FP6-509204

RES INTEGRATION

Work Package 5:

ENVIRONMENTAL AND ECOLOGICAL IMPACT ASSESSMENT OF SELECTED IRES SCHEME

Kragujevac, Serbia, September 2007

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INTRODUCTION

This workpackage #5 (WP5) deals with numerous issues for environmental and ecological impact assessment of selected IRES scheme. These issues are of primary importance when dealing with different technologies where an impetus is to minimize their impact to environment and ecology. The status on these issues are presented by all project partners and all regions (such as Greek, German, Italian, Serbian, FYROM, and Albanian region). In the first part of the WP4, technologies and their developers are described. When technology sites are described, we describe the sites giving main characteristics of their landscape, climatic conditions and describe their landscape. To describe the environmental and ecological status on the technology sites, we illustrate their air quality, water and sediment quality, ecological characteristics, cultural environment, landscape, man-made environment, and socio-economic environment.

Environmental effects of the technologies of the selected IRES scheme are presented through short outline of the development of each technology and description of potential technology effects on the environment and ecology. For the technologies, this description contains listing of separate impacts during construction and operation and decommissioning, separate impacts that are harmful or beneficial or negligible to the environment, and receiving habitats, and habitat characteristics which are vulnerable to change.

Due to application of these technologies, potential accidents on environment and ecology are also described. They are listed as separate accidents during construction and operation and decommissioning and, in addition, receiving habitats and habitat characteristics are identified, which may be exposed to accidents by the technologies in operation.

Measures against adverse effects of the technologies on the environment and ecology are expressed with priority for protection and identification and evaluation of mitigation measures to avoid, to reduce or to remedy the impacts. Measures envisaged preventing, reducing and, if possible, eliminating any accident effects on the environment and ecology for the technologies are also presented.

For each technology of the selected IRES scheme, data on technical shortcomings, absence of the appropriate expertise and skills are given with respect to its environmental performance of this technology. Finally, program of monitoring of technology impact on the environment by technology developers of each technology is presented.

1. TECHNOLOGIES AND THEIR DEVELOPERS

The applied technologies depend on the local needs of different communities for RES development and on the implementation possibilities. The most often the use of solar energy for heating is suggested, and production of biomass for export, heating, and electricity. Each partner developed its project (the optimum IRES scheme) that suits the best to their region. These schemes are mixes of different renewable energy technologies that would require different landscape types and have different influences on ecology and environment of the planned landscape. For project developer Agricultural University of Athens (AUA), Table 1.1.1 gives the listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place and Table 1.1.2 gives the basic description of each RES technology. For project developer WIP, Germany (WIP), Table 1.2.1 gives the listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place and Table 1.2.2 gives the basic description of each RES technology. For project developer ETA Renewable Energies (ETA), Table 1.3.1 gives the listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place and Table 1.3.2 gives the basic description of each RES technology. For project developer Mechanical Engineering Faculty at Kragujevac (MFKG), Table 1.4.1 gives the listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place and Table 1.4.2 gives the basic description of each RES technology. For project developer MAGA - Macedonian Geothermal Association (MAGA), Table 1.5.1 gives the listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place and Table 1.5.2 gives the basic description of each RES technology. For project developer Polytechnic University of Tirana (PUT), Table 1.6.1 gives the listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place and Table 1.6.2 gives the basic description of each RES technology. Total listing of applied technologies and their developers for their IRES schemes is given in Table 1.7.

Table 1.1.1. The listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place. Project developer is Agricultural University of Athens (AUA)

#	Technology	Landscape type
1.1	Geothermal exploitation boreholes	Built environment
2.1	Electricity production from wind turbines	Hills with Mediterranean vegetation, coastal rocks
3.1	Stand alone PVs for electricity in isolated settlements	Residential zone
3.2	Stand alone PVs for desalination	Coastal rocks
4.1	Waste recycling and composting	Entire island
4.2	Use of cooking oils as biofuel	Entire island

Table 1.1.2. The basic description of each RES technology of the selected IRES scheme. The project developer is Agricultural University of Athens (AUA).

#	Technology Description
1.1	3 new Geothermal exploitation boreholes in Thiafes site (700 m from Adamas) for the need of 25 hotels, for a total capacity of 1,800.00 MWh/year

2.1	4 wind turbines of (2 x 600 + 2 x 850 KW) which accounts for 2.900 KW electricity Power Energy production : 8,650.00 Mwh/year
3.1	Lighting and cooling in settlements, houses and cafeterias with the use of stand alone PV systems. Capacity 20 stand alone units of 3 KWe or 4,200 KWh/year
3.2	100 RO Rankin cycle stand alone desalination systems of a capacity of $5m^3$ fresh water/day each
4.1	Separation of waste in source for recycling of certain material. Process of the remaining for compost production 900 t/year and use of compost for various vegetation purposes. RDF capacity 500 t/year
4.2	Use of cooking oil in municipal vehicles as a complementary fuel using a small oil converter before tank. Capacity 5 t/year

Table 1.2.1. The listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place. Project developer is WIP, Germany (WIP).

#	Technology	Landscape
1	Biogas Plant by FITEC	Forest land next to the river
2	Wood Chip Production by Ökomodell Achental	Industrial land

Table 1.2.2. The basic description of each RES technology of the selected IRES scheme. Project developer is WIP, Germany (WIP).

#	Technology Description
1	Anaerobe digestion of corn and other energy crops
2	Chipping, sewing and drying of waste wood for the production of premium wood chips

Table 1.3.1. The listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place. Project developer is ETA Renewable Energies (ETA).

#	Technology	Landscape
1.1	Centralized Photovoltaic Energy	Field
1.2	Decentralized Photovoltaic Energy	Buildings
2	Solar Thermal Energy	Buildings

Table 1.3.2. The basic description of each RES technology of the selected IRES scheme. Project developer is ETA Renewable Energies (ETA).

#	Technology Description
1.1	Implementation of three 1MW centralized PV power plants
1.2	Implementation of 2MW of distributed PV systems
2	Implementation of 1000 rooftop thermosyphon domestic solar hot water systems

Table 1.4.1. The listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place. Project developer is Mechanical Engineering Faculty at Kragujevac (MFKG).

#	Technology	Landscape

1.1	*Production of oil rapeseed*	Field
1.2	*Production of energy-for-combustion crops*	Field
2.1	*Collection of forest residues*	Forest
3.1	*Production of biodiesel*	Industrial zone
3.2	*Production of wood chips and pellets*	Industrial zone
4.1	*Production of electricity by biogas*	Industrial zone
4.2	*Production of electricity by biomass*	Industrial zone
4.3	*Production of electricity by hydro*	River
5.1	*Production of heat by co-combustion of biomass and coal*	Industrial zone
6.1	*Demonstration of advantages of solar energy in the village municipalities*	Residential zone

Table 1.4.2. The basic description of each RES technology of the selected IRES scheme. Project developer is Mechanical Engineering Faculty at Kragujevac (MFKG).

#	Technology Description
1.1	Organization of production of rapeseed with crop rotation on 3000 ha; Organization of collection and processing the rapeseed (in average 1t of oil/ha);
1.2	Organization of production of giant reed on 5000 ha; (in average 25t/ha) Organization of collection and processing the giant reed for energy;
2.1	Organization of collection of forest's residues;
3.1	Completion of a biodiesel production plant for 450-500 t/yr with possibilities to increase the production to 1.000 t/yr with minimal additional financial investments.
3.2	Completion of two plants for production of wood chips. In Knic community, 2400 t of wood chips would be produced per year. In Cvetojevac community, 2400 t of wood chips would be produced per year.
4.1	Reconstruction of the existing 0.2 MW power plant to work with biogas. Construction of the new power plant of 0.2MW to work with biogas
4.2	Construction of one biomass power plant of *0.6*MW electric power.
4.3	Construction of 9 small hydro plants with 0.4 MW of power.
5.1	Construction of one boiler for combustion of the mixture of 90% of coal and 10 % of biomass. Heat power of boiler is *60* MW
6.1	Completion of 2000 solar water heaters in order to demonstrate the economy advantages in comparison with the present use of electricity for sanitary warm water preparation.

Table 1.5.1. The listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place. Project developer is MAGA - Macedonian Geothermal Association (MAGA).

#	Technology	Landscape
1.1.	Agricultural production of raw material for biodiesel production	Field
1.2.	Storage of raw material and crushing plant for raw oil production	Industrial zone
1.3.	Biodiesel production	Industrial zone

2.1.	Collection of forest residues	Forest
2.2.	Production of wood briquettes and pellets	Industrial zone
3.1.	Two geothermal exploitation boreholes	Wetland
3.2.	Geothermal District Heating scheme completion	Residential zone
4.1.	Installation of domestic hot water solar systems in village Kuklish and Murtino	Residential zone

Table 1.5.2. The basic description of each RES technology of the selected IRES scheme. Project developer is MAGA - Macedonian Geothermal Association (MAGA).

#	Technology Description
1.1.	Organized agricultural production of raw material (rape seed and soy-bean) on 1320 ha, taking into account the crops rotation cycles, and irrigation for all cultures.
1.2.	Storage of raw material, and two crushing plants for rape seed crude oil in Martine with 334.6 t/a, and soy-bean in Kuklish village with 112.8 t/a.
1.3.	Biodiesel production plant from rape seed and soy-bean oil in Murtino, with capacity of biodiesel production process of 140 l/h, i.e. 500 t/yr
2.1.	Organization of collection of forest's residues.
2.2.	Briquettes and pellets production from waste wood residue from timber harvesting, wood processing facilities and fire wood preparation in two production plants in Murtino with 797,92 t/a and in Kuklish with 1924,3792 t/a.
3.1.	Construction of two geothermal exploitation boreholes: IED-3 with total depth from 750 m and IED-4with total depth from 1200 m, in the area from Bansko-Monospitovo geothermal field in the south part of the Strumica valley.
3.2.	Reconstruction and modernization of the Geothermal District Heating System “Bansko”. Increasing its capacity by introduction of use of two new exploitation wells.
4.1.	Installation of 645 domestic hot water solar systems (DHW) for converting solar irradiation into thermal energy for the heating of sanitary water.

Table 1.6.1. The listing of RES technologies that will be developed in future with the planed landscapes where these developments will take place. Project developer is Polytechnic University of Tirana (PUT).

#	Technology	Landscape
1.	Small Hydro Electricity Production	Semi Mountains, Plains
2.	Wind Energy Production	Semi Mountains, Forest
3.	Solar Thermal Energy Production	Semi Mountains, Plains, Industrial and residential zones.

Table 1.6.2. The basic description of each RES technology of the selected IRES scheme. Project developer is Polytechnic University of Tirana (PUT).

#	Technology Description
1	Construction of 3 Small Hydro Power Plants
2	Installation of wind turbines at the places where the annual wind speed is more

	than 5m/sec
3	Installation of domestic hot water solar system for thermal energy production

Table 1.7 Total listing of applied technologies and their developers for their IRES schemes

Technology	**Developers**
Solar energy	
Solar Thermal Energy	2(ETA), 6.1(MFKG), 4.1(MAGA), 3(PUT)
Stand alone PVs for electricity in isolated settlements, Centralized Photovoltaic Energy	3.1(AUA), 1.1(ETA)
Stand alone PVs for desalination	3.2 (AUA)
Decentralized Photovoltaic Energy	1.2(ETA)
Wind energy	
Electricity production from wind turbines	2.1 (AUA), 2(PUT)
Hydro energy	
Production of electricity by hydro	4.3(MFKG), 1(PUT)
Production of biofuels	
Production of oil rapeseed	1.1(MFKG), 1.1(MAGA)
Production of energy-for-combustion crops	1.2(MFKG)
Collection of forest residues	2.1(MFKG), 2.1(MAGA)
Production of biodiesel	3.1(MFKG), 1.3(MAGA)
Production of wood briquettes	2.2(MAGA)
Production of wood chips	3.2(MFKG), 2(WIP)
Production of pellets	3.2(MFKG), 2.2(MAGA)
Use of cooking oils as biofuel	4.2(AUA)
Biogas Plant by FITEC	1(WIP)
Waste recycling and composting	4.1(AUA)
Production of electricity from biomass	
Biogas Plant by FITEC	1(WIP)
Production of electricity by biogas	4.1(MFKG)
Production of electricity by wood chips	4.2(MFKG)
Production of heat by co-combustion of coal and wood chips	5.1(MFKG)
Geothermal energy	
Geothermal exploitation boreholes	1.1 (AUA), 3.1 (MAGA)
Geothermal District Heating scheme completion	3.2 (MAGA)

2. SITES FOR TECHNOLOGIES

2.1 DESCRIPTION OF THE SITES

2.1.1 Main characteristics of landscape for the selected technologies

For different landscapes used by different RES technologies, Table 2.1.1 gives their size, and maximum and minimum altitudes. Their sizes are not so high which depends on the applied technology. The largest regions are regions in Balkan countries devoted to agricultural production of energy crops, and the highest regions are in Balkan countries devoted basically to hydro and wind energy production

Table 2.1.1 Size, maximum and minimum altitudes for different lands used by different RES technologies.

