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INRES

Insular regions cooperating for maximising the environmental and economic benefits from research in Renewable Energy Sources

Seventh Framework Programme – Capacities (Regions of Knowledge)
Support Action

Work package 2 (Regional Assessment and Mapping) Deliverable 2.3 (3 Regional RES- ID Cards)

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1. Introduction

The present deliverable is next to the already developed regional Cartographic Competences Schemes (CCSs) (deliverable 2.1) the additional element for providing the overall picture of the current performance levels in the RES field of the three project regions Canary Islands, Crete and Samsø. Furthermore, together with the CCSs the Regional RES-ID Cards presented in the following facilitate the further project development and the elaboration of the Comparative Analysis that will highlight the main RES dynamics in the regions and reveal the priorities on which to build in the future for implementing concerted research strategies and RTD policies that can support further the economic development in the regions.

Each Regional RES-ID Card provides an insight into the RES performance of the regions, illustrating information on the legal and political framework conditions and the expertise of the scientific and industrial communities in the field of concern.

Regional RTD and innovation policy framework


Policies, i.e. operational programmes, plans, laws, initiatives, networks, etc., have been gathered that favoured the diffusion and adoption of RTD in the RES field in the past as well as today for developing advanced technologies and enhancing the investment in the sector. Policies refer to the last programming period (2000 – 2006) as well as to the new programming period (2007 – 2013). The data gathering adopted a top down approach, focussing in the first place on RTD and innovation programmes and laws particularly addressed to the RES field (as for example energy plans) and aimed at sustaining the sector's sustainable progress in each region. Next to these policies, further RTD and innovation programmes, projects and initiatives (i.e. help desks, networks, etc.) in which the RES sector is embedded have been named. After this first overview on the RTD and innovation scenario in the island regions a more exhaustive description of the most important identified policies has been provided.

Regional research agenda

The regional research agendas detail on which research projects the research communities have been working during the last five years and which projects are currently being carried out in each region. Next to the research activity, the outcome of conducted research projects is demonstrated by providing information on available RES technologies/ prototypes. For a harmonious and complete data gathering a questionnaire has been used as supporting tool. The presentation of each region's performance is made according to the distinction of RES subsectors as agreed on in the project: solar energy, wind energy, water energy, bioenergy, and geothermy. The international perspective has been included into the analysis as well, listing cooperation activities of the scientific communities with further regions, considering in particular the three project partner islands. Last but not least, a SWOT analysis assesses each regional situation in terms of core competencies and shortcomings with regard to knowledge production and technology transfer capabilities in the RES sector.

Regional industrial performance


The industrial community is taken under investigation. Main distributed and adopted RES technologies in the regions are demonstrated. Next to this also research activities accomplished from private side are

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illustrated. A questionnaire has been used as supportive data gathering tool. As already for the scientific community, information is given on the cooperation activities of industrial players within the region as well as with regard to further regions, both at national and international level. Finally, the SWOT analysis assesses the industrial RES performance, highlighting strengths and weaknesses of the industry with regard to knowledge production and technology transfer capabilities in the RES sector and opportunities and threats coming from the environment.

The information gathered in the present document is mainly based on the profiles that have been collected in the CCSs. The data collection was conducted by the relevant project partners representing the political, scientific and industrial community. INNOVA was responsible for the overall completion of the report, the elaboration of the single Regional RES-ID Cards was under the responsibility of the following partners:

- Canary Islands: *ACISI*
- Crete: *REAC*
- Samsø: *SEA Academy*

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2. Regional RES- ID Card – Canary Islands

2.1. Regional RTD and innovation policy framework

The following table gives evidence to the legal and political framework of the Canary Islands as particularly regards the RES sector.




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Table 1 – Overview on RTD and innovation policies – Canary Islands


RES- related RTD and innovation policies	RTD and innovation programmes/Legislative references/Public incentives/Projects/Others initiatives (help desks, networks, etc.)	Title	Short description	RES sector	Budget spent, Source of funding	Time scale
	Public incentives	Action Plan of the Strategy of Saving and Energy Efficiency in Spain	The plan recognizes in the saving and energy efficiency an instrument of economic growth and social welfare.	Energy saving and efficiency	2.367 M€	2008-2012
	Legislative references/publc incentives	Plan of Renewable Energies	Its objective is to maintain the commitment to cover by means of renewable sources at least 12% of the total energy consumption in 2010, as well as to incorporate the other two indicative objectives - 29.4% of electrical generation by means of renewable energies and 5.75% of biofuels in transport for that year	All	23.598.641 thousands Euros	2005-2010
	Legislative references	Royal Decree 616/2007 of 11th of May of 2007	The Royal Decree intends the creation of a frame for the promotion of high efficiency heat and electricity co-generation, based on the demand of useful heat and the saving of primary energy, increasing the power efficiency and improving the security of the supply.	Co-generation		
	Legislative references	Royal Decree 661/2007 of 25th of May of 2007	Regulates the activity of production of electrical energy in special regime. The Registry of	All		

