

R.E.S. INTEGRATION

RURAL SUSTAINABLE DEVELOPMENT THROUGH INTEGRATION OF RENEWABLE ENERGY TECHNOLOGIES IN POOR EUROPEAN REGIONS

Specific Targeted Research Project (FP6-509204)

WORK PACKAGE 2: Identify schemes for IRES implementation

Project Acronym	R.E.S. INTEGRATION	
Project Full Title	Rural sustainable development through integration of renewable energy technologies in poor European regions	
Contract number	FP6-509204	
Type of action	Specific Targeted Research Project	
Project duration	1 st November 2004 – 31 st October 2007	
Project coordination	AUA – Agriculture University Of Athens, Greece	
Contact persons Germany WIP	Maurice Pigaht, M.Eng. WIP - Renewable Energies Tel: +49 89 72012724 Fax: +49 89 72012791 maurice.pigaht@wip-munich.de www.wip-munich.de	
Document's title	DELIVERABLE No 3: Inventory of RES Technologies	
Date	30 September 2005	

Project supported by the European Commission
within the 6th framework Programme



Specific measures in support of
International Co-operation - Western Balkan Countries (INCO-WBC)

<http://www.cordis.lu/fp6/inco.htm>



WOOD CHIPS FOR HEATING		NATIONAL SITUATION
General description of the technology		Wood chips are an ideal feedstock source for central or district heating systems in forested areas. The targeted areas has large and regular amounts of wood chips that are produced from forestry and wood manufacturing residues. The chips are often produced from larger pieces of wood waste by private wood shredding companies/individuals.
General information of the resource to be exploited		25 915 m ³ wood chips 8.890 m ³ Sawdust
Possible application and routes	Estimated power to be installed	Sufficient theoretical potential to operate a 16.5MW plant
	Estimated energy production	Total potential of 132.500.000kWh
	Estimated energy distribution all year round	All year round (dependant only on storage capacity)
General data on costs		Strongly dependant on the size of the district heating network and the distance between homes to be covered.
Energy objectives		53% of heat consumption from local renewable sources
Environmental & sustainability issues		Wood chips should be produced from sustainably managed forests. Chip production from general forest maintenance, cuttings and re-growth is also possible. However, after a certain level of exploitation (e.g. more than half of the natural re-growth), sustainability issues arise because of losses in soil quality.
Socio-economic benefits		Creation of small wood shredding enterprises. Re-introduction of local wastes into value chains. Improvement of the regional balance of payments.



Wood Pellets Production		NATIONAL SITUATION
General description of the technology		The production of wood-pellets in the Achantal and the Leukental regions
General information of the resource to be exploited		Waste products of sawmills and wood industries
Possible application and routes	Estimated power to be installed	8.890 m ³ sawdust per annum 25.915 m ³ wood-chips
	Estimated production	1,69 t/h wood pellets per annum
	Estimated energy distribution all year round	13500 tons wood pellets per annum relatively evenly distributed
General data on costs		5-6t/h capacity estimated as being required for profitable operation
Energy objectives		Energy export
Environmental & sustainability issues		Wood exploitation is limited by forest re-growth and the return of nutrients to the soil
Socio-economic benefits		Energy exports leading to an improved trade balance. Local employment in pellets manufacture. Local employment in wood residues/pellets trade.



Biogas plant (plant waste)		NATIONAL SITUATION																																																			
General description of the technology	Gasification of in biogas digesters. Combustion of gas in biogas motors or modified tractor motors. Sale of heat and electricity.																																																				
General information of the resource to be exploited	3.185 tons per year green cuttings organic part of domestic waste – 289 tons per year food leftovers – 800 tons per year cooking oils/fat – 30 tons per year																																																				
Possible application and routes	Estimated power to be installed	1.1 MW																																																			
	Estimated energy production	9 054 000 kWh per year																																																			
	Estimated energy distribution all year round	<table border="1"> <caption>Estimated data from the energy distribution chart</caption> <thead> <tr> <th>Month</th> <th>Gras (%)</th> <th>Strauchschnitt/anderes (%)</th> <th>Total (%)</th> </tr> </thead> <tbody> <tr><td>1</td><td>1.8</td><td>0.2</td><td>2.0</td></tr> <tr><td>2</td><td>1.8</td><td>0.2</td><td>2.0</td></tr> <tr><td>3</td><td>0.0</td><td>0.0</td><td>0.0</td></tr> <tr><td>4</td><td>1.0</td><td>9.0</td><td>10.0</td></tr> <tr><td>5</td><td>3.0</td><td>5.0</td><td>8.0</td></tr> <tr><td>6</td><td>6.5</td><td>3.5</td><td>10.0</td></tr> <tr><td>7</td><td>7.5</td><td>3.5</td><td>11.0</td></tr> <tr><td>8</td><td>6.5</td><td>5.0</td><td>11.5</td></tr> <tr><td>9</td><td>4.5</td><td>7.0</td><td>11.5</td></tr> <tr><td>10</td><td>3.5</td><td>14.5</td><td>18.0</td></tr> <tr><td>11</td><td>2.0</td><td>0.0</td><td>2.0</td></tr> <tr><td>12</td><td>0.0</td><td>3.5</td><td>3.5</td></tr> </tbody> </table>	Month	Gras (%)	Strauchschnitt/anderes (%)	Total (%)	1	1.8	0.2	2.0	2	1.8	0.2	2.0	3	0.0	0.0	0.0	4	1.0	9.0	10.0	5	3.0	5.0	8.0	6	6.5	3.5	10.0	7	7.5	3.5	11.0	8	6.5	5.0	11.5	9	4.5	7.0	11.5	10	3.5	14.5	18.0	11	2.0	0.0	2.0	12	0.0	3.5
Month	Gras (%)	Strauchschnitt/anderes (%)	Total (%)																																																		
1	1.8	0.2	2.0																																																		
2	1.8	0.2	2.0																																																		
3	0.0	0.0	0.0																																																		
4	1.0	9.0	10.0																																																		
5	3.0	5.0	8.0																																																		
6	6.5	3.5	10.0																																																		
7	7.5	3.5	11.0																																																		
8	6.5	5.0	11.5																																																		
9	4.5	7.0	11.5																																																		
10	3.5	14.5	18.0																																																		
11	2.0	0.0	2.0																																																		
12	0.0	3.5	3.5																																																		