Landscape	size (ha)	max altitude (m)	min altitude (m)
GREEK REGION			
Built environment	-	50	0
Hills with Mediterranean vegetation, coastal rocks	-	329	200
Residential zone	-	50	0
Coastal rocks	-	20	0
GERMAN REGION			
Forest land next to the river	8	500	500
Industrial land	0,4	520	520
ITALIAN REGION			
Field	5.5 ha	1050	100
Buildings	n/a	885	100
SERBIAN REGION			
Field	17183.2	-	185
Forest	23829	1132	
Industrial zone	-	-	-
Residential zone	129	-	-
FYROM REGION			
Field	1320	220	210
Wetland	500	214	209
Forest	9807	800	300
Industrial zone	-	-	-
Residential zone	Cadastre area 2198,(Kuklish) 2373,(Bansko) 1640(Murtino)	275	212

ALBANIAN REGION			
Mountains	15875	2045	1000
Semi Mountains	12078	1000	200
Plains	6557	200	0
Forest	1540	1500	0
Industrial Zone	4	500	0
Residential Zone	138	500	0

2.1.2 Climatic conditions on the planned landscapes

For different sites used by different RES technologies, Table 2.1.2 gives wind mean annual speed at 10 m height, annual average rainfall and solar radiation. Mean annual wind speed at 10 m height is at the range from 1.8 to 6.5 m/s, however actual measurements in Balkan countries are missing. In regions with high wind, some wind energy production is recommended and in regions without wind here no wind energy use is recommended. Annual average rainfall is in the range from 399.4 to 1300 mm. In Italian region minimum value is recorded for Gioiosa Ionica and maximum value is recorded at Canolo Nuovo. Yearly solar radiation is from 1404 to 1900 kWh/m^2-yr.

Table 2.1.2 Wind, mean annual speed at 10 m height, annual average rainfall and solar radiation for sites used by different RES technologies

Landscape	Wind, mean annual speed at 10 m height (m/sec)	Rain, annual average rainfall in mm (mm)	Solar radiation (kWh/m^2-yr)
GREEK	**REGION**		
All	6.5	399.4	1900
GERMAN	**REGION**		
All	4,5	1100	1150
ITALIAN	**REGION**		
Entire Region	Mostly max 4m/s, one part 5m/s	594 -1688	1751
SERBIAN	**REGION**		
All	1.8 m/s, without calmness 2 m/s	566.1-686.6	1850
FYROM	**REGION**		
All	Calm, very rare up to 6 m/s	min: 330.2 in 2000 max: 884.8 in 2002 average: 532.2 in 1989-99	1,403.70

ALBANIAN	**REGION**		
Semi mountains, Forests	3-6 m/sec	1000-1300	1500
Plains, Industrial & Residential	2-4 m/sec	1000-1300	1500

2.1.3 Description of the landscapes planned for the technologies

For different sites used by different RES technologies, Table 2.1.2 gives their legal status, small geological description of soil conditions and trends, history and evolution. Their legal status may be as protected area, nature reserve, non-hunting zone, etc. The small gelogical description of trend may be its stability, fast or slow degradation, or improvement. History and its evaluation may be in presence of recent fires, changes in land use and ownership, etc. Table 2.1.2 shows that some regions are protected and have a legal status however most of regions are not protected. Small geological description of soil condition is of interest just in Greek and Macedonian regions. Small geological trend of soil is stable in case of Greece but for other regions is not of interest. History and evolution is present is some area like in tourist area of Greece. In national parks in Italy, development is subject to restriction and extra bureaucracy. FYROM region was subjected to fires.

Table 2.1.3. Legal status, small geological description of soil conditions and trends, history and evolution for sites used by different RES technologies.

Landscape	Legal status	Small geological description (condition)	Small geological description (trend)	History and evolution
GREECE	**REGION**			
Hills with Mediterranean vegetation, coastal rocks	NATURA 2000 area	Significant formations and rich in minerals	stable	Geomorphology based on volcanic activity, land use changes are present in tourist areas.
GERMAN	**REGION**			
All	No	-	-	
ITALIAN	**REGION**			
Field (within certain zones)	National Park	-	-	Aspromonte National Park – development is subject to restriction and bureaucracy – to be avoided if possible

SERBIAN	**REGION**			
All	no	-	-	-
FYROM	**REGION**			
Field	No	Typical non-calcareous alluvial soil, Cleyed, alkalized, calcareous alluvial soils , and skele-tical calcareous alluvial soils. Districnongleic colluvial soils, and Distric gleic colluvial soils	-	4 fires from 1.01. to 25.07. 2007 in Kuklish
Wetland	Monospitovo swamp – Natural monu-ment 3.1Km 500 ha, 250 ha strict protection	Mineral non-calcareous gleysols	-	No
Forest	No, but Belasica mountain in 2003 became euregion	Typical tertiary and deluvial calcareous sediments cinnamonic forest soi, and illime-rized tertiary and deluvial non-calcare-ous sediments cinna-monnic forest soil. Humic dystric brown forest soil (cambisols)	-	-
Industrial zone	No	Typical non-calca-reous alluvial,Gleyed, alkanized, calcareous, and Skeletical calca-reous alluvial soils. Distri-cnongleic colluvial soils, and District gleic	-	1 fire from 1.01. to 25.07. 2007 in Murtino

		colluvial soils.		
Residential zone	No	Salty clay, and deluvial soil.	-	2 fires from 1.01. to 25.07. 2007 in Kuklish and 4 fires in Bansko
ALBANIAN	**REGION**			
All	no	-	-	-

2.2 OUTLINE OF THE ENVIRONMENTAL AND ECOLOGICAL STATUS ON THE TECHNOLOGY SITES

2.2.1: Air quality on the landscapes where the technologies are located

For all regions, Table 2.2.1 would give air quality on the landscapes where the technologies are located presented as concentration of SO_2, NO_x, particulate, and ozone. However, in all target regions, air quality is not measured and is not known, except in Germany where the air quality is normal. The partners did not envisage any decay in air quality due to application of renewable energy technologies.

Table 2.2.1 Air quality on the landscapes where the technologies are located presented as concentration of SO_2, NO_x, particulate, and ozone.

Landscape				
Landscape	SO_2, μg/m^3	NO_x, μg/m^3	particulate, μg/m^3	ozone, ppm
GREEK, ITALIAN,GREMAN, **SERBIAN**, **FYROM**, AND **ALBANIAN REGIONS**				
All	n/a	n/a	n/a	n/a

2.2.2: Water (for drinking, agriculture) and sediment quality on the landscapes where the technologies are located

For all sites where the technologies are located, Table 2.2.2 presents water and sediment quality. In all target regions, responses are not adequate, so question should be clarified.

Table 2.2.2: Water and sediment quality on the landscapes where the technologies are located

Landscape	Water quality	Sediment quality
GREEK, ITALIAN,SERBIAN, ALBANIAN REGIONS		
All	No measurements available	No measurements available
	GERMAN REGION	
All	Drinking water	Former river banks, uncontaminated

	FYROM REGION	
Field, wet-land, forest	pH 6-8	Average salt content 710 mg/l Min 233 mg/1; Max 2101 mg/l
Industry & residences	pH 6-8, Kuklish (no drinking water), Murtino and Bansko (drinking water).	Average salt content 710 mg/l Min 233 mg/1; Max 2101 mg/l

2.2.3 Ecological characteristics of the landscapes where the technologies are located (1)

For different sites where new RES will be applied, Table 2.2.3 states its biodiversity and number of species, birds, habitats, habitat types on the landscapes. The most important bio-species are endangered, threatened, rare, and endemic. For countries of EU, birds are shown according to directive 79/409/EEC and habitat types according to directive 92/43/EEC. For different landscapes, biodiversity is heterogeneous. However, data on number of species, Birds, habitats, habitat types are generally available for EU countries but not for Balkan countries. The changes in its biodiversity, number of species, type of birds, and of habitats, during RES production are not expected.

Table 2.2.3: Biodiversity, number of species, birds, habitats, habitat types on the landscapes where the technologies are located.

Landscape					
Landscape	**Biodiversity & Number of species[1]**		**Birds[2]**	**Habitats**	**Habitat types[3]**
GREEK	**REGION**				
Beach rocks with vegetation	Heterogeneous. Flora = 444 taxa. 59 = endemic + rare + threatened. Mammals = 8 (1 critically endangered included in the IUCN red list). reptiles and amphibians = 11 (all under protection, 1 vulnerable, 2 critically endangered, 1 included in the red list of IUCN). Terrestrial Invertebrates = 21.		43 species nest in Milos, 21 species live there for the whole year. 17 species are included in the directive	Mosaic. Important for species conservation	code: 1240
Hills with brushwood vegetation					Code: 5420, 5211, 5212,
Sea rocks					Code: 8217
Sandy beaches					Code: 1210, 2250,1310,
GERMAN	**REGION**				
Forest	heterogeneous	25 all	20	forest	River banks forests
Industrial area	heterogeneous	8	5	Bushes	
ITALIAN	**REGION**				

Field	Heterogeneous. N/a. Wild Boar, Fox, Hare, Wolf, Dormouse. Beech, Pine, Holm-oak, Silver Fir, Chestnut, Oak, mushrooms		Pheasant, Hawk	-	no
Buildings	Urban, sparse	n/a	same	-	no
SERBIAN	**REGION**				
Field, Forest	Heterogeneous. Quantitative data are not available. Reach flora, poor fauna.		-	-	No
Industrial, Residential	-	-	-	-	-
FYROM	**REGION**				
Field	Heterogeneous. Quantitative data are not available.		No data available	Agriculture lend	No data available
Wetland	Heterogeneous. Endemic fish - Barbus barbus stojanovii. 35 specific species of swamp algae. Tertiary relicts: Osmunda regalis, Isoetes frigia; Rare plant: Sisyrinchum bermudina		No data available	Wetland and pond with characteristic associations: Ass. Osmundo-Thelipteretum; Ass. Scripio - Alopecuretum cretici; Ass. Periploco-Alnetum glitinozae Dicthostyleto-Fimbristiletum dichotomae and Ass. Scipreto-caricetum oederi	Fish: Cobitis taenia strumicae - Bern Convention Appendix III
Forest	Heterogeneous. Rare plant: Pinus nigra palasiana		No data available	Woodland with characteristic associations: Ass.Querco - Carpinetum	

				orientalis Sub ass.with Buxus, Syringia, Paliurus, Juniperus etc.	
Industrial zone	-	-	-	Agriculture land	-
Residential zone	-	-	-	Residential and Agricu-lture land	-
ALBANIAN	**REGION**				
Semi mountains, Plains, Forest	heterogene-ous	No data	No data	No data	-
Industrial Residential	-	-	-	-	-

2.2.4 Ecological characteristics of the landscapes where the technologies are located (2)

For sites of RES production and application, Table 2.2.4 gives the presence of biotopes, protected areas, national & marine parks, and noise environment. Only Greek and Italian regions deal with biotopes and protected areas and national parks. Noise environment is usually not measured however there is quality feeling, where we see that for industrial areas expected noise is of high intensity. Marine parks are not found.

Table 2.2.4: Biotopes, protected areas, national & marine parks, and noise environment on the landscapes where the technologies are located.

Landscape	biotopes (% of total area)	protected areas (% total area)	National & marine parks	Noise environment
GREEK REGION				
All	The area of wind turbines	The area of wind turbines	-	-
GERMAN	**REGION**			
Forest	10	0	-	Average
Industry	0	0	-	High
ITALIAN	**REGION**			
Field	No	No	No	No
Buildings	No	No	Canolo, Gerace and Mammola towns are technically in the Aspromonte National Park, and	No

			so rooftop systems may need special authorization there	
SERBIAN	**REGION**			
Field, Forest	no	no	no	no noise
Industrial Residential	no	no	no	not measured
FYROM	**REGION**			
Field	-	-	No	No noise
Wetland	vidi od karta	vidi od karta	No	No noise
Forest	-	-	No	No noise
Industrial Residential	-	-	No	Not measured
ALBANIAN	**REGION**			
Semi mountains Plains, Forest	no	no	no	no noise
Industrial Residential	no	no	no	not measured

2.2.5 Cultural environment on the sites of the technologies of the selected IRES scheme

For sites of RES production and application, Table 2.2.5 gives information on their cultural heritage, archaeological sites, and religious interests. The proposed IRES scheme would not affect any cultural heritages sites, archaeological sites, and sites of religious interest.