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		Electrical Energy Production Facilities of Special Regime is a suitable instrument created to follow the electrical production of co-generation as well as of renewable energies and residues.			
Legislative references	Order ITC/1522/2007 of 24th of May of 2007	Establishes the regulation of the guarantee of the origin of the electricity coming from renewable energy sources and high efficiency co-generation power plants in order to stimulate its contribution to the electricity production as well as to facilitate the commerce of electricity produced from these sources	All		
Legislative references	Order ITC/885/2009, of April, 2nd	Regulates the transference of funds of the specific account of the National Commission of Energy to the Institute for the Diversification and Saving of Energy, in 2009, for the execution of the measures of the Action Plan of 2008-2012 of the Strategy of saving and energy efficiency in Spain (2004-2012), and the criteria for the execution of the measures contemplated in this Plan	All		
Legislative references	Royal Decree 1027/2007 of 20 of July of 2007	Approves the Regulation of Thermal installations in Buildings (RITE).			
Legislative references	Order ITC/71/2007 of 22 of January of 2007	Complementary norms and technical trainings for the homologation of solar collectors are approved. With the object of	Solar thermal		

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		its certification, the solar collectors of liquid heating and prefabricated Solar thermal heating system will be obligatory, through the norms UNE-EN 12975 and UNE-EN 12976 respectively.			
Legislative references	Royal Decree 47/2007 of January, 19th	Partially transposes the European Directive 2002/91/CE, by which the basic procedure for the certification of power efficiency of buildings of new construction is approved	Energy saving and efficiency		
Legislative references	Real Decree 314/2006 March, 17th	Approves the Technical Code of Construction (CTE, 2006). It is the normative frame by which the basic exigencies of quality must be fulfilled in buildings, including their facilities to satisfy the basic requirements with security and habitability	Energy saving and efficiency		
Legislative references	Resolution of May, 31st of 2001	Establishes models of the standard contract and invoice for the connected photovoltaic solar facilities to the low voltage network.	Solar energy (PV)		
Legislative references	Real Decree 1663/2000 of 29th of September	Regulates the connection of photovoltaic facilities to the low voltage network. The present Real Decree will be of application to the photovoltaic facilities of nominal power non superior to 100 kVA and whose connection to the distribution network takes place in low voltage (i.e. non superior to 1 kV)	Solar energy (PV)		

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Legislative references	Energy Plan of the Canary Islands (PECAN)	To foster the maximum use of renewable energy sources, especially wind and solar, as a means of reducing the vulnerability of the system and protecting the environment	Wind and Solar		2006-2015
Legislative references	Decree 161/2006, of 8th of November of 2006	Regulates the authorization, connection and maintenance of the electrical systems in the scope of the Canary Islands Autonomous Community. The present Decree will be of application to all the electrical systems that are installed in the Canary Islands. It includes all equipment and circuits associated to a particular application: production, conversion, transformation, transmission, distribution or use of the electrical energy.	All		
Legislative references	Decree 130/2004 of September, 15th 2004	Sets the beginning of elaboration of the Energy Directives, in the scope of all the Canary Islands territory.	All		
Legislative references	Law 1/2001 May, 21	Regulates the construction of buildings and solar energy use in the Canary Islands Autonomous Community.	Solar energy		
Legislative references	Royal Decree 1028/2007 of July, 20 th 2007	Regulates the administrative procedures for authorisation of electric generation installations in the territorial sea waters	Wind energy		


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2.1.1. Detailed policy analysis

After the first overview on the RTD and innovation scenario in the Canary Islands region, a more exhaustive description for the most important identified policies is provided along with illustrative indicators, if available. Three of the presented policies under section 2.1. are described more in detail:


- Plan of Renewable Energies (P.E.R.)
- Royal Decree 1027/2007 of 20 of July of 2007
- Energy Plan of the Canary Islands (PECAN)

NAME OF THE MEASURE	Plan of Renewable Energies (P.E.R.)
TIME SCALE	2005-2010
BUDGET	23.598.641 thousands Euros
KEY ACTORS (i.e. funding institution)	IDAE (Instituto para la Diversificación y Ahorro de la Energía -Institute for Diversification and Saving of Energy)
RATIONALE (why the initiative has been set up in the region)	PER was drawn up in order to bolster the priority goals of the government's energy policy, which are to guarantee the security and quality of the electricity supply, while promoting care for the environment, and is a reflection of Spain's determination to meet its direct international commitments.
SECTOR (if possible related to RES)	All renewables
TARGET GROUPS	
RATIONALE	
AREA OF INTEREST	Electricity production and biofuels
FOCAL POINTS AND SPECIFIC OBJECTIVES	According to the Plan's forecasts, 12.1% of overall energy consumption in 2010 will be met from renewable sources, and they will provide 30.3% of gross electricity production. Biofuels will provide an alternative for 5.83% of petrol and diesel consumed by transport.
KEY ACTIVITIES	<p>In the following are listed the activities for each sector:</p> <ul style="list-style-type: none"> • Wind: Measures for improving the wind energy technology in order to optimize their behaviour in grid connection. Red Eléctrica de España studies different alternatives for a greater penetration of wind generation in the electric system, compatible with security operation. This includes the development of the electric transport system, incentives for the replacement of old wind turbines and the establishment of a single operation centre for the special regime. • Small Hydro: The different activities consider the hydroelectric resources, legal procedures and environment and social aspects. This includes public tenders in state infrastructures and hydroelectric use of ecological flows. • Solar Thermal: Measures focused on overcoming existing economic, technological, legal and social barriers. This includes the approval of the Technical Code of Construction in 2005, application of public investment grants, divulgation campaigns and training courses to the citizens. • Solar thermoelectric: Public grants for the first demonstrative projects and support for the execution of these projects.


