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**WP2: NATIONAL AND INTERNATIONAL ACTIVITIES ON BIOMASS CHP**

## **County report for Slovenia**

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## APPENDIX 1

Detailed information about biomass CHP plants in Slovenia

1. Tanin, Sevnica
2. Novoles, Straža
3. Furnirnica Merkscha, Celje
4. Tisa - Stol, Kamnik
5. Lipa, Ajdovščina

## **1 Current situation on CHP and biomass CHP in the national energy sector.**

Slovenia is a country poor with fossil fuels, in particular those of high quality. The existing energy system based on hydroelectric power plants is largely exploited. Due to Slovenia's specific natural conditions in the Alpine and Sub-alpine area, the environment is very vulnerable, which makes the construction of new power plants both a demanding and costly intervention. Slovenia's dependency on imported energy has reached as much as 81 %, although it should not exceed 65 %. The use of energy per inhabitant is within the average of the European Union, while the consumption per unit of GDP is 2.5 times higher, which means that energy is not used as efficiently as in the EU. With respect to this situation, it is understandable that the Resolution on Efficient Energy Supply and Use in Slovenia (1996) gives special emphases to the improvement of efficiency, and to the increase of consumption (production) through renewable energy sources.

On national level data about power production are collected by Statistical Office of the Republic of Slovenia. There are three important surveys at national level:

- The statistical survey of electricity and heat production in public power plants which covers public supply undertakings which generate electricity for sale to third parties as their primary activity;
- The statistical survey of autoproducers which covers autoproducer undertakings which generate electricity and/or heat wholly or partly for their own use as an activity which supports their primary activity;
- The statistical survey of heat supply which covers heat only plants and heat distribution companies.

Total gross production of electricity in Slovenia was 13.624 GWh (in year 2000), of which 32 % was produced in CHP plants (Table 1). The majority of all CHP plants are public plants, but also autoproducers are very important producers of electricity and heat. By our definition autoproducers are producer undertakings which generate electricity and heat wholly or partly for their own use as an activity which supports their primary activity. They may be privately or publicly owned. From Biomass CHP point of view the category of autoproducers is very important. According to our data almost all Biomass CHP plants are in wood processing industry and they are in category of autoproducers - they produce electricity and heat mainly for support their primary production.

Table 1: Electricity production by type of producers and net power of plants, 2000<sup>1</sup> (all data are in GW)

GW	total	Total		Public plants		Autoproducers		Male HE <sup>2)</sup>
		electricity only	CHP plants	electricity only	CHP plants	electricity only	CHP plants	Small HE <sup>2)</sup>
<b>TOTAL</b>								
<b>Gross production</b>	<b>13624</b>	<b>9247</b>	<b>4377</b>	<b>9061</b>	<b>3927</b>	<b>96</b>	<b>450</b>	<b>90</b>
<b>Own use by power plants</b>	<b>829</b>	<b>324</b>	<b>505</b>	<b>323</b>	<b>463</b>	<b>1</b>	<b>42</b>	<b>1</b>
<b>Net production</b>	<b>12795</b>	<b>8923</b>	<b>3872</b>	<b>8738</b>	<b>3464</b>	<b>96</b>	<b>408</b>	<b>89</b>
<b>Net power (MW)</b>	<b>2631</b>	<b>1768</b>	<b>863</b>	<b>1678</b>	<b>767</b>	<b>19</b>	<b>96</b>	<b>71</b>
<b>Hydroelectric power plants</b>								
Gross production	3834	3834	-	3648	-	96	-	90
Own use by power plants	63	63	-	62	-	1	-	1
Net production	3771	3771	-	3586	-	96	-	89
Net power (MW)	860	860	-	770	-	19	-	71
<b>Conventional thermal plants</b>								
Gross production	5029	652	4377	652	3927	-	450	-
Own use by power plants	553	49	505	49	463	-	42	-
Net production	4476	603	3872	603	3464	-	408	-
Net power (MW)	1115	252	863	252	767	-	96	-
<b>Nuclear power plant</b>								
Gross production	4761	4761	-	4761	-	-	-	-
Own use by power plants	212	212	-	212	-	-	-	-
Net production	4549	4549	-	4549	-	-	-	-
Net power (MW)	656	656	-	656	-	-	-	-

1) The figures are rounded, so the sums might not be totally correct.