General data on costs	Guaranteed feed-in tariff around 9.9c/kWh
Energy objectives	Increased energy autonomy
Environmental & sustainability issues	Reduction of waste Increased use of renewable energies
Socio-economic benefits	Local employment Improved trade balance Addition income for rural economy



Biogas plant (animal waste)		NATIONAL SITUATION
General description of the technology		Gasification of in biogas digesters. Combustion of gas in biogas motors or modified tractor motors. Sale of heat and electricity.
General information of the resource to be exploited		24 064 tons per annum animal manure
Possible application and routes	Estimated power to be installed	3,6 MW
	Estimated energy production	28 800 000 kWh
	Estimated energy distribution all year round	Peaks in the winter
General data on costs		Transport costs of manure a key problem
Energy objectives		Increased energy autonomy
Environmental & sustainability issues		Reduction of waste Increased use of renewable energies
Socio-economic benefits		Local employment Improved trade balance Addition income for rural economy



Energy crops		NATIONAL SITUATION
General description of the technology		Raising biogas capacity by planting energy crops (mainly corn).
General information of the resource to be exploited		1229 ha
Possible application and routes	Estimated power to be installed	810 kW
	Estimated energy production	6 480 000 kWh
	Estimated energy distribution all year round	Almost exclusively in the harvesting season
General data on costs		Guaranteed feed-in tariff around 9.9c/kWh
Energy objectives		Increased energy autonomy
Environmental & sustainability issues		Reduction of waste Increased use of renewable energies
Socio-economic benefits		Local employment Improved trade balance Addition income for rural economy



Solar thermal		NATIONAL SITUATION
General description of the technology		Solar thermal systems on domestic roofs and municipal buildings.
General information of the resource to be exploited		One of the best insulations in this part of Europe. Solar thermal installations on about 50 000m ² of roof space.
Possible application and routes	Estimated power to be installed	On 3.000 houses a water heating system with 6m ² collector area and on 3.000 houses a space heating support system with 10m ² collector areas.
	Estimated energy production	5.400.000 kWh water heating per annum 7.500.000 kWh space heating per annum
	Estimated energy distribution all year round	1750 hours/year predominantly in summer
General data on costs		
Energy objectives		Reduced electricity and fuel oil demand for heating
Environmental & sustainability issues		Increased use of renewable energies
Socio-economic benefits		Local employment Improved trade balance Addition income for rural economy



Solar Photovoltaics		NATIONAL SITUATION
General description of the technology		Roof-top solar PV systems for electricity production to be fed into the grid
General information of the resource to be exploited		One of the best insulations in this part of Europe. Solar thermal installations on about 20.000 m ² of roof space.
Possible application and routes	Estimated power to be installed	20kW on free standing public and private buildings 500kW on industrial sites
	Estimated energy production	1738 MWh
	Estimated energy distribution all year round	1750 hours/year predominantly in summer
General data on costs		45.7€/kWh to 57.4€/kWh guaranteed feed-in tariff
Energy objectives		Increased energy autonomy
Environmental & sustainability issues		Increased use of renewable energies
Socio-economic benefits		Local employment of PV installers Improved trade balance Addition income for rural economy



Small Hydropower		NATIONAL SITUATION
General description of the technology		Small hydropower up to a maximum of 5MW
General information of the resource to be exploited		Hydro resources are available through the numerous alpine water courses. The most attractive sites are already exploited, although the output on these can be increased by retrofitting the plants. In addition, water rights that have been put on hold could be reactivated to make an addition 3000 to 4000 MWh of additional hydropower. If new water rights are applied for, an additional 8.000 MWh per year could be produced from small hydro.
Possible application and routes	Estimated power to be installed	3MW in several plants
	Estimated energy production	12000MWh
	Estimated energy distribution all year round	Peak production in spring. Smaller peak in autumn.
General data on costs		6.65-9.67 €/kWh guaranteed feed-in tariff
Energy objectives		Increased energy autonomy
Environmental & sustainability issues		Increased use of renewable energies
Socio-economic benefits		Local employment of PV installers Improved trade balance Addition income for rural economy



Geothermal		NATIONAL SITUATION
General description of the technology		Shallow geothermal heat assisted heat pumps for domestic space heating
General information of the resource to be exploited		Additional 250 houses with heat pumps viable
Possible application and routes	Estimated power to be installed	1000kW
	Estimated energy production	3 750 000 kWh
	Estimated energy distribution all year round	Near zero production in summer. High peaks due to tourism in winter.
General data on costs		
Energy objectives		Reduced electricity and fuel oil demand for heating
Environmental & sustainability issues		Increased use of renewable energies
Socio-economic benefits		Local employment Improved trade balance Addition income for rural economy