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	<ul style="list-style-type: none"> • Solar photovoltaic: Measures focused on overcoming existing economic, technological, legal and social barriers. This includes the approval of the Technical Code of Construction in 2005, feed in tariffs and support for off-grid installations. • Biomass: Support for the investment in thermal applications in the domestic sector, including grants for equipment investments in homes and grants for purchasing agricultural machines for harvest and treatment of biomass. • Biogas: Feed in tariffs and diffusion of existing technologies. • Biofuels: The main public support is the zero taxes for hydrocarbons. Other measures include de development of a logistic collection of used vegetable oils and the selection of new oleaginous species adapted to the agronomic characteristics in Spain.
FUNDING INFORMATION	The main support for electricity production from renewables is that derived from the feed in tariff established in Spain
EX-POST EVALUATION <i>(main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)</i>	<p>The main objective is the systematic and periodic evaluation of the development of the different renewable sources following the objectives established, as well as the analysis of existing barriers and the formulation of proposals to overcome them.</p> <p>There are diverse information sources, such as the Administration, data from equipment manufacturers, clusters, etc. It is important to highlight information from Autonomous Communities, the Industry, Trade and Tourism Office; Treasury; Agriculture, Fishing and Food Office and IDAE.</p> <p>In 2008, renewable energies represented 10,5% of the net electric production in Spain.</p> <p>Spain ranks first in Europe in solar thermoelectric power installed, second in wind and photovoltaic and third in small hydro.</p>
CONTACT AND REFERENCE DATA	www.idae.es

NAME OF THE MEASURE	Royal Decree 1027/2007 of 20 of July of 2007
TIME SCALE	2008 -
BUDGET	
KEY ACTORS <i>(i.e. funding institution)</i>	
RATIONALE <i>(why the initiative has been set up in the region)</i>	<p>Through the Royal Decree RD 1027/2007, the Regulation for Thermal Installations in the Buildings was approved.</p> <p>The regulation is related to the energy efficiency of buildings, fixing the minimum requirements of energy efficiency that must be fulfilled the thermal installations of the new and existing buildings and a procedure of periodic inspection of boilers and air conditioning systems.</p> <p>RD 1027/2007 was justified by the need to transpose the European Commission's Directive 2002/91/EC, of 16 of December, energy efficiency of buildings. Also the approval of the Spanish Technical Code of the Construction by Royal Decree 314/2006, of 17 of March, has advised to write up a new text to</p>


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	<p>replace the then existing Code of Thermal Installation in Buildings (RITE), approved by Royal Decree 1751/1998, of 31 of July and that incorporates, in addition, the experience of its practical application during the past few years.</p>
<p>SECTOR <i>(if possible related to RES)</i></p>	<p>The approved regulation constitutes the basic legal frame work that regulates the requirements of energy efficiency and security that must be fulfilled the thermal installations in buildings to guarantee the well-being and hygiene of the people.</p> <p>The thermal installations must be designed, calculate, executed, maintained and operated in such a way that reduces the consumption of conventional energy of the thermal installations and as a consequence, mitigate Green House Gas emissions and other atmospheric pollutants. By means of energy efficient systems, that allow for the recovery of energy and the use of the renewable energies and of residual energies, fulfilling the requirements following of energy efficiency a use of renewable energies:</p> <p>Energy performance: heating and cooling equipment, as well as the ones for the movement and transportation of thermal working fluids, will be selected to obtain maximum benefits, in any operation condition, and operated nearest possible to their peak efficiency performance.</p> <p>Recovery of energy: the thermal installations will incorporate subsystems that allow the saving, the recovery of energy and the use of residual energies.</p> <p>Use of renewable energies: the thermal installations will take advantage of the renewable energies available, with the objective to cover with these energies a part the necessities of the building.</p>
<p>TARGET GROUPS</p>	<p>To all buildings. It will not be of mandatory application the Code of thermal Installations in buildings (RITE), to buildings that at the date in which the Royal Decree, were already under construction nor to the projects that had asked for construction license, except with respect to its reform, maintenance, and mandatory inspections.</p> <p>For the application of the RITE code it will be considered as thermal installations the fixed air conditioning systems (heating, refrigeration and ventilation) and of hot water production, for meeting the demand of thermal well-being and hygiene of the people.</p> <p>The RITE code will be applied to the thermal installations in buildings of new construction and to the thermal facilities existing buildings, with respect to their reform, maintenance, use and inspection, with the limitations determined by the own RITE code.</p> <p>It will be understood by "reform" of a thermal installation, all changes made to it that supposes a modification of the project or technical memory with which it was executed and registered. Therefore, reforms are considered those that are included in any of the following cases:</p> <ul style="list-style-type: none"> • The addition of new subsystems of air conditioning or hot water production or the modification of the existing ones; • The substitution by another one of different characteristics or extension of the number of generating equipment for heat or cold; • The change of the type of energy used or the incorporation of renewable energies; • The change of initial use of the building. <p>The RITE code will not be of application to the thermal installations of industrial, agricultural or of other type of processes, that is not meant to take care of the demand of thermal well-being and hygiene of people.</p>
<p>RATIONALE</p>	
<p>AREA OF INTEREST</p>	<p>Energy efficiency and solar thermal energy</p>