Table 2.2.5: Cultural heritage, archaeological sites, and religious interests on the landscapes where the technologies are located.

Landscape	Cultural heritage	Archaeological sites	Religious interest
GREEK	**REGION**		
All	Some traditional settlements	Not affected	Not affected
ITALIAN	**REGION**		
Field	No	Unknown	No
Buildings	Some, to be considered in planning installations, cultural monuments to be excluded	No	No
FYROM	**REGION**		
All except Residential zone	No	Yes	No
Residential zone	Kuklish – charnel-house from second world war	Kuklish – 15 Tiveriopolski Martyrs; Bansko – 40 Sevastilski Martyrs	Kuklish – St. Anastasij church Murtino –

		Roman thermal spa Turkish thermal spa and spa Salandjata	St. Georges church
GERMAN	**SERBIAN**	**ALBANIAN**	**REGIONS**
All	No	No	No

2.2.6 Landscape on the sites of the technologies (1)

For sites of RES production and application, Table 2.2.6 presents their interesting natural features, interesting ecological features, interesting geo-morphologic features, and state its rareness. These interesting fitues are given only for Greek, German and FYROM regions. However, it is not expected that the proposed IRES schemes will influence these natural features, ecological features, geo-morphologic features, and rareness.

Table 2.2.6: Interesting natural features, interesting ecological features, interesting geo-morphologic features, and rare landscape of the landscapes where the technologies are located

Landscape	**Interesting natural features**	**Interesting ecological features**	**Interesting geo-morphologic features**	**Rareness**
GREEK	**REGION**			
Beach rocks with vegetation	The rocky coast	Mountainous area and cliffs with caves.	Interesting and unique features	Yes
Hills with brushwood vegetation		Presence of rare snake and other reptiles	Interesting and unique features	
Sea rocks		Presence of rare sea monk	Interesting and unique features	Yes
GERMAN	**REGION**			
Forest	River shore	River shore	no	Partly
Industry	No	no	no	No
FYROM	**REGION**			
Field, Indu-stry,Residences	No	No	No	No
Wetland	Monospitovo swamp	Monospitovo swamp	Monospitovo swamp	Monospitovo swamp
Forest	No	No	Roma uranium mine	No
ITALIAN	**SERBIAN**	**ALBANIAN**	**REGIONS**	
All types	No	No	No	No

2.2.7 Landscape at the sites of the technologies (2)

For sites of RES production and application, Table 2.2.7 gives information on their natural panoramic view, unique natural beauty, geological interest, interest for observation of either flora or/and fauna. The proposed IRES schemes will influence natural panoramic view only in the area with wind turbines. The proposed IRES schemes will not influence unique natural beauty, geological interest and interest for observation.

Table 2.2.7: Natural panoramic view, unique natural beauty, geological interest, interest for observation of the landscapes where the technologies are located.

Landscape	natural panoramic view	unique natural beauty (Y/N)	geological interest	interest for observation
GREEK	**REGION**			
All	The area of wind turbines	Not in the area	The whole island	West part of island
GERMAN	**REGION**			
Forest	Mountain view	No	No	Bird observation
Industry	Mountain view	no	no	No
ITALIAN	**REGION**			
Field	Yes	Yes	No	Flora/fauna
Buildings	Mountain view	No	No	No
SERBIAN	**REGION**			
All types	Yes	No	No	No
FYROM	**REGION**			
Field	Belasica mountain	No	No	No
Wetland	Belasica mountain	Yes	No	Osmunda regalis; Isoetes frigia Pinus nigra palasiana; Sisyrinchum bermudina; Barbus barbus stojanovii; and all other characteristic wetland and forest species which are typical for Sub-Continental region
Forest, industrial, residential	Belasica mountain	No	No	No
ALBANIAN	**REGION**			

Semi mountains	yes	yes	yes	yes
Plains Forests, residential	yes	yes	no	no
Industrial Zone	no	no	no	no

2.2.8 Man-made environment at the landscapes for the selected technologies

For sites of RES production and application, Table 2.2.8 states presence of their traditional architecture, architectural landmarks, and built panoramic view on the landscapes. The proposed IRES schemes will not influence traditional architecture, architectural landmarks, and built panoramic view.

Table 2.2.8: Traditional architecture, architectural landmarks, built panoramic view on the landscapes where the technologies are located.

Landscape	**Traditional architecture**	**Architectural landmarks**	**Built panoramic view**
GREECE	**REGION**		
	No	No	No
GERMAN	**REGION**		
Forest	No	No	No
Industry	Alp architecture in village	none	None
ITALIAN	**REGION**		
Field	No	No	No
Buildings	Yes	No PV planned on landmarks	No
SERBIAN	**REGION**		
All except residential	No	No	No
Residential zone	Yes	No	No
FYROM	**REGION**		
All except residental	No	No	No
Residential zone	Kuka cardaklija (house with specific veranda). Bansko Spa complex	No	Bansko spa
ALBANIAN	**REGION**		
All except residential	no	no	no
Residential	yes	no	yes

2.2.9 Socio-economic environment at the landscapes for the technologies (1)

For sites of RES production and application, Table 2.2.9 states traditional activities, tourism value, recreation value, and educational interest of these sites. Traditional activities are present but they are diminishing. The proposed RES development would support these activities. The tourisam value is high for Greek and FYROM regions. Recreation value is high for Greek and Albanian regions. The proposed IRES schemes will not change significantly traditional activities, tourism value, recreation value, and educational interest.

Table 2.2.9: Traditional activities, tourism value, recreation value, and educational interest on the landscapes where the technologies are located.

Landscape	Traditional activities	Tourism value	Recreation value	Educational interest
GREEK	**REGION**			
Built environment - Residential zone	Yes but diminishing	High	high	medium
Hills with Mediterranean vegetation,	Agriculture in lower parts	-	-	high
Sea rocks			yes	high
Sandy beaches	some	high	high	
GERMAN	**REGION**			
Forest	none	Biking trail	Biking trail	None
Industry	none	none	none	None
ITALIAN	**REGION**			
Field	Grazing/agriculture, but in disuse	None	None	None
Buildings	Various	None	None	None
SERBIAN	**REGION**			
All except residential	No	No	No	No
Residential zone	Use of firewood for heating during winter.	Village tourism.	No	No
FYROM	**REGION**			
Field	Agriculture	-	-	-
Wetland	-	-	-	-
Forest	Wood processing	-	Recreational walks through the forest and visit of waterfalls	-
Industrial	Agriculture food	-	-	-

zone	processing			
Residential zone	Agriculture	- Kuklish Hotel Sirius from 01.01.2005 to 31.03.2007 - 8097 overnight accommodations. - Bansko Hotelot Car Samuil from 01.01.2005 to 31.12.2006 - 1067 overnight accommodations. - Several small hotels in Bansko	-	- in Bansko primary school Marchal Tito - in Kuklish primary school Dame Gruev - in Murtino primary school Marchal Tito
ALBANIAN	**REGION**			
All except residential	no	no	yes	no
Residential	Fisher-man	yes	yes	no

2.2.10 Socio-economic environment at the landscapes for the technologies (2)

For sites of RES production and application, Table 2.2.10 presents the research interest, organized walking paths, main land uses in the area, and number of NGOs in the area. The proposed IRES schemes will not change significantly research interest, organized walking paths, main land uses in the area, and nr. of NGOs in the area.

Table 2.2.10: Research interest, organized walking paths, main land uses in the area NGOs in the area on the landscapes where the technologies are located.

Landscape				
Landscape	Research interest	Organized walking paths	Main land uses in the area	NGOs in the area.
GREEK	**REGION**			
Built environment - Residential zone	yes	no	Tourism, services, commercial uses	1 or 2 based on the island and around 5 activated on the island
Hills with Mediterranean vegetation,	high	no	Restricted agriculture, restricted cattle, grazing	no

Sea rocks	high	no	Some fishing, tourism	no
Sandy beaches	yes	some	tourism	no
GERMAN	**REGION**			
Forest		Existing	Forestry, tourism	Ökomodell Achental, BUND
Industry		Non existing	Industry	none
ITALIAN	**REGION**			
Field	None	None	Agriculture	None
Buildings	None	None	Housing/commercial	None
SERBIAN	**REGION**			
Field	No	No	Agriculture	No
Forest, industrial	No	No	No	No
Residential	No	No	Housing	2
FYROM	**REGION**			
Field	Agriculture	No	Agriculture	-
Wetland	Biology	No	Agriculture	-
Forest	-	Yes	Forestry	-
Industrial zone	-	No	-	-
Residential zone	-	No	Housing	3 ecology NGO “Planetum”, "Edelvajs", "Entusiast”, and 6 social and sports NGO that work in all Strumica area
ALBANIAN	**REGION**			
Semi mountains	no	yes	-	no
Plains	no	no	agriculture	no
Forest, Industrial	no	no	-	no
Residential Zone	no	no	housing	1

3. ENVIRONMENTAL EFFECTS OF THE TECHNOLOGIES OF THE SELECTED IRES SCHEME

3.1 SHORT OUTLINE OF THE DEVELOPMENT OF EACH TECHNOLOGY

For each technology in each region, Table 3.1 presents the short outline of its development.

Table 3.1. Short outline of the development of each technology

Technologies	Short outline
	GREEK REGION
1.1	The area is very well studied for its geothermy, so preparation for the borehole is needed, then construction of the project, construction of distribution net that reaches the hotels, then operation and maintenance.
2.1	3 wind turbines (2050 kW) are already constructed and feed the p.p.c. network with electricity. A 4th wind turbine of 850kW will be installed to cover the needs of a R.O. desalination unit (capacity 2000m^3/day). Construction of unit and water distribution network and then maintenance will complete the phases of the development.
3.1	Study of suitable settlements and uses for the first implementation of the PV systems. Expansion of the development to other areas with convenient characteristics for more uses.
3.2	R.O. rankine cycle desalination units in the two main settlements. Investigation of potential water uses and needs. Construction of water distribution if necessary for use in small farms.
4.1	Design of waste management scheme. Implementation of recycling project. Implementation of suitable treatment in necessary facilities (should be constructed) for waste valorization. Planning of mid term and long term solutions.
4.2	Creation of a used oils collection system. Treatment of the oils. Format necessary corrections in public vehicles. Use of material.
	ITALIAN REGION
1.1	Implementation of three 1MW PV plants. Each will be grid-connected, providing approximately 1.500 MWh each to the community (4.500 MWh in total)
1.2	Implementation of 2.000 kW of distributed PV on buildings across the community: 25%: small 3kWp systems : producing in total 744 MWh 10%: 3 to 20kWp systems : producing in total 298 MWh 65%: 50 to 200 kWp systems : producing in total 1.930 MWh
2	Implementation of 1000 solar hot water heaters (thermosyphon systems), consisting of: -450L systems for multi-family buildings (9 inhabitants) -200L systems for single-family dwellings (4 inhabitants)
	SERBIAN REGION
1.1	When agricultural production is in question, incorporation of rapeseed production in the present composition of plant cultures is proposed. Whole part of the plants are collected and processed in biodiesel, glycerin and animal husbandry food. No

