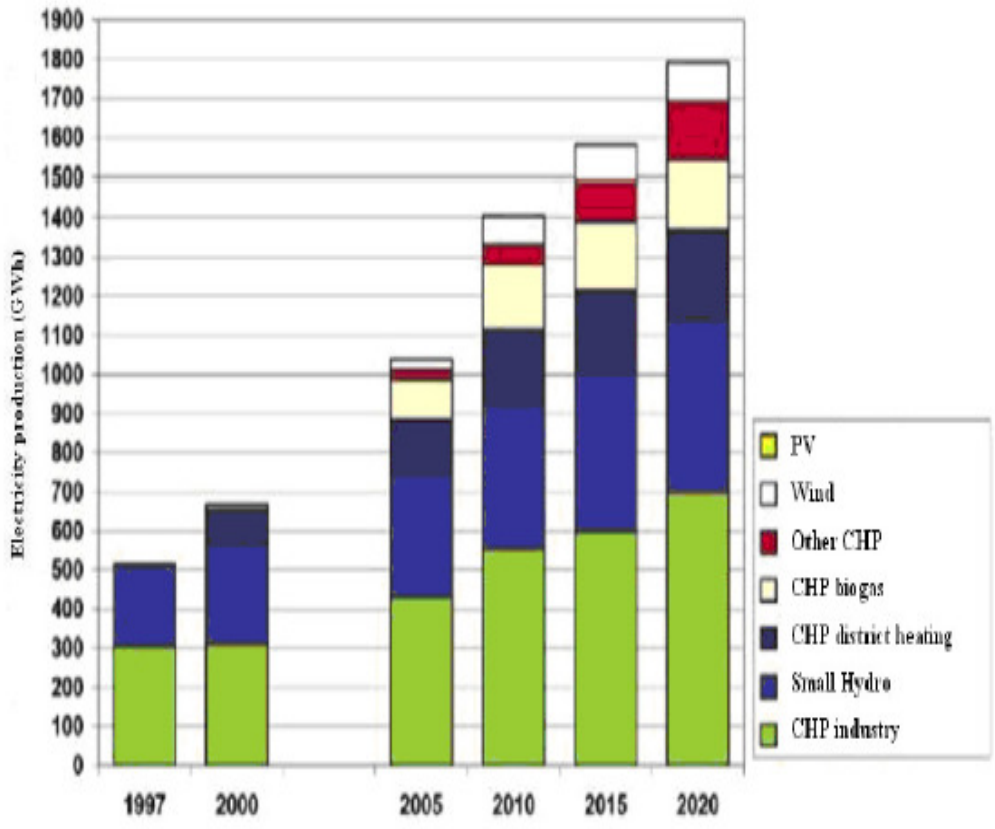

Figure 7-1: Electricity production

Source: Big East: Assessment ofBiogas Policies in Slovenia

- New energy law is under revision where the feed in tariff system will be renewed and purchase prices increased. In this document also projections of new capacities are given and are as follows:

Table 7-1: Yearly installed capacities in MW

Year	2008	2009	2010	2015	2020
Hydro	10,1	21,2	34,3	211,8	452,3
Biomass	0,4	0,8	1,2	11,3	25,8
Wind	0,0	0,5	1,0	181,0	411,0
Geothermal	0,0	0,0	0,0	3,0	28,0
PV	1,0	3,5	7,0	34,0	119,0
Biogas	1,0	3,5	6,0	18,5	35,0
Landfill, sewage	0,5	0,5	1,0	4,0	8,0
TOTAL in MW	13,0	30,0	50,5	463,6	1.079,1

Source: Big East: Assessment ofBiogas Policies in Slovenia

- New forecasts and expected produced electricity can be seen in the following figures.