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FOCAL POINTS AND SPECIFIC OBJECTIVES	<p>The Regulation of Thermal Installations in buildings (RITE) which it is approved by this royal decree, was an initiative to support the development of the Plan of action of the strategy of saving and energy efficiency in Spain (2005-2007) and will also contribute to reach the objectives established by the Plan of promotion of the renewable energies (2000-2010), fomenting a greater use of the thermal solar energy mainly in hot water production.</p> <p>This new regulation is developed with an approach based on objective benefits, expressing the requirements that must be satisfy the thermal installations without forcing the use of an specific technical solution or materials, nor preventing the introduction of new technologies and design concepts, as opposed to the traditional approach of obligatory regulations that consist of a set of detailed engineering specifications, with the disadvantage of limiting the range of acceptable solutions and prevent the use of new products and innovating techniques.</p>
KEY ACTIVITIES	
FUNDING INFORMATION	
EX-POST EVALUATION <i>(main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)</i>	
CONTACT AND REFERENCE DATA	Ministerio de la Presidencia


NAME OF THE MEASURE	Energy Plan of the Canary Islands (PECAN)
TIME SCALE	2006 - 2015
BUDGET	Financial resources are estimated at 4,115 million Euros, of which more of the 90 percent corresponds to private financing, since the power sector is a liberalized economic activity in Spain
KEY ACTORS <i>(i.e. funding institution)</i>	Utility (UNELCO-ENDESA); the grid operator (REE); oil companies distributing fuel in the islands; transport sectors; the Government of the Canary Islands (through the Regional Industry Ministry) which is competent in energy; the islands authorities "Los Cabildos Insulares", which are competent in territorial energy planning; private investors in renewable energy projects; banks funding RES projects; the Canary Islands Institute of Technology, that advises the Government on its energy policy.
RATIONALE <i>(why the initiative has been set up in the region)</i>	<p>Contribute to reduce the current total external energy dependency on oil diversifying the energy sources. It proposes the introduction of natural gas and the high scale deployment of renewable energies, especially wind and solar, two sources with great potential in the Canary Islands. In quantitative terms, the expectation is to reduce the present dependency on oil of the 99 percent to the 72 % by in 2015.</p> <p>The four basic principles can be expressed as follows:</p>

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	<p>a) To guarantee the provision of energy to all the consumers in optimal conditions as far as regularity, quality and price is concerned.</p> <p>b) To promote maximum rational use of the energy, which implies diminishing consumption of energy, maintaining at the citizen level and in the general economic system, a similar level of satisfaction in terms of environmental quality, positive social impacts and maintenance of the competitiveness of the productive sector.</p> <p>c) To promote the maximum possible use of renewable, especially and wind and solar, as a means of reducing the outer vulnerability of the economic system and improving the protection of the environment.</p> <p>d) To integrate the environmental dimension in all the energy decisions, helping to progress in the way towards a sustainable growth of the Region.</p>
SECTOR <i>(if possible related to RES)</i>	
TARGET GROUPS	
RATIONALE	
AREA OF INTEREST	
FOCAL POINTS AND SPECIFIC OBJECTIVES	<p>The energy intensity is the ratio between energy and the GDP. It is the index that measures the energy consumption which we used to generate wealth. The objective for 2015 is to reduce in a 25 percent in constant terms respect to the values of the year the 2004. The challenge is to reduce in a quarter the energy consumption maintaining such production levels.</p> <p>In order to reach this goal, the following specific objectives are defined:</p> <ul style="list-style-type: none"> • To increase, in a 25% in this same period the global efficiency of the electrical sector. • To reduce a 15% the total oil products consumption in the road transport. • To reduce a 15% the oil product consumption in intra-island marine and air transport. • To increase in a 20% the efficiency in the use of energy <p>In 2004 the renewable energies only covered the 0.62 percent of the Canary Islands energy consumption. The PECAN foresees to increase it up to 8 %.</p> <p>Pecan aims at a30 % of the electrical generation from renewable energies in 2015.</p> <p>OBJECTIVES IN RENEWABLE ENERGIES:</p> <ul style="list-style-type: none"> • Wind: to reach 1,025 MW in the time horizon of 2015, which means to multiply by seven the power installed in December of 2004. • Solar thermal: to reach a surface of 460,000 m2 from the 58,000 m2 installed. • Photovoltaic: to reach 160 MWp installed in the Canary Islands in 2015, from the 700 kWp installed. • Others: <ul style="list-style-type: none"> - Small hydro: To reach 13 MW of installed electrical power in 2015. - Solar thermoelectric: To reach 30 MW of installed electrical power in 2015. - Energy of the waves: To reach 50 MW of installed electrical power in 2015. - Biofuels: To reach 30 MW of electrical power installed in 2015 and 5.75% in 2010 of fuels destined to the road transport.
KEY ACTIVITIES	<p>Institutional measures:</p> <ul style="list-style-type: none"> - Canary Islands Energy Law - Canary Energy Agency - Participation of the Canary Islands in national institutions of the energy