	particular negative effect can be expected.
1.2	When production of energy plants is in question, energy plants are produced in non-used land. Whole part of the plants are collected and processed in either wood chips or pellets.
2.1	When forests residues are in question, their collection and processing in convenient fuel to be supplied to domestic and foreign markets enables improvement of the present way of cutting and collecting wood from forests. Except to let the residues at the place of cutting, which can negatively impact the environment, cutting places are cleaned and residues collected.
3.1	Completion of a biodiesel production plant for 450-500 t/yr with possibility to increase the production to 1.000 t/yr with minimal additional financial investments.
3.2	Completion of two plants for production of wood chips. The parts for these two plants would be imported and assembled at site. The raw material that would be forest residue and short rotation energy plant (giant red) will be transported o the plant by special vehicles. The same will be with products.
4.1	Reconstruction of existing 0.200 MW power plant to work with biogas. The reconstruction would be repair of one existing gas engine and procurement of new gas engine of 0.2MW. These engines would be connected to generators to generate AC current for outside main and internal consumption.
4.2	Construction of one biomass power plant of *0.6* MW. First we should find proper site that would enable erection of the plant and storage of the biomass in chips form. In addition, good road communication should exist. Wood chips boiler will be inside the plant and the turbine and electricity generator. Ash will be disposed outside the plant in the special ash pit.
4.3	Construction of *9* small hydro plants with *0.4* MW of power. When constructing small hydro-plants, first we should find proper site, construct dam, hydraulic pipe that would conduct water to turbine that is located inside turbine house. In addition we should connect generator to local main or to house battery which depends on the investor.
5.1	Construction of one boiler for combustion of the mixture of 90% of coal and 10 % of biomass. Power of boiler is *60* MW. The existing boiler for coal combustion would be transformed into one for mixture combustion. This transformation would be in transformation of the feed-in equipment.
6.1	When solar energy use is in question, only sanitary warm water preparation could be economically and environmentally justified.
	FYROM REGION
1.1.	Agricultural production of raw material planed in total area is separated in 4 fields with different crops because of needs of these agricultural plants for crop rotation. The two main cultures are rape seed and soy-bean. The other's cultures are wheat and pepper or tomato. In this project is planed to grow winter rape seed which is sown from mid August to early September with 9 kg/ha. The soil must be ploughed until depth of 30 cm

	and after that 2-3 times cultivated before seedling. Seedling depth should not extend 25 cm in the 40-45 cm rows and rows space between plants 10-15 cm. During vegetation period several agricultural measures must be taken: weed control especially in early stages of plant development, fertilizing and diseases and pest control. Harvesting is recommended when 20-30% of the seeds on the main stem have turned to brown. For production of soy-bean the soil must be ploughed in depth until 30 cm during the September, and after that cultivated before seedling. Planting is in April in rows 60-75 cm wide and 5-6 cm between plants in each row, at a depth of 1-2cm, with 50 kg/ ha. During vegetation period several agricultural measures must be taken: weed control especially in early stages of plant development, fertilizing and diseases and pest control. Harvesting is recommended when the pods turn to brown or gray and pod rattle when shaken.
1.2.	Rape seeds arrived at a facility by truck or tractor is sampled for moisture content, foreign matter, and damaged seeds. Then the seeds are weighed and conveyed to metal tanks for storage before processing. The mustard-rapeseed should be stored under low moisture content (8 %) and temperature (25 ^{O}C). For Murtino rapeseed process plant is planned with a silo system for rape seed store, with 860 m^3 volume (3 silo: dimensions Ø 6, 4 x 9 m high). For soybeans stored up to one year, the oil content value is 12 %. For soybeans stored more than one year, the oil content value is 11%. For Kuklish soybean process plant a silo system for soybean store is planned, with 670 m^3 volume (3 silo: dimensions Ø 5, 7 x 9 m high). Rapeseed and soy-bean oil extraction or crushing involves a number of steps including: seed cleaning - removal of foreign matter, tempering - pre-heating of the seed to improve ease of oil extraction (optional), dehulling - removal of seed coat, flaking - flakings seed to increase surface area to facilitate oil extraction, conditioning - heating the flaked seed, again to facilitate oil extraction, mechanical extraction - by pre-pressing and extrusion and/or expansion, solvent extraction for maximum extraction of oil, economic at very large scale only.
1.3.	Biodiesel production process based on catalyzed transesterification of oil with methanol is the most economical process requiring only low temperatures and pressures and producing a 98 % conversion yield. 100 kg of rape seeds and soy-beans oil is reacting with 10 kg of methanol in the presence of a base catalyst to produce 10 kg of glycerin and 100 kg of methyl esters or biodiesel. The methanol is charged in excess to assist the quick conversion and the excess is recovered for reuse. The catalyst is usually sodium or potassium hydroxide that has already been mixed with the methanol. After the reaction, the base catalyst must be neutralized with a strong mineral acid. After finishing biodiesel production process, biodiesel is transported to the biodiesel storage tank. Waste water, soap and salt are transport to the dirty water tank for additional treatment.
2.1.	Logging and collection of forest residues are conducted at the same time as logging for the primary products, in an integrated operation. Forest residues primary are stored in forest places near Kuklis and Murtino community. Wood forest bundle residue from forest landing site to the chipping –comminution place

	are transported by agricultural tractor with a small (load space even up to 6-8 m^3 loose) trailer, and small lorry (load space even up to 12-15 m^3 loose) , because of short distance (under 8 km). Storage can take place at the stump, in piles - comminuted or uncomminuted - at roadside, at a central terminal, or at the briquette plant.
2.2.	Wood briquetting process can be divided into four sectors: selection and separation of incoming wood residue, comminuting and storage of wood ships, actual processing of briquettes (drying, grinding, briquetting and cooling), packaging /wrapping and storage of products.
3.1.	First step is investigation of exploitation borehole IED-3 (geothermal water IED-30) with betonite mud. Next steps are: formation evaluation procedures, cutting sampling, testing program for capacity of the aquifer and pumps. At the end exploitation and maintenance of geothermal boreholes.
4.1.	In the Podbelasica region there are approximately 2500 houses. For technical and economical reason, it is believed that only 25% of them - 645 households will have possibility to install domestic hot-water systems. Under these conditions and assuming that the solar collector area of the DHW systems will be 2.5 m^2, the solar energy output can reach the amount of 825 MWh. This energy correspondent approximately to 2% of the total energy used for space heating in the Podbelasica region or 60% of the electricity consumed for the same purpose.
	ALBANIAN REGION
1	Three Small Hydro Power Plants with the total capacity of 1 MW will produce 4000 MWh/year, electrical energy.
2	The Wind Turbines will produce 350 MWh/year electrical energy.
3	There are approximately 4000 houses in the Bregu Region. For technical and economical reason, it is believed that only 25% of them -1000 households will have possibility to install domestic hot-water systems. Under these conditions and assuming that the solar collector area of the DHW systems will be 2.5 m^2, the solar energy output can reach the amount of 1100 MWh.

3.2 DESCRIPTION OF POTENTIAL TECHNOLOGY EFFECTS ON THE ENVIRONMENT AND ECOLOGY

For each technology in each region, this chapter would identify separate impacts during construction, operation, and decommissioning. These impacts would be classified as harmful, beneficial, or negligible to the environment. For each technology in each region, the chapter identifies the receiving habitats, and habitat characteristics which are vulnerable to change. In addition, the chapter states problems with landscape, resources, and society due to production and application of RES.

3.2.1 Separate impacts during construction and operation and decommissioning for the technologies

For each technology in each region, Table 3.2.1 identifies separate impacts during construction, operation, and decommissioning.

Table 3.2.1: Separate impacts during construction and operation and decommissioning for the technologies

Technologies	Identify separate impacts during		
	construction	operation	decommissioning
	GREEK REGION		
1.1	Dust, noise, possible erosion – land sliding	Some, possible pollution to aquifers if nor managed properly (leakage). Possibility of land sliding.	Some waste spoils from site clearance
2.1	Dust, noise, possible road opening, land claiming.	Some, mainly aesthetical and wild life related (possible effects on birds)	Some concerning the disposal of the material of the turbines
3.1	No	No	Yes, toxic material of cells need specific management while disposed
3.2	No	Possible problems with brine collection	Yes, toxic material of cells need specific management while disposed
4.1	Yes, related to the construction of the waste treatment unit	Yes, related to the management of the non valorized waste. Air pollutants from RDF burning.	Yes, related to proper rehabilitation of used areas
4.2	no	Yes, air pollutants	-
	GERMAN REGION		
1	A part of the surrounding forest has to be cut for the installation (4000 m2). This land is already dedicated to the future enlargement of the sewage plant.	The electric generator creates noise (150 db) which could affect the wildlife around the plant.	If the plant is decommissioned soundly, now environmental problems occur on this side.
2	The site is in the industrial area it is currently used by a gardening enterprise.	The drying of the wood chips is done through a wood boiler which emissions might cause	If the plant is decommissioned soundly, now environmental problems occur on

		environmental harm.	
	ITALIAN REGION		
1.1	Minimal – field clearance, but mostly empty fields in the first place. Minimal waste from construction as mostly pre-fabricated parts.	Minimal - Existence of a fence, which could divert local fauna in their paths, but this would only lead to about 100 to 150m diversion	PV panels often contain some materials that could potentially affect the environment, if improperly disposed of. Also general waste from components (electrical wires, etc.)
1.2	Minimal waste from mounting as mostly pre-fabricated parts.	Minimal - PV panels can become quite hot during operation, and so birds would not be able to land on the part of the roof where it was, but this is a marginal problem, as adjacent roof space would still be available.	Same as for #1.1
2	Minimal waste from mounting as mostly pre-fabricated parts.	Same as #1.2	General waste from components (tubes, boiler, etc)
	SERBIAN REGION		
1.1	-	1. Dust from earthwork. 2. Nose from tractors. 3. Use of chemicals for plant protection. 4. Use of mineral fertilizers. 5. Smoke from fuel combustion in the tractor machines.	-
1.2	1. Dust from earthwork	1. Dust from earthwork. 2. Nose from tractors.	1. Dust from earthwork
2.1	-	1. Nose from the pick-up and transport machines. 2. Smoke from fuel combustion in the pick-up and transport machines.	-
3.1	1. Waste spoil from site clearance and excavation works. 2. General waste from	1. The potential odor from biodiesel chemicals inside plant dangerous to workforce.	1. Waste spoil from site clearance.

	construction workforce.	2. The potential odor from biodiesel chemicals outside plant dangerous to environment. 3. Reduction in fossil-fuel CO_2 emission when used in cars. 4. Increase in 10-25% NOx emission when used in car (compared to fossil diesel).	
3.2	1. Dust, noise	1.The potential odor. 2. The crushers, chippers, etc are noise sources during operation.	1. Waste spoils from site clearance.
4.1	1. Waste spoil from site clearance and excavation works. 2. General waste from construction workforce.	1. The potential odor of biogas. 2. Harmful NOx and CO of discharge gases. 3. Reduction in fossil-fuel CO_2 emission.	1. Waste spoils from site clearance.
4.2	1. Waste spoil from site clearance and excavation works.	1. NO_x, CO and particulate discharge into environment. 2. Reduction in fossil-fuel CO_2 emission.	1. Waste spoils from site clearance.
4.3	1. Dust, waste spoil from site clearance and excavation works.	1. The turbines and electricity generators are noise sources during operation. 2. Reduction in fossil-fuel CO_2 emission.	1. Waste spoils from site clearance.
5.1	1. General waste from construction workforce.	1.The mill fans are noise sources during operation. 2. SO_2, NO_x, CO and particulate discharge into environment. 3. Reduction in fossil-fuel CO_2 emission.	1. Waste spoils from site clearance.
6.1	1. General waste from construction workforce.	1. High visual impact. 2. The pumps are noise sources during operation. 3. Reduction in fossil-	1. Waste spoils from site clearance.

		fuel CO_2 emission.	
	FYROM REGION		
1.1.	No	- Soil and ground water contamination with chemicals for plant protection and fertilizers. - Soil and ground water contamination from the spillage of materials such as vehicle fuel and oil. - Soil erosion in cases of improper irrigation and crop rotation. - Noise and smoke from fuel combustion in the agriculture machinery. - Dust during agricultural works (plough, cultivate, harvesting etc.)	- Uncontrolled burning of waste (brings to forest fire and bad road visibility).
1.2.	- Soil and water contamination from construction material. - Ground contamination from the spillage of materials such as vehicle fuel. - Soil erosion from equipment vibration. Compaction of soil due to vehicle movements, causing reduced infiltration of water and difficulty of penetration by plant roots. - Noise and dust from plant construction work.	- Soil and water contamination with rape seed or soy-bean meal or crude oil. - Soil and water contamination with machine oil in cases of plant equipment damage. - Noise from crushing press. - Dust from cleaning rape seeds and soy-bean seed side plant.	- Waste spoils from site clearance.
1.3.	- Soil and water contamination from construction material. - Ground	- Soil and water contamination with site products (rape seed or soy-bean meal,	- Waste spoils from site clearance. - Soil and water contamination with site

	contamination from the spillage of materials such as vehicle fuel. - Soil erosion from equipment vibration. Compaction of soil due to vehicle movements, causing reduced infiltration of water and difficulty of penetration by plant roots. - Noise and dust from plant construction work.	glycerol), raw material (crude oil, alcohol) or bodies in cases of damage. - Soil and water contamination with machine oil in cases of plant equipment damage. - Fire in cases of plant damage or human inattention. - The potential odor from biodiesel chemicals inside plant dangerous to workforce. - The potential odor from biodiesel chemicals outside plant.	products (rape seed or soy-bean meal, glycerol), raw material (crude oil, alcohol) or biodiesel.
2.1.	- Ground contamination from the spillage of materials such as vehicle fuel and oil during construction of forest paths. - Soil erosion from equipment vibration during construction of forest paths. - Noise and smoke from fuel combustion in the machinery and vehicles.	- Ground contamination from the spillage of materials such as vehicle fuel. - Soil erosion from equipment vibration. Compaction of soil due to vehicle movements, causing reduced infiltration of water and difficulty of penetration by plant roots. - Noise and smoke from fuel combustion in the agriculture machinery and vehicles.	No
2.2.	- Soil and water contamination from construction material. - Ground contamination from the spillage of materials such as vehicle fuel, or the release of contaminants already	- Soil and water contamination with machine oil in cases of plant equipment damage. - Soil and water contamination with woods sawdust. - Noise and dust from wood press machinery.	- Waste spoils from site clearance. - Fire of stored wood in cases of human inattention.