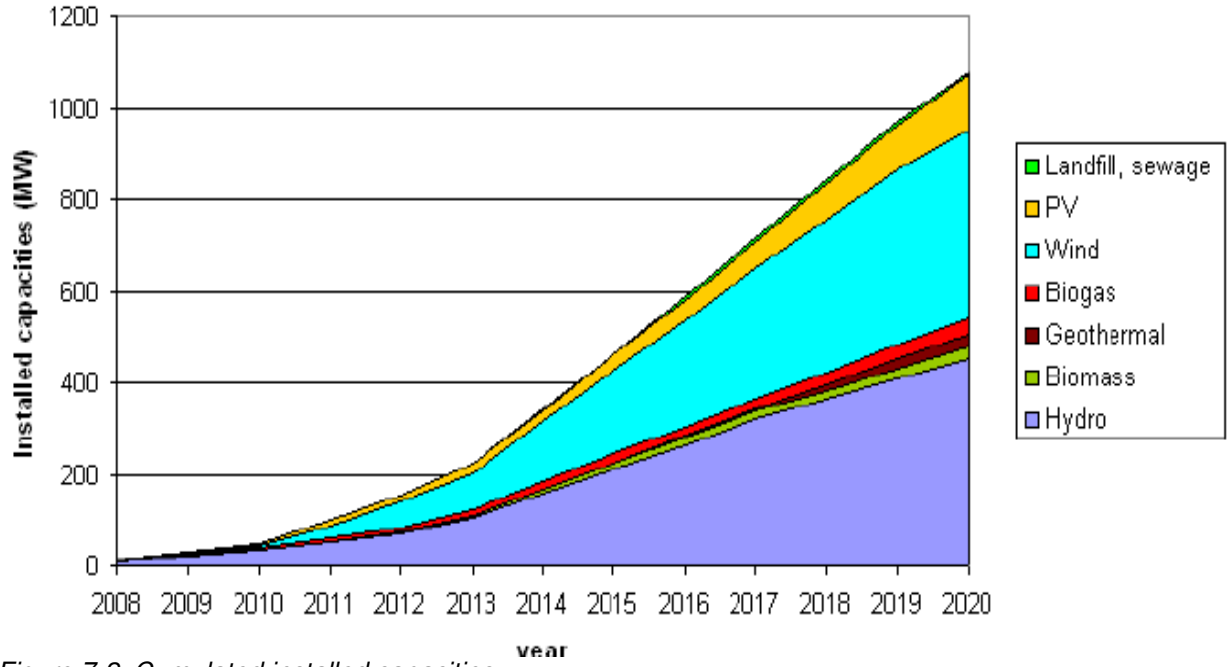

Figure 7-2: Cumulated installed capacities

Source: Big East: Assessment ofBiogas Policies in Slovenia

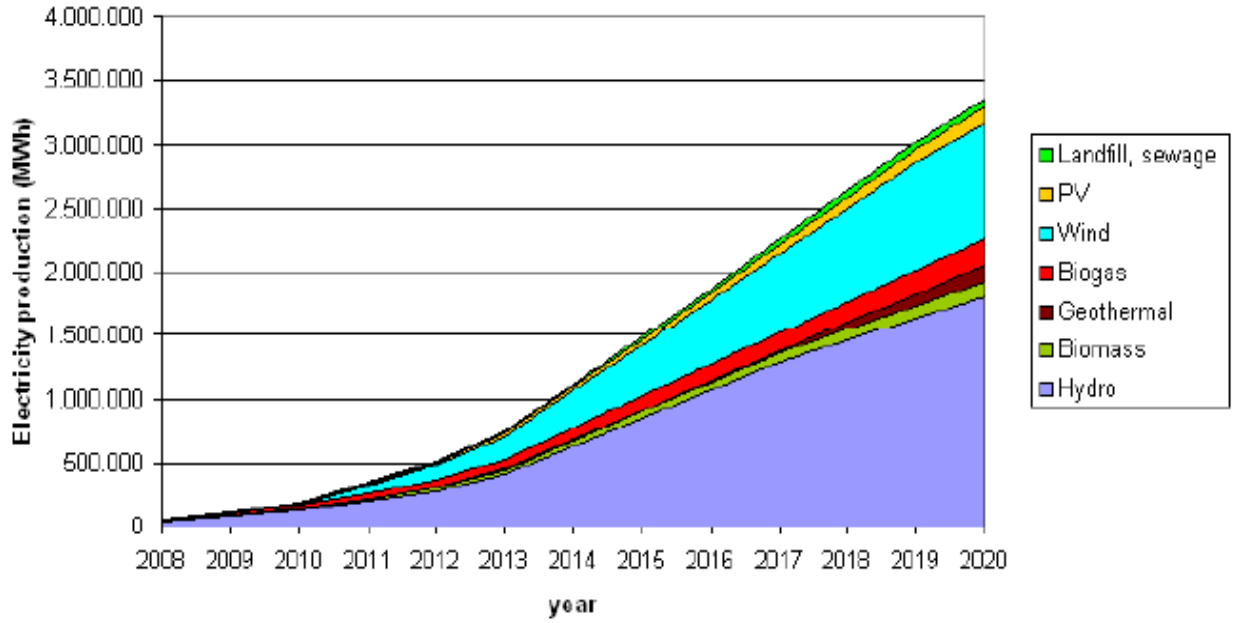

Figure 7-3: Electricity production
Source: Big East: Assessment ofBiogas Policies in Slovenia

Biofuels

Table 7-2: Precise review of the annual quantities of biofuels and their contribution to the total amount of motor fuels for 2009