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	<p>sector</p> <ul style="list-style-type: none"> - Coordination with the State the actions related to energy policy issues - Creation of a coordination agency with islands authorities <p>Economic and fiscal measures</p> <ul style="list-style-type: none"> - Fiscal policy on energy - Monitoring of the fulfilment of the competition in the power sector in the Canary Islands - Use of the especial fiscal existing instruments and benefits to encourage the financing of RES projects <p>Environmental Actions</p> <ul style="list-style-type: none"> - Consideration of security aspects of the energy supply in the decisions of environmental policy - Consideration of the environmental aspects in all the decisions of energy policy - Consideration of the impact on the power sector derived from the arrangement decisions of the territory: Special Territorial plans of Power Infrastructure <p>Actions relative to the renewable energies sector:</p> <ul style="list-style-type: none"> - Criteria of development of the wind energy and solar photovoltaic - Programs of support for the thermal solar energy and other renewable sources - Obligatory nature to install solar PV and thermal in new and existing buildings <p>Actions relative to the Rational Use of the Energy:</p> <ul style="list-style-type: none"> - Writing of a specific Plan of rational use of energy - Plan of Energy Audits - Energy Certification of buildings - Voluntary Agreements with companies for energy savings - Training and awareness Campaigns - Support for co-generation projects - Use of information and communication technologies as an alternative to the physical transport - financial Support for projects promoting rational energy use
FUNDING INFORMATION	
EX-POST EVALUATION <i>(main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)</i>	
CONTACT AND REFERENCE DATA	<p>Consejería de Empleo, Industria y Comercio Dirección General de Energía C/ León y Castillo, nº 200 Edf. Servicios Múltiples III Planta 2ª 35071 Las Palmas de Gran Canaria Tfnos: 928 89 94 00 Fax: 928 89 97 74 http://www.gobiernodecanarias.org/organizacion/estructura.jsf</p>

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2.2. Regional research agenda


In the following subsections research activities are listed that are accomplished by the public scientific RES community of the Canary Islands. Furthermore, in this regard developed RES technologies are illustrated as well as the international cooperation activities of the regional RES research community.

2.2.1. Research focus and current research activities

This section illustrates on which research projects (national and international) the research community has been working during the last five years and which projects are currently being carried out.


Research profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	Cluster Pilot Project for the Integration of RES into European Energy Sectors using Hydrogen (RES2H2)
Sector	Wind energy and hydrogen storage
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> Where (geographically) is it from? What sort of organisation is offering it? What research is being carried out? What is it aimed for? What are the main advantages? 	<p>The objective of the project is to demonstrate that clean stationary hydrogen applications can be a solution to the problem of energetic storage. The specific goal is to produce electricity and water making use of hydrogen as an energy vector.</p> <ul style="list-style-type: none"> - Duration: 60 months (2002-2007) - Funding Organisation: European Commission - Role: Coordinator
Special features	Activities: Design, construction and assessment of two self-sufficient energy systems, in such a way that wind power can be used to generate hydrogen, electricity and water, with the characteristics of hydrogen as an energy vector being used to this end.

Research profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	RENEWISLANDS
Sector	Research area: Wind energy Sub-sectors: Hydrogen production and storage
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer	The RENEW ISLANDS project aims to contribute to the market penetration of new energy systems combining fuels cells (FC), renewable energy sources (RES) and Hydrogen (H2) in islands and remote regions.

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<p>to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<ul style="list-style-type: none"> - Duration: January 2003-December 2004 - Funding Organisation: European Commission - Total Project Value (€): 5.358.605 € - Role: Partner
Special features	<p>Activities:</p> <ul style="list-style-type: none"> • To analyze issues associated with intermittent RES penetration in islands and assess the potential for hydrogen energy storage; • To understand integrated RES/H2/FC applications and markets; • To configure integrated RES/H2/FC applications and develop a software tool to model their technical, economic and environmental characteristics; • To check the technical and economic feasibility of a grid-connected integrated RES/H2/FC installation on the example of Porto Santo, Madeira, based on existing wind park; • To discuss opportunities for integrated RES/H2/FC systems in islands, the effects of energy and environment regulation on their introduction, and wider dissemination issues.