	present in the land / soil. - Soil erosion from equipment vibration. Compaction of soil due to vehicle movements, causing reduced infiltration of water and difficulty of penetration by plant roots. - Noise and dust from plant construction work.	- Fire of stored wood and briquettes in cases of human inattention.	
3.1.	- Contamination of surface waters / wetland from accidental spills such as drill fluids and contaminated liquid discharges during construction. - Ground contamination from the spillage of materials such as vehicle fuel. - Soil erosion from equipment vibration. compaction of soil due to vehicle movements. - Noise and dust from drilling equipment, generators and vehicles during construction work. - Land slips and land slides due to poor embankment grading. - Risk of collapse and subsidence.	- Contamination potential with reference to recharge of contaminated groundwater's and their migration over long time periods. - Contamination potential due to the slow term migration of contaminated groundwater's. - Water contamination with wastewater discharges. - Contamination due to leakage / spillage. - Impacts of abstraction on the hydro geological regime. - Capacity of existing regime to sustain the abstraction. - Land slips and land slides due to poor embankment grading. - Risk of collapse and subsidence. - Negative effects on of other geothermal wells. - Negative effects on surface waters / wetlands	- Waste spoils from site clearance.

4.1.	- Ground contamination from the spillage of materials such as vehicle fuel. - Noise and dust from construction work. - Soil erosion from equipment vibration. compaction of soil due to vehicle movements.	- Soil and water contamination with antifreeze.	- Waste spoils from site clearance.
	ALBANIAN	**REGION**	
1	- Soil and water contamination from construction material	no	Waste spoils from site clearance.
2	no	no	Waste spoils from site clearance.
3	- Ground contamination from the spillage of materials such as vehicle fuel. - Noise and dust from construction work. - Soil erosion from equipment vibration. compaction of soil due to vehicle movements.	- Soil and water contamination with antifreeze.	Waste spoils from site clearance.

3.2.2 Separate impacts that are harmful or beneficial or negligible to the environment for the technologies

For each technology in each region, Table 3.2.2 identifies separate impacts that are harmful, beneficial, or negligible to the environment.

Table 3.2.2: Separate impacts that are harmful or beneficial or negligible to the environment for the technologies.

Technologies	Identify potential impacts that are		
	harmful to the environment	beneficial to the environment	negligible to the environment
	GREEK REGION		
1.1	• If fluids not isolated, then possible water pollution.	• No brine at the surface. • Less CO2 emissions	• Possible light smell. • Noise and dust from drilling equipment,

	• Reinjection of waste may have problems if in communication with water aquifers. • Possible noise during construction and production. Possibility of land sliding if not properly designed and constructed. In case of failure possible thermal pollution to sea.	than gas or oil or coal. • Geothermal energy applications will enhance the tourist period and regulate fluctuations of tourists that put pressure on the islands carrying capacity. Increase autonomy of the island and sense of security to citizens.	generators and vehicles during construction work.
2.1	• Disturbance to wildlife, mostly migratory birds.	• 1 million Mwh avoids 670,000 tn of CO2 - 3,750 tn of SO2 - 1,775 tn of Nox • No air or water pollution, no toxic or hazardous substances. • Land between turbines to be used for other purposes	• Visual impact but not serious due to restricted number of generators. • Limited noise not affecting any fauna or humans. • Land consumer but on land unlike to serve for other purposes.
3.1	• Includes toxic materials that need management during decomposition together with lead batteries. • Silicon for cell could be hazardous to workers if breathed in as dust.	• CO2 avoidance. • Shade offered by reflectors can be beneficial to vegetation	• Potentially explosive materials but unlike in our case.
3.2	• Brine production during desalination. • Includes toxic materials that need management during decomposition together with lead batteries. • Silicon for cell could be hazardous to workers if breathed in as dust.	• Water offer through RE desalination systems leads to better surface and groundwater sources protection because of avoidance of overexploitation and to better conditions for soil management and protection. • Strengthening of	• Potentially explosive materials but unlike in our case.

		agriculture and other activities avoiding mono-cultivation of tourism protects the environment of the islands and reduces impacts by human activities. • CO2 avoidance. • Shade offered by reflectors can be beneficial to vegetation	
4.1	• Management of remaining waste (not recycled and not included in composting) may pollute aquifers and soil.	• Recycling of Municipal Solid Waste and the use of the produced compost substituting industrial energy-demanding N sources and fertilizers in general	
4.2	• Air pollution during combustion	• less VOCs, less CO, and less CO2 in the atmosphere. • Protection of water means that would receive oils if not reused (sea or streams).	
	GERMAN REGION		
1	Wood cutting and noise emissions.	Reduction of CO2 emissions, reduction of sewage waste.	Methane emissions from the plant
2	Emissions from the wood boiler.	Mitigation of fossil fuels in private stoves.	Noise from the wood chipping.
	ITALIAN REGION		
1.1	Certain types of PV cells can be toxic. E.g. CdTe (although it has low solubility). GaAs is also potentially dangerous due to Arsenic, which is toxic and carcinogenic.	Avoidance of CO2 emissions by regional power plant.	-

	Silicon is not toxic (the majority of PV cell supply). *This only applies if there is improper disposal.*		
1.2	Same as 1.1	Avoidance of CO2 emissions by regional power plant.	-
2	-	Avoidance of CO2 emissions from local gas/petroleum boilers	-
	SERBIAN REGION		
1.1,1.2		1. Use of chemicals for plant protection. 2. Use of mineral fertilizers.	1. Dust from earthwork. 2. Nose from tractors.
2.1			1. Nose from tractors and pick-up machines. 2. Smoke from fuel combustion in the pick-up and transport machines.
3.1	1. The potential odor from biodiesel chemicals inside plant dangerous to workforce. 2. The potential odor from biodiesel chemicals outside plant dangerous to environment. 3. Waste spoils from site clearance. 4. Increase in 10-25% NOx emission when used in car (compared to fossil diesel).	1. Avoiding in fossil-fuel CO_2 emission when used in cars.	1. Dust from earthwork. 2. Nose from const'n machines. 3. The potential odor of biodiesel.
3.2	1. Waste spoils from site clearance. 2. Noise of the crushers, chippers, etc during operation.		1. The potential odor during operation.
4.1	1. Waste spoils from site clearance.	1. Avoiding fossil-fuel CO_2 emission.	

	2. General waste from construction workforce.	2. Avoiding fossil-fuel SO_2 emission.	
4.2	1. Waste spoils from site clearance.	1. Avoiding fossil-fuel CO_2 emission. 2. Avoiding fossil-fuel SO_2 emission.	
4.3	1. Waste spoils from site clearance.	1. Regulation of high water. 2. Avoiding fossil-fuel CO_2 emission. 3. Avoiding fossil fuel SO2, NOx, and particulate emission.	1. The turbines and electricity generators are noise sources during operation.
5.1	1. Waste spoils from site clearance. 2. SO_2, NO_x, CO and particulate discharge into environment.	1. Reducing CO_2 emission. 2.Avoiding SO2 emission	1. The mill fans are noise sources during operation.
6.1	1. General waste from construction workforce. 2. Waste spoils from site clearance during decommissioning.	1. Avoiding fossil fuel CO2 emission 2. Avoiding fossil fuel SO2, NOx, and particulate emission.	1. High visual impact. 2. The pumps are noise sources during operation.
	FYROM REGION		
1.1.	- Use of chemicals for plant protection and fertilizers. - Soil erosion in cases of improper irrigation and crop rotation. - Fire in cases of uncontrolled burning of waste.	- Higher job offer - With right agricultural measurement soil condition can be improved.	- Dust from earthwork. - Nose from tractors.
1.2.	- Soil and water contamination from construction material - Ground contamination from the spillage of materials such as vehicle fuel. - Soil erosion from equipment vibration. - Soil and water contamination with rape	- Higher job offer - Secure yield redemption.	- Dust from earthwork. - Dust from cleaning rape seeds and soy-bean seeds inside plant. - Noise from crushing press.

	seed or soy-bean meal or crude oil. - Soil and water contamination with machine oil in cases of plant equipment damage. - Waste spoils from site clearance.		
1.3.	- Soil and water contamination from construction material - Ground contamination from the spillage of materials such as vehicle fuel. - Soil erosion from equipment vibration. - Soil and water contamination with site products (rape seed or soy-bean meal, glycerol), raw material (crude oil, alcohol) or bodies in cases of damage. - Soil and water contamination with machine oil in cases of plant equipment damage. - Fire in cases of plant damage or human inattention. - Waste spoils from site clearance.	- Higher job offer - Farmer's can use their one's biodiesel for agriculture machinery, which will be cheaper for them. - Energetic independence from fuel import. - Avoiding CO_2 emission from fossil-fuel when used in cars.	- Dust from earthwork. - Nose from machines. - The potential odor from biodiesel chemicals inside plant dangerous to workforce. - The potential odor from biodiesel chemicals outside plant.
2.1.	- Ground contamination from the spillage of materials such as vehicle fuel and oil during construction of forest paths. - Soil erosion from equipment vibration	- Higher job offer - Reduce risks of forest fires.	- Noise and smoke from fuel combustion in the machinery and vehicles.

	during construction of forest paths. - Soil erosion from equipment vibration. - Waste spoils from site clearance.		
2.2.	- Soil and water contamination with machine oil in cases of plant equipment damage. - Soil and water contamination with woods sawdust. - Noise and dust from wood press machinery. - Fire of stored wood and briquettes in cases of human inattention. - Waste spoils from site clearance.	- Higher job offer - Energetic independence from fuel import.	- The potential odor during operation.
3.1.	- Contamination of surface waters / wetland from accidental spills such as drill fluids and contaminated liquid discharges during construction and exploitation. - Ground contamination from the spillage of materials such as vehicle fuel. - Soil erosion from equipment vibration. compaction of soil due to vehicle movements. - Land slips and land slides due to poor embankment grading. - Risk of collapse and subsidence. - Contamination potential with reference to recharge of	- Higher job offer - Energetic independence from fuel import. - Avoiding CO_2, SO2, NOx, and particulate emission from fossil - fuel.	- Noise and dust from drilling equipment, generators and vehicles during construction work.

	contaminated groundwater's and their migration over long time periods and slow term migration. - Water contamination with wastewater discharges. - Contamination due to leakage / spillage. - Impacts of abstraction on the hydro geological regime. - Capacity of existing regime to sustain the abstraction. - Negative effects on of other geothermal wells and surface waters/wetlands. - Waste spoils from site clearance.		
4.1.	- Waste from construction workforce. - Soil and water contamination with antifreeze. - Waste spoils from site clearance.	- Energetic independence from fuel import. - Avoiding CO_2, SO2, NOx, and particulate emission from fossil - fuel.	- Noise from systems pumps. - Visual impact.
	ALBANIAN REGION		
1	1. Waste spoil from site clearance and excavation works.	- Energetic independence from import. - It is the cleanest energy production	no
2			
3	- Waste from construction workforce. - Soil and water contamination with antifreeze. - Waste spoils from site clearance.	- Energetic independence from fuel import. - Avoiding CO_2, SO2, NOx, and particulate emission from fossil - fuel.	- Noise from systems pumps. - Visual impact.

3.2.3 Receiving habitats, and habitat characteristics which are vulnerable to change for the technologies

For each technology in each region, Table 3.2.3 identifies the receiving habitats, and habitat characteristics which are vulnerable to change. The receiving habitats may be air, water, and soil. The habitat related characteristics that are vulnerable to change may be biodiversity, wildlife, vegetation, etc.