NMB98 (kg)	63,028,957
NMB95 (kg)	527,007,325
Diesel (kg)	1,116,368,304
Total mineral fuel excluding biofuels (kg)	1,706,304,586
NMB98 (MJ)	2,763,819,764
NMB95 (MJ)	23,109,271,202
Diesel (MJ)	47,553,029,751
Total mineral fuel excluding biofuels (MJ)	**73,426,120,716**
Bioethanol in NMB98 (kg)	1,736,954
Bioethanol in NMB95 (kg)	1,155,499
Biodiesel in diesel (kg)	29,288,120
Pure biodiesel (kg)	2,387,850
Total biofuels (kg)	**34,558,423**
Bioethanol in NMB98 (MJ)	62,523,522
Bioethanol in NMB95 (MJ	41,859,975
Biodiesel in diesel (MJ)	1,080,731,630
Pure Biodiesel (MJ)	88,111,665
Total biofuels (MJ)	**1,273,226,792**
Biofuels installed in NMB98 (m/m %)	2,67
Biofuels installed in NMB95 (m/m %)	0,22
Biofuels installed in diesel (m/m %)	2,56
Share of biofuels in all fuels including biofuels (m/m %)	1,99
Biofuels installed in NMB98 (E/E %)	2,21
Biofuels installed in NMB95 (E/E %)	0,18
Biofuels installed in diesel (E/ E%)	2,22

Share of biofuels in all fuels including biofuels (E/E %)	1,70

7.2. ANNEX 2: Relewant laws (texts)

Biogas Policies in Slovenia

Relevant legislation framework affecting RES in Slovenia

• The Law on Energy (1999, amended 2000, 2002, 2004, 2005, 2007);

The Energy Act (OJ RS, No. 26/05, official consolidated text – EZ-UPB1). Ensures stimulation of the RES use gives priority to efficient use of energy and RES instead fossil fuels and enables different ways for promoting production of energy from RES. It also defines qualified producers of electricity. Qualified producers are producers that generate electricity in an ind vidual generating facility with a higher-than-average efficiency for heat and electricity cogneration, or that use renewable energy sources in a manner which is in accordance with environmental protection.

Also important here is the definition of electricity from renewable sources, this is as follows:

a) Electricity generated in power stations that use renewable energy sources exclusively

b) The proportion of electricity from renewable energy sources generated in combined power stations that also use fossil fuels, and

c) Electricity referred to in Points a) and b) of this indent that is used to fill energy storage systems, without using electricity generated from such systems.

Renewable sources of energy are sources of energy that are preserved in nature and are fully or largely renewable, in particular energy from watercourses, wind and biomass and geothermal and non-accumulated solar energy. Biomass is the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and timber industries, as well as the biodegradable fraction of industrial and municipal waste, the use of which for energy purposes is permitted by waste management regulations.

• Regulation for the conditions to acquire the status of qualified electricity producer (G. RS, no.71/2007)

The new Decree on the conditions for obtaining the status of a qualified electricity producer sets out types of qualified electricity producers in terms of primary source of electricity and nominal electrical power, conditions for obtaining the status of qualified electricity producer and the procedure for obtaining the status of a qualified electricity producer.

• Governmental regulation of rules for definition of prices and for purchase of electricity from qualified producers of electricity (Of. G. RS, no. 25/2002)

This regulation sets out the rules and starting points for contractual relations between qualified electricity producers and the operators of the networks to which qualified power plants are connected, and the rules for setting prices and premiums for the purchase of electricity from qualified electricity producers.

Decree on Prices and Premiums for Purchase of Electricity from Qualified Producers (Of. G. RS, no 8/2004, 25/2002, 75/2006) sets prices for produced and sold electricity to the grid kWh of RES-E.

□□ **Decree on emission of certificates of origin (Of. G. RS, no 121/2005)**

□□ **Rules on electricity market operation (Of. G. RS, no. 30/2001, 118/2003)**

□□ **Decree on common conditions for supply and selling of electricity (Of. G. RS, no. 117/2002 (21/2003 - amended))**

□ □**Environment protection law, (Of. G. RS, no. 39/2006)**

The law is legal basis for numerous instruments stimulation the use of RES, such as CO2

tax and emission trading. The law places the use of RES among the tasks that can be financed
from government budget for environment protection and from the sources of the Ecological fund.