2) Estimate for small private hydroelectric power plants.

Source of data: Statistical Office of the Republic of Slovenia, 2001

The majority of CHP plants in Slovenia are producing electricity and heat from lignite, brown coal, fuel oil and natural gas, only 1 % of power from CHP plants is produced from biomass (table 2). Among biomass only wood, wood waste and biogas are used as a fuel in CHP plant.



Table 2: Fuel use in conventional thermal plants, (year2000)

	Unit	Total			Public plants		Autoproducers <sup>1)</sup>	
		Total	Electricity only	CHP plants	Electricity only	CHP plants	Electricity only	CHP plants
Brown coal, imported	1000 t	426	-	426	-	347	-	79
Brown coal, domestic	1000 t	749	609	140	609	140	-	-
Lignite	1000 t	3718	-	3718	-	3718	-	-
Wood and wood waste	1000 t	133	-	133	-	-	-	133
Fuel oil, extra light	1000 t	2	2	-	2	0	-	0
Fuel oil, sulphur below 1%	1000 t	51	-	51	-	2	-	49
Fuel oil, sulphur 1% and more	1000 t	-	-	-	-	-	-	-
Other liquid fuels	1000 t	285	-	285	-	-	-	285
Natural gas	mio Sm <sup>3</sup>	225	1	224	1	-	-	224
Bio gas	mio Sm <sup>3</sup>	9	-	9	-	-	-	9

<sup>1)</sup>Fuel use for electricity production and for heat production for sale and for own use is included.

Source of data: Statistical Office of the Republic of Slovenia, 2001

If we study heat supply in last 5 years we can see that the net production has increased (index is 1,13). Especially the production of CHP plants has increased (for 555 TJ in last 5 years), but unfortunately not on the account of biomass (Table 3).

Table 3: Balance of heat supply

	Unit	1995	1996	1997	1998	1999	2000
<b>Net production</b>							
	<b>TJ</b>	<b>8097</b>	<b>8191</b>	<b>7972</b>	<b>8098</b>	<b>8149</b>	<b>9172</b>
Heat only plants	TJ	2420	2230	2126	2037	2153	2940
CHP plants	TJ	5677	5961	5846	6061	6266	6232
<b>Fuel use<sup>1)</sup></b>							
Brown coal	1000 t	221	234	208	254	240	205
Lignite	1000 t	205	192	161	161	156	159
Wood and wood waste	1000 t	41	41	33	30	30	28
Fuel oil, extra light	1000 t	3	2	2	3	5	4
Fuel oil, sulphur below 1%	1000 t	7	17	7	2	1	1
Other liquid fuels	1000 t	...	...	...	...	...	0
Natural gas	mio Sm <sup>3</sup>	78	88	87	93	94	121
<b>Final consumption</b>							
	<b>TJ</b>	<b>8097</b>	<b>8191</b>	<b>7972</b>	<b>8098</b>	<b>8149</b>	<b>8181</b>
Households	TJ	3876	4446	4589	4465	4330	3952
Other consumers	TJ	4221	3745	3383	3633	3819	4229

Source of data: Statistical Office of the Republic of Slovenia, 2001

## **2 RTD and Demonstration projects on biomass CHP**

There are no RTD or Demonstration projects on biomass CHP in Slovenia at the moment. We have only demonstration projects on biomass district heating systems (PHARE project in towns: Gornji Grad, Preddvor, Solčava and Nazarje).

## **3 Existing CHP plants**

There were only 8 biomass CHP plants in Slovenia in 1995. According to an available database (Ministry of the Environment and Spatial Planning, RACI) there are 6 CHP plants in Slovenia. Five of them are autoproducers installed in wood processing industry. One plant was part of wood processing factory but with downfall of the factory it was sold separately to a private company and now they produce and sell power to different small companies in close neighbourhood. Only one plant is selling surplus electricity and heat to the grid. They all have old out-of-date combustion technologies.