Research profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	Quality Assurance in solar thermal heating and cooling technology keeping track with recent and upcoming developments
Sector	Research area(s): Solar energy Sub-sector(s): Solar Thermal
<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? 	<p>To prepare the quality assurance framework so that the European solar thermal heating and cooling industry can sustainably contribute to the targets agreed by the Member states (20% of RES by 2020)</p> <ul style="list-style-type: none"> - Duration: June 2009 - May 2012 - Funding Organisation: European Commission - Total Project Value (€): 1.892.002€ - Role: partner

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<ul style="list-style-type: none"> ▪ What is it aimed for? ▪ What are the main advantages? 	
Special features	<p>Activities:</p> <ul style="list-style-type: none"> • Scientific support to the implementation of aspects related to new products, so that the standard is not a barrier to the development of technologies • Development of aspects related to solar thermal and adaptation of calculation procedures • Strengthening the quality assurance on laboratory tests • Identification of need for standardisation for solar thermal systems


Research profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	Consortio solar de investigación y desarrollo: CONSOLIDA
Sector	Research area(s): Solar energy Sub-sector(s): Solar thermal
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	Website http://www.cenit-consolida.es/ Abstract Improvement and development of new procedures for electricity generation, of new technology components and new solar applications such as HVAC, desalination and solar hydrogen production. <ul style="list-style-type: none"> - Duration: January 2008-December 2011 - Funding Organisation: Centro para el Desarrollo Tecnológico Industrial (CDTI)- Spain - Total Project Value (€): 30.278.232 € - Role: partner
Special features	<p>Activities:</p> <ul style="list-style-type: none"> • Development of new technologies and more efficient solar components • Electric grid integration of thermosolar installations • Improvement of emerging applications (solar hydrogen, solar desalination)

Research profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	SOLCO
Sector	Research area: Solar energy Sub-sector: Solar thermal

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<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Website http://www.solcoproject.net</p> <p>The SOLCO project promotes the widespread use of solar cooling applications and chilling systems in the building sector. It focuses on solar cooling technology across southern European islands.</p> <ul style="list-style-type: none"> - Duration: January 2007-February 2009 - Funding Organisation: European Commission - Total Project Value (€): 409.426€ - Role: Partner
Special features	<p>Activities:</p> <ul style="list-style-type: none"> • To identify the non-technological barriers that hamper the use and implementation of solar technology and chilling systems, • Training of the market actors and potential users, and • Raising the awareness about these technologies as well as a large and targeted dissemination of information and results.


Research profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	EL HIERRO 100% RES
Sector	Research area(s): Water energy Sub-sector(s): Wind hydro power station
<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Website http://www.insula-elhierro.com/english.htm</p> <p>The wind-hydro power station combines wind and hydraulic power, using water as an economic way of storing energy. It will be the first providing close to 80% of the electricity demand of a totally isolated area. The project also includes different RES contributing to increase RE penetration into the weak island grid through the implementation of PV, solar thermal and biomass programs.</p> <ul style="list-style-type: none"> - Duration 5 years (1/04/2003-31/03/2008) - Funding Organisation: European Commission - Total Project Value (€): 7.039.000 € - Role: Coordinator
Special features	<p>Activities:</p> <p>An important part of the project is devoted to the construction and monitoring of the Wind Hydro Power Station on El Hierro, but also feasibilities and economic studies for a WHPS on Crete</p>

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	<p>and Madeira are elaborated.</p> <p>Important tasks are also the implementation of:</p> <ul style="list-style-type: none"> - the Solar Thermal Energy Programme - the PV Programme; and - the biofuel production
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Research profile	
Organisation	Universidad de La Laguna / Dept. Física Básica
Title	<p>Mejora de eficiencia en células fotovoltaicas mediante distintos procesos y estudio económico de su implementación en una línea de producción industrial en el Polígono Industrial de Granadilla</p> <p>("Efficiency improvements in photovoltaic cells through different processes and an economic study on its implementation in an industrial production line in the Granadilla industrial zone")</p>
Sector	<p>Research area: Solar energy</p> <p>Sub-sector: Silicon based solar cells</p>
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:	<p>Duration: 01/2009 – 01/2012</p> <p>Funding Organisation: Gobierno de Canarias</p> <p>Total Project Value (€): 34.000 €</p> <p>Role: Coordinator</p> <p>Activities: Manufacturing of solar cells and economic study to install a manufacturing line in Granadilla (Tenerife).</p>
Special features	