Table 3.2.3: Receiving habitats, and habitat characteristics which are vulnerable to change for the technologies

Technologies	Identify	
	receiving habitats[1]	habitat related characteristics[2]
	GREEK REGION	
1.1	Water, soil	biodiversity
2.1	soil	wildlife
3.1, 3.2	Soil, water	biodiversity
4.1	Air, water, soil	Biodiversity, wildlife, vegetation
4.2	Air	wildlife
	GERMAN REGION	
1	Endangered species of birds	River banks ecosystems
2	none	None
	ITALIAN REGION	
1.1, 1.2	Water, Soil	Problems to vegetation and wildlife in certain PV panel cases, *but only if improperly disposed of.*
2	-	-
	SERBIAN REGION	
1.1, 1.2	Air-at negligible scale	Biodiversity-at negligible scale
2.1	Forest	Biodiversity, wildlife and vegetation
3.1, 3.2, 4.2	Soil, air, water	Biodiversity, wildlife and vegetation
4.1, 5.1	Air	Biodiversity, wildlife and vegetation
4.3	Water	Biodiversity, and wildlife
6.1	Roof cover	Biodiversity, wildlife
	FYROM REGION	
1.1, 1.2, 1.3, 2.2.	- Soil, water, air at negligible scale.	- Biodiversity.
2.1, 3.1.	- Soil, water, air at negligible scale.	- Biodiversity, wildlife, and vegetation.
4.1.	- Soil.	- Biodiversity.
	ALBANIAN REGION	
1	Water	Biodiversity, and wildlife

2	- Air at negligible scale.	Biodiversity
3	Roof cover	Biodiversity, wildlife

3.2.4 Landscape, resources, and society, which are vulnerable to change for the technologies of the selected IRES scheme

For each technology in each region, Table 3.2.4 gives landscape, resources, and society, which are vulnerable to change. Regarding landscape, the visual impact of technologies for RES production may be subject of discussion. Regarding resources, the most important is land availability. Regarding society, the image of RES energy production should be positive and RES production should be beneficial to society to offer new energy, water and new economic activity.

Table 3.2.4: Landscape, resources, and society, which are vulnerable to change for the technologies of the selected IRES scheme

Technologies	Identify		
	landscape	resources	society
	GREEK REGION		
1.1	Coastal landscape possibly affected	Geothermal water	Local society has previous negative image for geothermal exploitation. Need to focus on the benefits and potential of new technologies
2.1	Visual impact subject to discussion	Land consuming	Wind energy is a technology on the edge, so a bit controversial between societal groups.
3.1	Depends on the construction and the architecture of the existing buildings	In the proposed scale negligible	Beneficial to society offering electricity where the grid is not connected
3.2	Coastal landscape possibly affected	Coastal land	Beneficial to society offering water and opportunities to develop various economic activities.
4.1	Reduction of waste volume is beneficial to landscape	Land for recycling facilities	Beneficial to society but depended on citizens' participation. Needs a period of compliance.
4.2	No effects	No effect	Beneficial, strengthening environmental consciousness and promoting local sustainability

	GERMAN REGION		
1	River banks	River water	None
2	none	None	None
	ITALIAN REGION		
1.1	Potentially aesthetically displeasing to residents	Land availability	Job creation during construction, some during operation
1.2	Potentially aesthetically displeasing to residents	-	Job creation during construction and operation
2	Potentially aesthetically displeasing to residents	-	Job creation during construction, some during operation
	SERBIAN REGION		
1.1, 2.1	Yes (beneficial)	No influence	Higher job offer
1.2	Yes (beneficial)	Land availability	Higher job offer
3.1, 3.2	Yes (not aesthetic)	Industrial land availability	Higher job offer
4.1	No change	No influence	No higher job offer
4.2	Yes (not aesthetic)	Industrial land availability	Higher job offer
4.3	Yes (beneficial)	Village land availability	No higher job offer
5.1	No change	No influence	No higher job offer
6.1	Yes (not aesthetic)	No influence	Higher job offer for collector production
	FYROM REGION		
1.1.	- Beneficial.	- Soil fertility.	- Higher job offer.
1.2.	- Not aesthetic.	- Industrial land availability.	- Higher job offer. - Secure yield redemption.
1.3.	- Not aesthetic.	- Industrial land availability.	- Higher job offer. - Energy independence from fuel import. - Farmer's can use their one's biodiesel for agriculture machinery.
2.1.	- Beneficial because forest residua will be dislocated.	- Forest residue. - Soil fertility.	- Higher job offer. - Reducing of forest fire risks
2.2.	- Not aesthetic.	- Industrial land availability.	- Higher job offer.

3.1.	- Not aesthetic.	- Geothermal water.	- Higher job offer - Energetic independence from fuel import. - Cheap renewable thermal energy.
4.1.	- Not aesthetic.	- No influence.	- Energetic independence from fuel import. - Cheap renewable solar thermal energy.
	ALBANIAN	**REGION**	
1	Yes (beneficial)	Village land availability	No higher job offer
2	Yes	No influence	Higher job offer
3	Yes	No influence	Higher job offer for collector production

3.3 DESCRIPTION OF POTENTIAL ACCIDENTS ON ENVIRONMENT AND ECOLOGY

For each technology in each region, this chapter identifies possibility of separate accidents during construction and operation and decommissioning and identifies the receiving habitats, which may be exposed to accidents for the technologies, and its habitat characteristics.

3.3.1 Separate accidents during construction and operation and decommissioning for the technologies

For each technology in each region, Table 3.3.1 states possibility of separate accidents during construction and operation and decommissioning.

Table 3.3.1: Separate accidents during construction and operation and decommissioning for the technologies

Technologies	Identify separate accidents during		
	construction	operation	decommissioning
	GREEK REGION		
1.1	• Danger of pollution to soil and aquifers in case of accident, with drill fluids and liquid discharges. • Danger of land sliding if poorly supported. • Risk of labor accidents. • Risk of oil spills from construction machinery if accident happens.	• Danger from discharges of polluted liquids and thermal pollution. • Danger of collapse.	• Danger from remaining material and substances if not properly removed.
2.1	• Risk of labor accidents. • Danger of oil spills from construction machinery in case of accident.	•	• Danger from remaining material and substances if not properly removed.
3.1	• Danger of pollution because of toxic substances, if PV-cell remaining pieces are left over during construction.	• Risk of fire due to heat, flame or air. • Moderately toxic after ingestion and inhalation. • Hazardous fumes for firemen if on fire.	• Contains toxic parts and lead batteries so could cause pollution of soil or water.

	• Risk of fire if not properly designed due to heat, flame or air. • Risk of labor accidents and risk for labour if silicon parts are breathed in as dust. • Danger of oil spills from construction machinery in case of accident.		
3.2	• Danger of pollution because of toxic substances, if PV-cell remaining pieces are left over during construction. • Risk of fire if not properly designed due to heat, flame or air. • Risk of labor accidents and risk for labor if silicon parts are breathed in as dust. • Danger of oil spills from construction machinery in case of accident.	• Risk of fire due to heat, flame or air. • Moderately toxic after ingestion and inhalation. • Hazardous fumes for firemen if on fire. • Salt outputs from the system from accidental misfits could cause soil damage.	• Contains toxic parts and lead batteries so could cause pollution of soil or water.
4.1	• Danger of oil spills from construction machinery in case of accident.	• Waste management system could collapse if accidents happens either in the phase of collection or in the phase of management or disposal. This could lead to landfill overloads or uncontrolled waste dumping.	• Rehabilitation of waste receiving areas is needed.
4.2		• If accident occurs the collected used oils could	

		end up to the aquifers polluting the water or the sea.	
	GERMAN REGION		
#1	Ground water disturbance	Methane emission	Ground water disturbance
#2	Ground water disturbance	Smoke emissions	None
	ITALIAN REGION		
1.1; 1.2	-	Electrical equipment tampering by fauna, causing potential mortality	-
2	-	Hot water from tank could fall/rupture (low probability), causing injury	-
	SERBIAN REGION		
1.1		1. Improper use of chemicals for plant protection (treat to soil by erosion). 2. Improper use of mineral fertilizers (treat to soil by erosion). 3. Tractor should have safety bars to avoid death of personal if turned over.	1. Uncontrolled burning of waste (brings to forest fire and bad road visibility).
1.2		1. Tractor should have safety bars to avoid death of personal if turned over.	
2.1		1. Danger of fire if wood residues are not stored pro-perly. 2. Intense smoke from diesel combustion in the transport machines, if machines are not tuned adequately.	
3.1	.	1. Danger of fire and poison if biodiesel production is not properly protected. 2. Excesive odor leakage complaints if next to settlements.	1. Danger of waste from site clearance leftovers if not handled adequately.
3.2		1.Danger of fire if wood	1. Danger of waste from

		chips and pellets are not stored properly. 2.Excessive odor leakage complaints if next to settlements.	site clearance leftovers if not handled adequately.
4.1	1. Danger of biogas explosion if production is not properly protected.	1. The potential odor of biogas when handling is unproper. NOx and CO in discharge gases.	1. Danger of waste from site clearance leftovers if not handled adequately.
4.2	1. Danger of fire if wood chips are not stored properly.	1.NO_x, CO and particulate discharge into environment in the case of malfunction.	1. Danger of waste from site clearance leftovers if not handled adequately. Waste spoils from site clearance.
4.3	1. Danger of waste from site clearance leftovers if not handled adequately.		
5.1	1. Danger of waste from site clearance leftovers if not handled adequately.	1. Danger of fire if wood residues are not stored properly. 2. SO_2, NO_x, CO and particulate discharge into environment in case of malfunction.	
6.1		1. Danger of freezing if water does not contain anti-freezing matter	1. Danger of waste from site clearance leftovers if not handled adequately.
	FYROM REGION		
1.1.	-	- Danger of soil, water contamination, and human, plant and wildlife poising with improper use of fertilizers and chemicals for plant protection. - Danger of soil and ground water contamination from the spillage of materials such as vehicle fuel and oil in cases of agricultural machinery damages. - Danger of death of personal if tractor is turned	- Uncontrolled burning of waste (brings to forest fire and bad road visibility).

		over.	
1.2.	- Danger of injuries of personal during construction work.	- Danger of receiving waste of spoil storage seeds because of improper storage.	- Danger of waste from site clearance leftovers if not handled adequately.
1.3.	- Danger of injuries of personal during construction work.	- Danger of fire and poison if biodiesel production is not properly protected. - Danger of leakage (alcohol, crude oil, biodiesel) because of improper storage. - Excessive odor leakage complaints if next to settlements.	- Danger of waste from site clearance leftovers if not handled adequately.
2.1.	-	- Danger of fire if wood residues are not stored pro-perly. - Danger of soil and ground water contamination from the spillage of materials such as vehicle fuel and oil in cases of agricultural machinery damages. - Danger of death of personal if tractor or vehicle is turned over.	-
2.2.	- Danger of injuries of personal during construction work.	- Danger of fire if wood is not stored properly. - Danger of SO2, NO_x, CO and particulate discharge into environment in case of malfunction.	- Danger of waste from site clearance leftovers if not handled adequately.
3.1.	- Danger of injuries of personal during construction work. - Danger of contamination of soil and surface waters / wetland from spills such as drill fluids and contaminated liquid discharges during construction in cases of accidence.	- Danger of contamination of soil, and surface waters / wetland from spills of contaminated liquid and hot water discharges during exploitation in cases of accidence. - Danger of land slips and land slides due to poor embankment grading. - Danger of collapse and subsidence.	- Danger of waste from site clearance leftovers if not handled adequately.

	- Danger of ground contamination from the spillage of materials such as vehicle fu in cases machinery damages. -Danger if land slips and land slides due to poor embankment grading.		
4.1.	- Danger of injuries of personal during construction work.	- Danger of freezing if water does not contain anti-freezing matter. - Danger of soil and water contamination with antifreeze if some solar systems damage accrued.	- Danger of waste from site clearance leftovers if not handled adequately.
	ALBANIAN REGION		
1	1. Danger of waste from site clearance leftovers if not handled adequately.		
2	Danger of worker working in high positions		
3		1. Danger of freezing if water does not contain anti-freezing matter	1. Danger of waste from site clearance leftovers if not handled adequately.

3.3.2 Identify receiving habitats and habitat characteristics, which may be exposed to accidents for the technologies

For each technology in each region, Table 3.3.2 identifies the receiving habitats (such as air, water, and soil), which may be exposed to accidents for the technologies, and habitat characteristics (biodiversity, wildlife, and vegetation).