Wood waste from wood processing industry are used in all five plants. Three of them are using only wood waste from their production, two plants are buying wood waste from different suppliers.

The sixth plant is located in a sewage water cleaning plant, using biogas as fuel for gas engines. Three engines (250 kW<sub>el</sub> each) are installed at this plant, but two of them are out of commission.

The installed electric power of all this five plants is 5,2 MW<sub>el</sub>. Average annual production is 15,4 GWh of electric power and 190,5 GWh of heat.

All the details are in Appendix 1.

## 4 Legislation and support mechanisms

In Slovenia we don't have special law about renewable sources of energy. Also there is no special legal instrument for promotion of biomass CHP plants.

At the moment there are only few legal documents regarding biomass CHP plants:

### 1. Energy Conservation Strategy for Slovenia (1996):

- Special emphasis is given to the promotion of renewable sources of energy (*according to this document share of wood biomass as energy source should double by the year 2010 (from 4 to 8 %)*). To reach this goal some action from the state should be taken (subsidies, investments, CO<sub>2</sub> taxes, special prices for "green electricity" – electricity produced from biomass).
- There were 8 biomass CHP in Slovenia in 1994 (*heat production 60 MWh and electricity production 8.5 MWh*)
- The strategy anticipates investments in 6 new biomass CHP till 2010 (*The estimate value of the investment is 12 mill. X.*).

### 2 Action programme for use of wood biomass in Slovenia (from 2001 to 2010)

- It is still just a proposal of the government to the parliament (it was not accepted yet).
- It doesn't anticipate any investment in biomass CHP, only in biomass district heating systems (50 new systems), biomass installation's in industry (100 new installation's) and biomass heating systems for individual houses (5000 new individual heating systems).
- Investments in installations in industry can also include biomass CHP plants.
- The estimate value of the investment is 179 mill. X

### 3 National energy programme (from 2001 to 2010)

- According to the law we should have a national energy programme.
- It is still in preparation, a special emphasis should be given also to biomass CHP plants.

### 4 Tax on burdening the air with carbon dioxide

- According to current legislation users of fossil fuels are entitled to certain tax deductions based on former fuel consumption, electricity generation and measures for efficient energy consumption, former fuel consumption contributing the major part of the deductions.
- An amendment should come into force soon, cancelling all the deductions based on former fuel consumption, thus making biomass a more interesting energy source.

### 5 Tax on waste deposition

- Tax on waste deposition is among other things based on the content of organic carbon in the waste, this carbon contributing to much higher taxes.
- With use of biomass as energy source two taxes can be avoided. First, tax on waste deposition, and second CO<sub>2</sub> tax, that should be paid for substitute fossil fuel.



## 5 Literature

1. Statistical Yearbook of the Republic of Slovenia. Statistical office of RSlovenia, Ljubljana, 2001,
2. (2000). Programme of use of wood biomass in Slovenia. Proposal to the government., Ministry of the environment and spatial planning, 46 p.
3. (1996). Resolution on Efficient Energy Supply and Use in Slovenia (1996). Ministry of economic affairs, 126 p.
4. KRAJNC, N, / DOMAC, J. (2001). South-Eastern European Biomass Action - A new international research co-operation between Slovenia and Croatia. V: Woody biomass as an energy source - challenges in Europe. Finland. Joensuu: European Forest Institute: Proceedings No. 39, p. 131 - 139.

## 6 Term of references

**Public plants** are public supply undertakings which generate electricity or electricity and heat as their primary activity. They may be privately or publicly owned.

**Renewables** comprise solid biomass, industrial and municipal waste.

**Autoproducers** are autoproducer undertakings which generate electricity and/or heat wholly or partly for their own use as an activity which supports their primary activity. They may be privately or publicly owned.