Research profile	
Organisation	Universidad de La Laguna / Dept. Física Básica
Title	<p>Células solares de bajo coste de silicio mono- y multicristal con láminas antirreflejantes formadas por silicio poroso luminiscente y dopadas con tierras raras</p> <p>("Low-cost silicon solar cells")</p>
Sector	<p>Research area(s): Solar energy</p> <p>Sub-sector(s): Silicon based solar cells</p>
Abstract: Please give a brief description on the conducted research activity (< 500	<ul style="list-style-type: none"> - Duration: 10/2007 – 10/2010 - Funding Organisation: Spanish Government - Total Project Value (€): 60.000 €

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<p>characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<ul style="list-style-type: none"> - Role: Coordinator
Special features	Activities: Manufacturing of low cost silicon based solar cells

Research profile	
Organisation	Universidad de La Laguna / Dept. Física Básica
Title	MEDESOL: Stand-alone seawater desalination by innovative solar-powered membrane distillation system
Sector	Solar energy
<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>The main objective of the project is the development of an environmentally friendly improved-cost desalination technology to fresh water supply in arid and semi-arid regions in EU and Third Countries based on solar membrane distillation (MD). The system is developed to be driven by the most energy-efficient and cost-effective solar collectors at suitable working temperature, compound parabolic concentrators.</p> <ul style="list-style-type: none"> - Duration: 10/2006 – 10/2009 - Funding Organisation: European Commission - Total Project Value (€): 1.385.118 - Role: Partner
Special features	<ul style="list-style-type: none"> • Design and construction of three prototypes. • Preliminary test with saline solutions of the solar-thermal driven MD technology. • Development, testing and assessment of two different MD system prototypes the UE and Third (Developing) Countries. • Design of pre-commercial systems for UE and Developing Countries.

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Research profile	
Organisation	Universidad de Las Palmas de Gran Canaria / Mechanical Engineering Department
Title	Analysis and design of a wind generator: Application in off-grid operation
Sector	Wind Energy
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Implementation of a variable speed wind generator in off-grid operation. Assembly of a wind prototype composed of an induction turbine with winding rotor fed with AC/DC/AC converters.</p> <ul style="list-style-type: none"> - Duration: 2004 to January 2006 - Funding Organisation: Canary Islands Government - Total Project Value (€): 18300
Special features	<ul style="list-style-type: none"> • Development of a variable speed wind generator prototype • For an optimised use of wind energy, better than a conventional induction generator. • Less losses in electronic systems as they do not transfer the entire wind energy to the electric grid.
Innovative aspects	<ul style="list-style-type: none"> • Induction electric machine with winding rotor. • Less disruption in the penetration of wind energy in the electric grid, as it 's controllable. • Laboratory tested.

Research profile	
Organisation	Universidad de Las Palmas de Gran Canaria / Mechanical Engineering Department
Title	Optimised sea water desalination system driven by wind energy for off-grid operation
Sector	Wind Energy
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? 	<p>Different possibilities for the activation of a reverse osmosis desalination plant, driven by electric dc or ac machines. Different dc or ac wind generation topologies, influence of the variable wind power.</p> <p>The objective is the design of an off-grid operation desalination system. As an advantage, it is simple and optimized, using few components for generation as well as for water production.</p> <ul style="list-style-type: none"> - Duration: 2009/January 2012 - Funding Organisation: Canary Islands Government -

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<ul style="list-style-type: none"> ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Agencia Canaria de Investigación, Innovación y Sociedad de la información. Fondo Europeo de Desarrollo Regional (2008)</p> <ul style="list-style-type: none"> - Total Project Value (€): 49750
Special features	<ul style="list-style-type: none"> • Feasibility study of drinking water production without use of electricity from the electric grid. • It can be used anywhere without any electrical grid • Drinking water production without any fossil fuels
Innovative aspects	<ul style="list-style-type: none"> • Drinking water production without any fossil fuels and making use of simple components in the desalination and production procedure. • Energy saving and low amortization costs • Laboratory tested.

Research profile	
Organisation	Universidad de Las Palmas de Gran Canaria Mechanical Engineering Department
Title	TECOAGUA project
Sector	Wind Energy Water energy
<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>TECOAGUA project propones the economic and technical feasibility study of different renewable energies sources coupled to the water cycle.</p> <ul style="list-style-type: none"> • Marine energy for desalination. • Reversible hydraulic with wind energy <ul style="list-style-type: none"> - Duration: 10/2009 – to 10/2012 - Funding Organisation: Centro para el desarrollo tecnológico industrial (Programa CENIT) www.cdti.es
Special features	<ul style="list-style-type: none"> • Feasibility study of the use of wind, marine and hydraulic energy for reverse osmosis desalination. • Feasibility of the use of renewable energies in water production • It can be used for mass water production
Innovative aspects	<ul style="list-style-type: none"> • Water production without fossil fuels • Energy saving and low amortisation costs • Development phase.