- **Decree on environmental tax for air pollution with CO2 emission (Of. G. RS, no 43/2005, 58/2005, 87/2005, 20/2006)**
- **Regulation on waste management (Of. G. RS, no. 84/1998, 45/2000, 20/2001, 13/2003, 41/2004-ZVO-1)**
- **The law for construction of objects (Of. G. RS, no. 102/04)**

Source: Big East: Assessment ofBiogas Policies in Slovenia

7.3. ANNEX 3: Energy policies in Slovenia

Renewable Energy Policies in Slovenia

1. Support Instruments

Feed-in tariff system

The electricity production from renewable energies is supported trough the feed-in tariff system as shown in the table below. This system is foreseen for independent qualified producers 11 from which distribution companies12 have to buy electricity on fixed prices electricityfrom qualified producers of electricity (Official Gazette RS, no. 25/02) and with Decree on prices and premiums for purchase of electricity from qualified producers (Official Gazette RS,no. 75/06).Uniform annual prices for the purchase of electricity from qualified producers and uniform annual premiums (when independent qualified producer sells at uniform annual premium he get paid a sum of adequate premium and market price, which is not necessary higher as uniform annual price) for electricity that the producers are selling individually to the end consumer or via distributor are shown in the table below :

Table 7-3: Uniform annual prices/premiums for electricity from qualified power plants

Type of QPP regarding primary energy source	Power capacity	Uniform annual price (cent€/kWh)	Uniform annual premium (cent€/kWh)
Hydroelectric QPP	Up to 1 MW inclusive From 1 MW up to 10 MW inclusive	6,16 5,94	2,40 2,18
Biomass QPP	Up to 1 MW inclusive Above 1 MW	9,41	5,65
Wind QPP	Up to 1 MW inclusive Above 1 MW	6,07 5,86	2,32 2,11
Geothermal QPP		5,86	2,11
Photovoltaic QPP	Up to 36 kW inclusive Above 36 kW	37,42 37,42	33,66 23,66
Other QPP[13]		**12,09**	**8,33**
Combined QPP (CHP) using RES[14]		6,70	2,94
QPP or heating plant using communal waste[15]	Up to 1 MW inclusive From 1 MW up to 10 MW inclusive	5,32 4,95	1,56 1,20
Heating plant for district heating	Up to 1 MW inclusive From 1 MW up to 10 MW inclusive	7,30 6,89	3,55 3,13
Industrial heating plant[16]	Up to 1 MW inclusive	7,09	-

Source: Official Gazette of RS, No. 75/06; QPP stand for qualified power plant

In the table QPP refers to but the rest of text is talking about qualified power producer. Qualified power producer can own more different qualified power plants from which he can sell electricity with prices mentioned below regarding the type of power plant.
Uniform annual prices and uniform annual premiums do not include VAT. It is foreseen that

the prices will be changed once a year with government decree, taking into account the inflationand other relevant factors. Uniform annual price and premium is valid for 10 years, however it is decreased by 5% after 5 years of operation and for additional 5% after 10 years of operation

Financial subsidies
RES power plants are stimulated through feed in tariff system and therefore there are no additional subsidies available. There is only one exception and this is only for farmers which have the opportunity to obtain subsidies of up to 50% of investment costs. In this example the uniform purchase priced is decreased (for each 10 % of received subsidy the price is decreased by 5%, etc.). Currently farmers have the possibility to apply for these funds by the Agency of Republic of Slovenia for agricultural market. The agency has published a tender for diversification of the activities on farms where energy production is one of the foreseen measures.

Soft loans
Environmental development fund of Slovenia is a public fund offering within calls attractive credits for environmental and RES investments for companies and households. Its main mission is to encourage development in the area of environmental safety.
Eco fund will publish a call for financing environmental investments in next months where investments in biogas plants are also foreseen. It is expected that the interest rate will be EURIBOR + 0,3%, also depending on credit insurance or projects held in regional areas or natural parks.

Regulation on the CO2 Emission Tax
The government of the Republic of Slovenia passed a regulation on CO2 emission tax in 1996. The regulation was changed in 2002 (Official Gazette of RS, No 91/2002). The tax is paid on account of the fuel use as well as on the account of the burning of combustible organic substances and it is seen as a state budget income as a whole. Tax is not paid for the use of the biomass, biogas and processed animal albumen and fat. The base for the tax payment represents unit load (UL) and the carbon quantity released with the burning of the particular fuel and combustible organic substance. The government sets the tariff for the unit load (UL) and it currently amounts to 3 SIT/UL. Companies, which have to pay the CO2 emission tax, can get these taxes back if they investment in measures for reducing CO2 emissions. That means that the companies still pays CO2 emission tax for the amount of the used fuel, but they can get the tax partly back if they invest in the following projects:

1. Introduction of cogeneration of heat and electricity within reconstruction of existing heating power plant,
2. Introduction of combined cycle within reconstruction of existing gas turbine,
3. Realization of measurements of rational use of energy in existing industrial object,
4. Reconstruction of existing devices for heat supply of urban area or other measurements for heat supply,
5. Exchange of fossil fuels with renewable energy sources on existing heating devices,
6. Realization of measurements for reducing of heating losses in objects.

Source: Big East: Assessment of Biogas Policies in Slovenia