**CHP plants** are combined heat and power plants which are designed to produce both heat and electricity.

**Heat only plants** are plants which are designed to produce heat only.

# BIOCOGEN, TASK 2

## Existing CHP plants

<b>Country:</b>	Slovenia
<b>Name:</b>	Lipa
<b>Location:</b>	Ajdovščina
<b>Owner:</b>	Lipa
<b>Year of construction:</b>	1984, 1983

**Short description of the plant**  
 It's an old plant in wood processing industry. They are autoproducers - they generate electricity and heat mostly for their own use as an activity which supports their primary activity. They produce electricity only 6 months. There is the only steam engine for producing electricity from biomass in Slovenia. There are two boilers. And 4 heat exchangers.

<b>Character of plant</b>	Commercial plant																									
<b>Annual production (normal year)</b>	<table border="1"> <thead> <tr> <th></th> <th></th> <th>Value</th> <th>Their own use (%)</th> <th>Covering their own needs (%)</th> </tr> </thead> <tbody> <tr> <td>District heat</td> <td>46,4</td> <td>GWh</td> <td>100</td> <td>100</td> </tr> <tr> <td>Grid electricity</td> <td>0,02</td> <td>GWh</td> <td>100</td> <td>20</td> </tr> <tr> <td>Electric efficiency</td> <td>n.a.</td> <td>%</td> <td></td> <td></td> </tr> <tr> <td>Thermal efficiency</td> <td>n.a.</td> <td>%</td> <td></td> <td></td> </tr> </tbody> </table>			Value	Their own use (%)	Covering their own needs (%)	District heat	46,4	GWh	100	100	Grid electricity	0,02	GWh	100	20	Electric efficiency	n.a.	%			Thermal efficiency	n.a.	%		
		Value	Their own use (%)	Covering their own needs (%)																						
District heat	46,4	GWh	100	100																						
Grid electricity	0,02	GWh	100	20																						
Electric efficiency	n.a.	%																								
Thermal efficiency	n.a.	%																								
<b>Technology</b>	<ul style="list-style-type: none"> <li>Combustion</li> <li>Steam engine</li> </ul>																									
<b>Capacity</b>	<ul style="list-style-type: none"> <li>Gate</li> <li>Capacity: 7,5 * 2 MW<sub>fuel</sub></li> </ul>																									

Fuel	Moisture content (%)	Lower heating value (kWh/kg)	Input of biomass (m3/h)
Woodchips (saw industry)	20	n.a.	1,4
others			
Fuel for pilot flame			

<b>Turbine</b>	Type: Spilling	Power: 1,100 MW <sub>el</sub>
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<b>Heat exchanger</b>	Type: IMP	Heat: 2* 5,5, 2*1,5 MW <sub>th</sub>
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<b>Flue Gas</b>	Flue gas volume flow: n.a. Nm <sup>3</sup> /h	Flue gas temperature: 180-250 °C
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<b>Emissions</b>	CO: 1100 mg/Nm <sup>3</sup>	NOx: 650 mg/Nm <sup>3</sup>	Particles: n.a. mg/Nm <sup>3</sup>	CxHy: n.a. mg/Nm <sup>3</sup>	SO <sub>2</sub> : n.a. mg/Nm <sup>3</sup>	Other: n.a. mg/Nm <sup>3</sup>
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<b>Costs</b>	Investment costs: n.a. Mio €
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	Fuel Costs (€/m <sup>3</sup> )	7,7
Woodchips (saw industry)		

Others	Subsidies: 0,000 Mio €	Number of employees: 6 (in four shifts)
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<b>Operating time</b>	Annual operating time: 7.969 h/a
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# PROCOGEN, TASK 2

## Existing CHP plants

<b>Country:</b>	Slovenia
<b>Name:</b>	Stol
<b>Location:</b>	Kamnik
<b>Owner:</b>	Tisa d.o.o.
<b>Phone:</b>	+386 1 8315 584
<b>Fax:</b>	+386 1 8314 908
<b>Email:</b>	
<b>Webpage:</b>	
<b>Year of construction:</b>	1968

**Short description of the plant**  
 It's an old plant built in wood processing industry. It is privately owned. Electricity and heat are sold to 55 small companies in neighbourhood. They will start with reconstruction this year. They are planing to start with new technology this year. The surplus will be sold to the grid.