Table 3.3.2: Receiving habitats, which may be exposed to accidents for the technologies, and habitat characteristics

Technologies	**Identify**	
	Receiving habitats[1]	**Habitat related characteristics[2]**
	GREEK REGION	
1.1	Water, soil, air	Biodiversity, wildlife
2.1	Soil, water	Vegetation
3.1;3.2	Water, soil, air	Biodiversity
4.1	Water, soil, air	Wildlife
4.2	Water, soil	Biodiversity, wildlife
	GERMAN REGION	
1	Forest and river bank	High sensitivity to groundwater disturbance
2	None	None
	ITALIAN REGION	
All	Soil	Wildlife
	SERBIAN REGION	
1.1,1.2	Air-at negligible scale	Biodiversity-at negligible scale
2.1	Forest	Biodiversity, wildlife and vegetation
3.1,3.2,4.2	Soil, air, water	Biodiversity, wildlife and vegetation
4.1,5.1	Air	Biodiversity, wildlife and vegetation
4.3	Water	Biodiversity, and wildlife
6.1	Roof cover	Biodiversity, wildlife
	FYROM REGION	
1.1. 1.2. 1.3. 2.2.	- Soil, water - Air at negligible scale	biodiversity
2.1. 3.1.	- Soil, water and air at negligible scale	biodiversity, wildlife, and vegetation
4.1.	- Soil	biodiversity
	ALBANIAN REGION	
#1	Water	Biodiversity, and wildlife
#2	Air at negligible scale.	Biodiversity
#3	Roof cover	Biodiversity, wildlife

4. MEASURES AGAINST ADVERSE EFFECTS OF THE TECHNOLOGIES ON THE ENVIRONMENT AND ECOLOGY

4.1 DESCRIPTION OF MEASURES WITH PRIORITY FOR PROTECTION

For each technology in each region, Table 4.1 describes protection measures with priority for protection.

Table 4.1: Description of measures with priority for protection

Technologies	Identify priority for protection		
	very urgent	urgent	low
	GREEK REGION		
1.1	• Creation of contingency plans dealing with risk issues and possible accidents (risk assessment). • Use of best available technology and material for the application of the technology	• Use of security technician during construction and operation phases. • Monitoring indicators for the proper operation of the scheme.	• Isolation of the installation from free access.
2.1		• Use of large rotators to prevent accidents with birds.	• Monitoring of compliance with environmental terms set for the project.
3.1	• Contingency plans for possible accidents. • Proper management at the end of life cycle.	• Fire protection measures for the area around the construction. • Preventive measures for workers.	
3.2	• Contingency plans for possible accidents. • Proper management at the end of life cycle. • Brine management	• Preventive measures for workers. • Irrigation scheduling and rational use of produced water.	
4.1	• Soil and landscape rehabilitation at the end of the landfill	• Appliance of economic measures (taxes or incentives)	• Citizens' environmental awareness projects.

	area capacity. • Filters to prevent air pollution from energy recovery through burning (eg RDF).	to lift recycling barriers. • Measures to apply recycling at source.	
4.2	• Contingency plan if used oil collection stops for any reason. • Motor regulation for maximum performance while burning mixed oil in order to lessen emissions.		
	•		
	GERMAN REGION		
1	Proper groundwater protection scheme	Diminish noice and methane emissions	Reduce ground sealing to a minimum.
2	Noise prevention scheme	Good heating system	
	ITALIAN REGION		
1.1; 1.2		-	Material left over from construction
2		-	-
	SERBIAN REGION		
1.1; 1.2			1. Dust from earthwork. 2. Noise from tractors.
2.1			1. Noise from tractors and pick-up machines. 2. Smoke from fuel combustion in the pick-up and transport machines.
3.1	1. Protect people outside the construction site by using fence and dust net. 2. Protect people inside the plant site by using goggle, aprons, and gloves.	1. Protect people outside the decommission site by using fence and dust net.	1. Dust from earthwork. 2. Noise from const'n machines. 3. The potential odor of biodiesel.
3.2	1. Protect people outside the construction site by using fence and dust net.	1. Protect people outside the decommission site by using fence and dust net.	1. The potential odor during operation.
4.1; 4.2	1. Protect people outside	1. Protect people	

	the construction site by using fence and dust net.	outside the decommission site by using fence and dust net.	
4.3	1. Protect people outside the construction site by using fence and dust net.	1. Protect people outside the decommission site by using fence and dust net.	1. The turbines and electricity generators are noise sources during operation.
5.1	1. Protect people outside the construction site by using fence and dust net. 2. Protect outside community by using filters for particulate discharge.	1. Protect people outside the decommission site by using fence and dust net.	1. The mill fans are noise sources during operation.
6.1	1. Protect people outside the construction site by using fence and dust net.	1. Protect people outside the decommission site by using fence and dust net.	1. High visual impact. The pumps are noise sources during operation.
	FYROM REGION		
1.1.	- Protection from uncontrolled use of chemicals for plant protection and fertilizers. -Protection from soil erosion.	- Fires protection from uncontrolled burning of waste.	- Protect people outside the agricultural site by using tree fence and dust net from dust from earthwork and nose from tractors.
1.2.	-	- Protect of receiving waste of spoil storage seeds because of high % of moisture. - Leaking protection of crude oil if it is not stored and handled properly or machine damages. - Protect people inside the crushing plant from noise from crushing press by using several measurements for reducing it.	- Protect people outside the crushing plant from dust from seed cleaning and noise from crushing press by using tree fence.
1.3.	- Fire protection from biodiesel if it is not	- Protect people inside the plant site from	- Protect people outside the biodiesel plant by using

	stored properly. - Leaking protection of raw materials and biodiesel if it is not stored and handled properly or machine damages.	chemicals, odor, and fire by using goggle, aprons, and gloves.	tree fence to reduce noise and odor.
2.1.	- Fire protection from wood if it is not stored properly.	- Protect people during wood collection from dust and noise.	- Protect people outside the collecting and primary storing site by using tree fence to reduce dust and noise from machinery and vehicle.
2.2.	- Fire protection from wood if it is not stored properly.	- Protect people inside the plant site from noise, dust, odor and fire by using goggle, aprons, and gloves.	- Protect people outside the briquette plant by using tree fence and to reduce dust and noise from wood press.
3.1.	- Contamination of soil and surface waters / wetland protection from spills of drill fluids and contaminated liquid discharges during construction in cases of accidence. - Contamination of soil and surface waters / wetland protection from spills of hot water discharges during exploitation in cases of accidence.	- Land slips and land slides protection due to poor embankment grading. - Collapse and subsidence protection.	- Protect people outside the construction site by using tree fence to reduce dust, noise and vibration from construction equipment.
4.1.	-	-	- Protect people outside the construction and decommission site by using fence and dust net to reduce dust and noise from equipment.
	ALBANIAN REGION		
1	1. Protect people outside the construction site by using fence and dust net.	1. Protect people outside the decommission site by using fence and dust	1. The turbines and electricity generators are noise sources during operation.

		net.	
2; 3	1. Protect people outside the construction site by using fence and dust net.	1. Protect people outside the decommission site by using fence and dust net.	1. High visual impact. The turbines are noise sources during operation.

4.2 IDENTIFY AND EVALUATE MITIGATION MEASURES TO AVOID, TO REDUCE OR TO REMEDY THE IMPACTS

For each technology in each region, Table 4.2 identify and evaluate mitigation measures to avoid, to reduce or to remedy the impacts of this technology to environment.

Table 4.2: Identification and evaluation of mitigation measures to avoid, to reduce or to remedy the impacts

	Identify and evaluate mitigation measures to		
Technologies	avoid	reduce	remedy
	GREEK REGION		
1.1	• Use of best available technology and material for the application of the technology • Isolation of the installation from free access.	• Use of security technician during construction and operation phases. • Monitoring indicators for the proper operation of the scheme.	• Creation of contingency plans dealing with risk issues and possible accidents (risk assessment).
2.1	• Monitoring of compliance with environmental terms set for the project.	• Use of large rotators to prevent accidents with birds.	
3.1	• Proper management at the end of life cycle. • Fire protection measures for the area around the construction. • Preventive measures for workers.	• Proper management at the end of life cycle.	• Proper management at the end of life cycle.
3.2	• Proper management at the end of life cycle.	• Irrigation scheduling and rational use of produced water. • Brine management	• Proper management at the end of life cycle.
4.1	• Citizens' environmental awareness projects.	• Filters to prevent air pollution from energy recovery through burning (eg RDF).	• Soil and landscape rehabilitation at the end of the landfill area capacity.

		• Appliance of economic measures (taxes or incentives) to lift recycling barriers. • Measures to apply recycling at source	
4.2		• Motor regulation for maximum performance while burning mixed oil in order to lessen emissions.	
		•	
	GERMAN REGION		
1	Closed loop water systems	Noise and methane emission prevention	
2	none	Groundsealing	
	ITALIAN REGION		
1.1	A proper recycling/ collection of modules should be carried out at the end of the life-cycle (many manufacturers actually have takeback programs for modules), which would negate the toxicity effects of certain types of cells/modules.	Place fencing around the compound to prevent people from entering (electrocution risk), as well as for animals.	-
1.2	Same as 1.1	Place appropriate safety measures during construction for human safety.	-
2	-	Same as 1.2	-
	SERBIAN REGION		
1.1;1.2;2.1			
3.1; 3.2; 4.1; 4.2; 4.3; 6.1	1. Protect people outside the construction site by using fence and dust net. 2. Protect people outside the decommission site by using fence and dust net.		
5.1	1. Protect people outside the construction site by using fence and dust net.	2. Protect outside community by using filters for particulate	

	2. Protect people outside the decommission site by using fence and dust net.	discharge.	
	FYROM REGION		
1.1.	- Avoiding soil erosion and contamination by choosing right culture and sorts for agricultural production.	- Practicing crop rotation for reducing use of chemicals for plant protection.	- Tacking some agricultural measures depending of soil erosion level (green manuring, calcification, soil rest etc.) for improving soil condition and soil fertility.
1.2.	-	- Reduce seeds from spoiling by storing them in optimal condition with low % of moisture. - Reduce leaking of crude oil by storing and handling properly.	-
1.3.	- Avoiding fires from biodiesel by storing and handling properly. - Avoiding leaking of raw materials and biodiesel by storing and handling properly. - Avoiding accident of staff with chemicals, or odor and fire by using goggle, aprons, and gloves.	- Reduce noise and odor outside the biodiesel plant by using tree fence.	-
2.1.	- Avoiding wood fires by storing and handling properly.	-	-
2.2.	- Avoiding wood fires by storing and handling properly.	- Reduce noise and dust outside the briquette plant by using tree fence and dust net.	-
3.1.	- Avoid land slips and land slides with good embankment grading. - Avoiding leaking of contaminated liquid and hot water discharges during construction and	- Constant control of borehole and pipes for reducing leaking of fluids.	-

	exploitation.		
4.1.	-	- Constant control of solar systems for reducing leaking of fluids.	-
	ALBANIAN REGION		
1; 2	Protect people outside the construction site by using fence and dust net		
3	Protect people outside the construction site by using fence and dust net.	- Constant control of solar systems for reducing leaking of fluids.	

5. MEASURES ENVISAGED PREVENTING, REDUCING AND, IF POSSIBLE, ELIMINATING ANY ACCIDENT EFFECTS ON THE ENVIRONMENT AND ECOLOGY FOR THE TECHNOLOGIES.

For each technology in each region, Table 5 gives measures envisaged preventing, reducing and, if possible, eliminating any accident effects on the environment and ecology for the technologies with priority for protection.

Table 5: Measures envisaged preventing, reducing and, if possible, eliminating any accident effects on the environment and ecology for the technologies with priority for protection

Technologies	Identify priority for protection		
	very urgent	urgent	low
	GREEK REGION		
1.1	Creation of contingency plans dealing with risk issues and possible accidents (risk assessment).	Monitoring indicators for the proper operation of the scheme.	
2.1			Monitoring of compliance with environmental terms set for the project.
3.1		Contingency plans for possible accidents.	
3.2		Contingency plans for possible accidents.	
4.1	People awareness projects		
4.2		Contingency plan if used oil collection stops for any reason.	