<b>Character of plant</b>	Commercial plant																				
<b>Annual production (normal year)</b>	<table border="1"> <thead> <tr> <th></th> <th></th> <th>Their own use (%)</th> <th>Covering their own needs (%)</th> </tr> </thead> <tbody> <tr> <td>District heat:</td> <td>12,9 GWh</td> <td>0</td> <td>100</td> </tr> <tr> <td>Grid electricity:</td> <td>2,7 GWh</td> <td>18</td> <td>100</td> </tr> <tr> <td>Electric efficiency:</td> <td>n.a. %</td> <td></td> <td></td> </tr> <tr> <td>Thermal efficiency:</td> <td>n.a. %</td> <td></td> <td></td> </tr> </tbody> </table>			Their own use (%)	Covering their own needs (%)	District heat:	12,9 GWh	0	100	Grid electricity:	2,7 GWh	18	100	Electric efficiency:	n.a. %			Thermal efficiency:	n.a. %		
		Their own use (%)	Covering their own needs (%)																		
District heat:	12,9 GWh	0	100																		
Grid electricity:	2,7 GWh	18	100																		
Electric efficiency:	n.a. %																				
Thermal efficiency:	n.a. %																				
<b>Technology</b>	<ul style="list-style-type: none"> <li>Combustion</li> <li>Steam turbine</li> <li>Gate</li> </ul>																				
<b>Capacity</b>	6,0 MW <sub>fuel</sub>																				

Fuel	Moisture content (%)	Lower heating value kWh/kg	Input of biomass kg/h
Woodchips (saw industry)	30	2,33	2575
others			
Fuel for pilot flame			

<b>Turbine</b>	Type	KKK
	Power	1,22 MW <sub>el</sub>

<b>Heat exchanger</b>	Type	
	Heat	MW <sub>th</sub>

<b>Flue Gas</b>	Flue gas volume flow	17000 Nm <sup>3</sup> /h
	Flue gas temperature	259 °C

<b>Emissions</b>	CO	171 mg/Nm <sup>3</sup>
	NOx	402 mg/Nm <sup>3</sup>
	Particles	n.a. mg/Nm <sup>3</sup>
	CxHy	n.a. mg/Nm <sup>3</sup>
	SO <sub>2</sub>	0 mg/Nm <sup>3</sup>
	Other	n.a. mg/Nm <sup>3</sup>

<b>Costs</b>	Investment costs	Mio €
	Fuel Costs (€/t)	
	Woodchips (saw industry)	22,7
	Others	
	Subsidies	0,000 Mio €
	Number of employees	17 (in 3 shifts)
<b>Operating time</b>	Annual operating time	5.616 h/a

# BIOCOGEN, TASK 2

## Existing CHP plants

Country:	Slovenia
Location:	Merkscha Furnirnica
Address:	Celje
Operator:	Merkscha Furnirnica
Phone:	+386 3 428 5166
Email:	
Webpage:	
Year of construction	1977

**Short description of the plant**  
 It's an old plant in wood processing industry. They are autoproducers - they generate electricity and heat mostly for their own use as an activity which supports their primary activity. They sell surpluses of electricity and heat to the grid. It is privately owned. The turbine was reconstructed in 2001.

<b>Character of plant</b>	Commercial plant			
			Their own use (%)	Covering their own needs (%)
<b>Annual production (normal year)</b>	District heat:	20 GWh	85	100
	Grid electricity:	1,2 GWh	90	70
	Electric efficiency:	n.a. %		
	Thermal efficiency:	n.a. %		
<b>Technology</b>	Combustion			
	Steam turbine			
<b>Capacity</b>	Gate			
	Capacity:	12,0 MW <sub>fuel</sub>		

Fuel	Moisture content (%)	Lower heating value (kWh/kg)	Input of biomass (m3/h)
Woodchips (saw industry)	60 %	20	2,5
Bark and other wood residues	40 %	30	1,6
Others	%		
Fuel for pilot flame	%		

<b>Turbine</b>	Type	AEG-KANIS
	Power	0,755 MW <sub>el</sub>

<b>Heat exchanger</b>	Type	
	Heat	MW <sub>th</sub>

<b>Flue Gas</b>	Flue gas volume flow	18725 Nm <sup>3</sup> /h
	Flue gas temperature	197 °C

<b>Emissions</b>	CO	504 mg/Nm <sup>3</sup>
	NOx	120 mg/Nm <sup>3</sup>
	Particles	124 mg/Nm <sup>3</sup>
	CxHy	n.a. mg/Nm <sup>3</sup>
	SO <sub>2</sub>	0 mg/Nm <sup>3</sup>
	Other	n.a. mg/Nm <sup>3</sup>

<b>Costs</b>	Investment costs	n.a. Mio €
		Fuel Costs (€/m <sup>3</sup> )
	Woodchips (saw industry)	4,7
	Sawdust	3,6
	Others	
	Subsidies	0,000 Mio €
	Number of employees	6 (in four shifts)
<b>Operating</b>	Annual operating time	8.256 h/a



# PROCOGEN, TASK 2

## Existing CHP plants

<b>Country:</b>	Slovenia		
<b>Name:</b>	NOVOLES		
<b>Location:</b>	Straža		
<b>Owner:</b>	Novoles		
<b>Phone:</b>	+386 7 308 45 00		
<b>Fax:</b>	+386 7 308 38 78		
<b>Email:</b>			
<b>Webpage:</b>			
<b>Year of construction</b>	1970		
<b>Short description of the plant</b>	It's an old plant in wood processing industry. They are autoproducers - they generate electricity and heat wholly for their own use as an activity which supports their primary activity. It is privately owned. They are using wood remains from their own production - but they are officially buying the wood remains from different parts of factory.		
<b>Character of plant</b>	Commercial plant		
<b>Annual production (normal year)</b>	District heat:	66,4 GWh	Their own use (%) 100
	Grid electricity:	7,4 GWh	Covering their own needs (%) 73
	Electric efficiency	n.a. %	
	Thermal efficiency	n.a. %	
<b>Technology</b>	Combustion		
	Steam turbine		
<b>Process</b>	Grate		
	Capacity	13,8 MW <sub>fuel</sub>	
<b>Fuel</b>			Moisture content %
	Woodchips (saw industry)	91 %	Lower heating value kWh/kg 30
	Sawdust	9 %	Input of biomass m3/h 0,6
	others	%	
	Fuel for pilot flame	%	
<b>Turbine</b>	Type	Siemens T 50-59	
	Power	1,95 MW <sub>el</sub>	
<b>Heat exchanger</b>	Type		
	Heat	MW <sub>th</sub>	
<b>Flue Gas</b>	Flue gas volume flow	26400 Nm <sup>3</sup> /h	
	Flue gas temperature	223 °C	
<b>Emissions</b>	CO	669 mg/Nm <sup>3</sup>	
	NOx	276 mg/Nm <sup>3</sup>	
	Particles	n.a. mg/Nm <sup>3</sup>	
	CxHy	n.a. mg/Nm <sup>3</sup>	
	SO <sub>2</sub>	0 mg/Nm <sup>3</sup>	
	Other	n.a. mg/Nm <sup>3</sup>	
<b>Costs</b>	Investment costs	1,5 Mio €	(In year 1970)
		Fuel Costs (€/m3)	
	Woodchips (saw industry)	16	
	Sawdust	0,3	
	Others		
	Subsidies	0,000 Mio €	
	Number of employees	12	(in four shifts)
<b>Operating time</b>	Annual operating time	5,678 h/a	