	GERMAN REGION		
1	Groundwater protection	Methane collection system	Noise prevention
2	Emission cleaning	Noise prevention	
	ITALIAN REGION		
1; 2	-	-	-
	SERBIAN REGION		
1.1	1. Control proper use of chemicals for plant protection. 2. Control proper use of mineral fertilizers.	Forbid by law burning of waste to protect forest and enhance road visibility.	
1.2	Control tractor purchase for safety features.		
2.1	Control regularly fire protection of wood-residue storage.	Regularly control combustion in the transport machines.	
3.1	Control regularly fire protection of biodiesel production.	Regularly control odor leakage.	Inspect cleared site for waste leftovers.
3.2	Control regularly fire protection of wood chips and pellets storage.	Regularly control odor leakage.	Inspect cleared site for waste leftovers.
4.1	Control regularly for biogas leakage.	Regularly control combustion process for NOx and CO discharge.	Inspect cleared site for waste leftovers.
4.2	Control regularly fire protection of wood chips storage.	Regularly control combustion process for NOx and CO discharge.	Inspect cleared site for waste leftovers
4.3	Inspect cleared site for waste leftovers		
5.1	Inspect cleared site for waste leftovers	1. Control regularly fire protection of wood chips storage. 2. Regularly control combustion process for NOx and CO discharge.	
6.1		Control fluid inside collector regularly for possibility of freezing.	Inspect cleared site for waste leftovers
	FYROM REGION		
1.1.	- Constant control of	- Increase control and	- Constant control of

	proper use of chemicals for plant protection and fertilizers. - Constant control of practicing proper agricultural measures for avoiding soil erosion.	forbid by law burning of waste to protect forest and enhance road visibility.	agricultural machinery shape for reducing noise and smoke from fuel combustion during work.
1.2.	-	- Constant control of seed storage condition. - Constant control of machinery and storage barrel for avoiding leaking of crude oil. - Constant control of noise and dust inside the crushing plant and reducing them by using several measurements.	- Constant control of noise and dust outside the crushing plant and reducing them by using tree fence and dust net.
1.3.	- Avoiding leaking of raw materials and biodiesel by storing and handling properly.	- Constant control of noise and odor inside the biodiesel plant and reducing them by using several measurements.	- Constant control of noise and odor outside the biodiesel plant and reducing them by using tree fence.
2.1.	- Properly wood storing and handling for avoiding fires.	-	- Constant control of agricultural machinery and vehicle shape for reducing noise and smoke from fuel combustion during work
2.2.	- Properly wood storing and handling for avoiding fires.	- Constant control of noise and dust inside the briquette plant and reducing them by using several measurements.	- Constant control of noise and odor outside the briquette plant and reducing them by using tree fence and dust net.
3.1.	- Avoid land slips and land slides with good embankment grading. - Avoid leaking of contaminated liquid and hot water discharges during construction and exploitation.	-	-
4.1.	-	-	- Constant control of solar systems for reducing leaking of fluids.

	ALBANIAN REGION		
1	Inspect cleared site for waste leftovers		
2			Inspect cleared site for waste leftovers
3		Control fluid inside collector regularly for possibility of freezing.	1. Inspect cleared site for waste leftovers 2. Constant control of solar systems for reducing leaking of fluids.

6 DATA ON TECHNICAL SHORTCOMINGS, ABSENCE OF THE APPROPRIATE EXPERTISE AND SKILLS.

6.1 DATA ON TECHNICAL SHORTCOMINGS OF EACH TECHNOLOGY OF THE SELECTED IRES SCHEME WITH RESPECT TO ITS ENVIRONMENTAL PERFORMANCE

For each technology in each region, Table 6.1 states data on technical shortcomings of the technology with respect to its environmental performance.

Table 6.1: Data on technical shortcomings of each technology of the selected IRES scheme with respect to its environmental performance

Technologies	Data
	GREEK REGION
1.1	In case of leaking, soil and water pollution occurs.
2.1	Possible noise from rotators. Contact with some birds could happen.
3.1	Non toxic cells are not available in this technology.
3.2	Non toxic cells are not available in this technology. Brine is an output of this technology
4.1	Needs personal involvement and education of citizens, needs controlled landfill for non recyclable or valorized material, needs sea transfer of materials to be recycled.
4.2	Transformations on vehicle motors are needed.
	GERMAN REGION
#1	CH4 effluents 0.5 % maximum. 4000 m2 are sealed. Leaking system for groundwater prevention reduces emissions to zero.
#2	120 db is maximum loudness due to noise prevention measures.
	ITALIAN REGION
All	None
	SERBIAN REGION
1.1;1.2;2.1	negligible

3.1	Waste spoils from site clearance. Other negligible.
3.2	Waste spoils from site clearance. Noise of the crushers, chippers, etc during operation.
4.1;4.2	Waste spoils from site clearance. General waste from construction workforce.
4.3	Waste spoils from site clearance.
5.1	Waste spoils from site clearance. SO_2, NO_x, CO and particulate discharge into environment.
6.1	General waste from construction workforce. Waste spoils from site clearance during decommissioning.
	FYROM REGION
1.1.	Soil and water contamination, soil erosion in cases where improper agricultural measures are taken.
1.2.	Noise from crushing press. Waste spoils from site clearance.
1.3.	Soil and water contamination and fire risks in cases of biodiesel and alcohol likage.Waste spoils from site clearance.
2.1.	Noise and dust during wood collection and transport.
2.2.	Noise and dust from wood presser. Waste spoils from site clearance.
3.1.	Soil and water contamination in cases of water leaking. Waste spoils from site clearance.
4.1.	General waste from construction workforce. Waste spoils from site clearance during decommissioning.
	ALBANIAN REGION
1; 2	Waste spoils from site clearance.
3	General waste from construction workforce. Waste spoils from site clearance during decommissioning.

6.2 DATA ON ABSENCE OF THE APPROPRIATE EXPERTISE AND SKILLS OF EACH TECHNOLOGY

For each technology in each region, Table 6.2 states data on absence of the appropriate expertise and skills of the technology.

Table 6.2: Data on absence of the appropriate expertise and skills of each technology

Technologies	Data
	GREEK REGION
1.1	No other similar applications exist in place, so local technicians and engineers need to be trained for the proper maintenance and operation of the system.
2.1	Wind energy is already integrated so there is a local “know how”.
3.1;3.2	Some training is needed to local human power.
4.1	Local government needs to seriously commit to the aims of this system since there exist no similar experience. A long preparation period is needed for local people to accept their involvement in the system.

4.2	A training session would be enough for the technicians to acquire the appropriate skills.
	GERMAN REGION
1; 2	None
	ITALIAN REGION
1.1; 1.2	Inexperience in installation and maintenance by local population, but short training of electricians sufficient, as well as instructions for disposal.
2	Inexperience in installation and maintenance by local population, but short training of installers sufficient
	SERBIAN REGION
1.1; 1.2	There is local "know-how" on disposal.
2.1;3.1;3.2;4.1;4.2; 4.3;5.1	There are enough unemployed workers, technicians and engineers, however they have to be thought to expertise and skills in order to govern maintenance and exploitation of planned projects adequately.
	FYROM REGION
1.1.	There is local a "know-how" on disposal.
1.2.; 1.3.	There are enough unemployed workers, technicians and engineers; however they have to be thought to expertise and skills in order to govern maintenance and exploitation of planned projects adequately.
2.1.	There is a local "know-how" on disposal.
2.2.; 3.1.; 4.1.	There are enough unemployed workers, technicians and engineers; however they have to be thought to expertise and skills in order to govern maintenance and exploitation of planned projects adequately.
	ALBANIAN REGION
All	There are enough unemployed workers, technicians and engineers, however they have to be thought to expertise and skills in order to govern maintenance and exploitation of planned projects adequately.

7. PROGRAM OF MONITORING OF TECHNOLOGY IMPACT ON THE ENVIRONMENT BY TECHNOLOGY DEVELOPERS OF EACH TECHNOLOGY

For each technology in each region, Table 7 gives program of monitoring of technology impact on the environment by technology developers.

Table 7: Program of monitoring of technology impact on the environment by technology developers of each technology

Technologies	Short outline

	GREEK REGION
1.1	Step by step monitoring of the procedure from central computer. Periodic measurements of water and air quality. Results available on reports.
2.1	Monitoring of generator performance in relation to physical parameters. Statistical data gathering on possible bird victims.
3.1	Periodic checking of the system condition.
3.2	Periodic soil analysis related to the brine production.
4.1	Set of performance indicators, periodic indicators estimation, evaluation of indicators and feedback to the system planning.
4.2	Checking for possible changes in cooked oil production. Periodic check on vehicle performance. Periodic measurements of air pollutants produced.
	GERMAN REGION
1; 2	None
	ITALIAN REGION
1.1	Occasional checks of the fields for debris.
1.2; 2	None
	SERBIAN REGION
1.1; 1.2	No need.
2.1	Public utility for forests exploitation has a small unit for monitoring the environmental conditions in and around the forest area. Unit is incomplete and cannot give representative results.
3.1	However, all the production units shall be equipped with measuring devices for following the changes of expected negative emissions. Devices to measure quality of biodiesel should be present.
4.1; 4.2; 5.1	Technology shall be equipped with measuring devices for following the changes of expected negative emissions.
3.2; 4.3; 6.1	No need.
	FYROM REGION
1.1.; 1.2; 4.1	No need.
1.3. 2.2; 3.1.	Technology shall be equipped with measuring devices for following the changes of expected negative emissions.
2.1.	Public utility for forests exploitation has a small unit for monitoring the environmental conditions in and around the forest area. Unit is incomplete and cannot give representative results.
	ALBANIAN REGION

All	No need.

8. CONCLUSION

For each technology in each region, Table 8 states the conclusions by its developers.

Table 8: Conclusions by developers for separate technologies

	GREEK REGION
1.1	This technology related to mild geothermal exploitation has no significant impacts if applied and operated by the book. Potential significant impacts are related to possible accidents or malfunction and should be subject to preventive measures.
2.1	No serious effects are related to wind generators. Matters of concern are the disputed aesthetical degradation and as referred killing of wild birds.
3.1	Effects from PV systems are related to body construction materials and possible accidents. As a result special attention is needed while removing the installations.
3.2	Besides the effects above, potential impacts have to do with brine collection from desalination and the use the water (final product). No adverse effects are expected if measures are adopted.
4.1	Waste management has always significant impacts on the environment. The proposed technology (recycling) will reduce impacts and balance them through waste to energy pollutants "trade scheme".
4.2	Burning of cooked oils causes air pollution, but the net balance from replacing fossil fuels is positive for the environment.
	GERMAN REGION
1	The biogas plant is situated in an environmentally sensitive area, however at the same time the placement of the biogas plant is very suitable to minimize environmental degradation and at the same time offer a great option to make a good use of the waste heat of the electricity production by drying the sewage sludge and thus reduce transport expenses and transport energy.
#2	The site is imbedded into the local industry zone which already has a very limited bio-diversity and both high air and noise emission level. Very clean wood combustion in the heating stove (of 150 kW) is accomplished through an exhaust gas cleaning system. A chimney of decent altitude makes sure that the gas is diverted into atmosphere. The noise emission from chipping takes place within generally very high perturbances of the wood logging.
	ITALIAN REGION
1, 2	Both PV and Solar Thermal technology have very small environmental impacts. Even in the case of having a potential impact (e.g. CdTe PV modules), the impacts are completely mitigated by proper disposal, with no impacts during the operation. Operational impacts/accidents are within normal bounds. Well designed systems will have the minimal of impacts.
	SERBIAN REGION
1	According to the investigations made, no negative environmental and ecological impact of planned projects completion can be foreseen, if they shall be technically and organizationally properly designed and completed.

	FYROM REGION
1.1.	If there will be practicing of all necessary agricultural measurements and growing and application of only right sorts for chosen area, there will be no negative environmental and ecological impact of planed project.
1.2.	If construction, organization and technical equipment of crushing plant are done properly, there will be no negative environmental and ecological impact of planed project.
1.3.	If construction, organization and technical equipment of biodiesel plant are done properly, there will be no negative environmental and ecological impact of planed project.
2.1.	If organization and technical equipment of wood collecting are done properly, there will be no negative environmental and ecological impact of planed project.
2.2.	If construction, organization and technical equipment of briquette plant are done properly, there will be no negative environmental and ecological impact of planed project.
3.1.	If construction, organization and technical equipment boreholes are done properly, there will be no negative environmental and ecological impact of planed project.
4.1.	If construction and technical equipment of solar systems are done properly, there will be no negative environmental and ecological impact of planed project.
	ALBANIAN REGION
1	According to the investigations made, no negative environmental and ecological impact of planned projects completion can be foreseen, if they shall be technically and organizationally properly designed and completed.
2	No negative environmental and ecological impact of planned projects completion can be foreseen, if they shall be technically and organizationally properly designed and completed.
3	If construction and technical equipment of solar systems are done properly, there will be no negative environmental and ecological impact of planed project.