# PROCOGEN, TASK 2

## Existing CHP plants

<b>Country:</b>	Slovenia																						
<b>Name:</b>	TANIN																						
<b>Location:</b>	Sevnica																						
<b>Owner:</b>	Tanin Sevnica																						
<b>Phone:</b>	+386 7 814 12 24																						
<b>E-mail:</b>																							
<b>Homepage:</b>																							
<b>Year of construction</b>	1978																						
<b>Short description of the plant</b>	It's an old plant in wood processing industry. They are autoproducers - they generate electricity and heat wholly for their own use as an activity which supports their primary activity. It is privately owned. They are using wood remains from their own production - that's why the costs of wood fuel for this plant is 0.																						
<b>Character of plant</b>	Commercial plant																						
<b>Annual production (normal year)</b>	District heat:	91,2 GWh	<table border="1"> <thead> <tr> <th></th> <th>Their own use (%)</th> <th>Covering their own needs (%)</th> </tr> </thead> <tbody> <tr> <td>District heat:</td> <td>100</td> <td>100</td> </tr> <tr> <td>Grid electricity:</td> <td>100</td> <td>70</td> </tr> </tbody> </table>		Their own use (%)	Covering their own needs (%)	District heat:	100	100	Grid electricity:	100	70											
	Their own use (%)	Covering their own needs (%)																					
District heat:	100	100																					
Grid electricity:	100	70																					
	Grid electricity:	4,1 GWh																					
	Electric efficiency	n.a. %																					
	Thermal efficiency	80 %																					
<b>Technology</b>	Combustion																						
	Steam turbine																						
<b>Capacity</b>	Gate																						
	Capacity	16,9 MW <sub>fuel</sub>																					
<b>Fuel</b>			<table border="1"> <thead> <tr> <th></th> <th>Moisture content (%)</th> <th>Lower heating value (kWh/kg)</th> <th>Input of biomass (kg/h)</th> </tr> </thead> <tbody> <tr> <td>Woodchips (saw industry)</td> <td>93 %</td> <td>50</td> <td>6903</td> </tr> <tr> <td>Bark</td> <td>1 %</td> <td>60</td> <td></td> </tr> <tr> <td>Others fuel oil</td> <td>6 %</td> <td></td> <td>200 t/year</td> </tr> <tr> <td>Fuel for pilot flame</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Moisture content (%)	Lower heating value (kWh/kg)	Input of biomass (kg/h)	Woodchips (saw industry)	93 %	50	6903	Bark	1 %	60		Others fuel oil	6 %		200 t/year	Fuel for pilot flame			
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<b>Turbine</b>	Type	Franco Tosi - T.V.A. 500																					
	Power	1,32 MW <sub>el</sub>																					
<b>Heat exchanger</b>	Type																						
	Heat	MW <sub>th</sub>																					
<b>Flue Gas</b>	Flue gas volume flow	20510 Nm <sup>3</sup> /h																					
	Flue gas temperature	221 °C																					
<b>Emissions</b>	CO	38 mg/Nm <sup>3</sup>																					
	NOx	248 mg/Nm <sup>3</sup>																					
	Particles	115 mg/Nm <sup>3</sup>																					
	CxHy	1,1 mg/Nm <sup>3</sup>																					
	SO <sub>2</sub>	10 mg/Nm <sup>3</sup>																					
	Other	n.a.	mg/Nm <sup>3</sup>																				
<b>Costs</b>	Investment costs	1,5 Mio €	(In year 1977)																				
		<table border="1"> <thead> <tr> <th></th> <th>Fuel Costs (€/t)</th> </tr> </thead> <tbody> <tr> <td>Woodchips (saw industry)</td> <td>0</td> </tr> <tr> <td>Bark</td> <td>0</td> </tr> <tr> <td>Others fuel oil</td> <td>0,28 €/kg</td> </tr> </tbody> </table>			Fuel Costs (€/t)	Woodchips (saw industry)	0	Bark	0	Others fuel oil	0,28 €/kg												
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Bark	0																						
Others fuel oil	0,28 €/kg																						
	Subsidies	0,000 Mio €																					
	Number of employes	7	(in four shifts)																				
<b>Availability</b>	Annual operating time	8000 h/a																					