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Research profile	
Organisation	Universidad de Las Palmas de Gran Canaria Mechanical Engineering Department
Title	Hydrogen production with medium and high temperature solar thermal systems (thermosolar systems)
Sector	Solar Energy Sub-sector: solar thermal
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Solar thermal systems use reflecting surfaces for solar radiation concentration to increase energy. The objective is to integrate thermosolar systems with hydrogen technologies.</p> <ul style="list-style-type: none"> - Duration: 11/2009 – to 11/2010 - Funding Organisation: Instituto Tecnológico de Canarias <p>Coordinator: Instituto Tecnológico de Canarias. - Universidad de Las Palmas de G. C.</p>
Special features	<ul style="list-style-type: none"> • Solar thermal energy use for hydrogen production processes: State of the art. Modelling (simulation) of integrated thermosolar- hydrogen production system. Economic and technical feasibility study. • Development of a simulation model showing the system operation. • It is used for the study and analysis of different hydrogen production prototypes
Innovative aspects	<ul style="list-style-type: none"> • Hydrogen production through renewable resources • Use of solar energy for hydrogen production • Non pollutant technology • Development phase


Research profile	
Organisation	ITER – Instituto Tecnológico de Energías Renovables
Title	EURO SOLAR
Sector	Solar
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? 	<p>Contribute to the sustainable development of the isolated communities through the use of renewable energies and this way facilitate the means for the payment generation, the reinforcement of their organizations, education, communication and training.</p> <p>EURO-Solar is addressed to the eight poorest countries of Latin America: Guatemala, El Salvador, Honduras, Nicaragua, Ecuador, Peru, Bolivia and Paraguay.</p> <p>The Euro- Solar Program has a total budget of 30 million euros</p>

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<ul style="list-style-type: none"> ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	and is co-financed by the European Commission (80%) and the beneficiaries countries (20%).
Special features	ITER gives technical assistance, specifically participating in the implementation of the EURO-Solar program, proposing a high standing technical heritage and developing visibility actions. The program will take place in combination with local partners, in particular, the intergovernmental institutions directly in the energy, education, health and the telecommunication sectors of the different countries, with the assistance of European Commission Delegation in the respective countries.
Innovative aspects	To contribute in the sustainable development of the isolated communities by the use of renewable energies


Research profile	
Organisation	ITER – Instituto Tecnológico de Energías Renovables
Title	HYMAC: Implantation of the Hydrogen Economy in the Macaronesia: Stationary Applications Plan
Sector	Hydrogen
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>The main goal of the project is to identify the technologies of production, storage and hydrogen use, both in a centralized as in a decentralized way and as land transport fuel, analyzing the problems that each of them generate, the challenges posed, the investigation lines that are being developed, trying to summarize finally the primary energy sources more suitable in each case, the investment and operation expected costs, the predictable technology marketing term (in case they are not already available), the impact of each of them in terms of CO2 emissions (and therefore, its potential to save energy over traditional technologies based in fossil fuels) and, finally, the preparation of a public-private partnership that allows the gradual starting off of these projects, as well as the association of the citizenship of these regions to carry out the effort.</p> <p>The Tenerife Energy Agency cooperated in the elaboration of the perception program that was carried out during in the year 2006.</p>
Special features	

Research profile	
Organisation	ITER – Instituto Tecnológico de Energías Renovables
Title	WavEnergy: Regional developing plan for the use of the Atlantic's swell energy
Sector	Water energy Sub-sector: energy from the sea

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<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>The main goal of the project is to develop a plan that defines the actions and priorities that have to be followed in order to use energy generated by waves. This plan will be apply in regions that would seriously like to bet for this type of energy. The project will pay special attention to harbours, now that they are infrastructures with big environmental impact associated and whose installations can be reused to build wave energy generation systems. To achieve this, a viability study method will be defined for the instillation of swell energy attracting systems in various harbours.</p>
Special features	<p>The project can be divided into two big blocks:</p> <ul style="list-style-type: none"> • Firstly, there is the making off the plan for the regions that decide to use wave energy. This plan will contain the following information: natural conditions necessary to generate wave energy, the advantages of this type of energy, financing modalities, methodology for the location's definition of the energy generators, determining in the use of this type of energy, variety of existing devices, etc. • Secondly, the pilot project will be developed and will allow the observation of the viability study method designed previously.
Innovative aspects	<p>This methodology will be tested particularly in the Harbour of Granadilla, which is an expected project in the south of Tenerife.</p>

Research profile	
Organisation	ITER – Instituto Tecnológico de Energías Renovables
Title	GLOBAL VOLCANO CO2: Global CO2 emission to the atmosphere from volcanoes
Sector	
<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>The ITERs Team of volcanology is going to carry out an ambitious research project that wants to evaluate the global diffuse emission rate of carbon dioxide (CO2) to the atmosphere due to subaerial volcanic activity. The aim of this project , financed by the 2004-2007 D+R National Plan of the Education and Science Ministry, is to improve our current knowledge of the carbone dioxide (CO2) quantity that is emitted by subaerial volcanic activity. Nowadays, this parameter is underestimated. Financed by Plan Nacional I+D+I 2004-2007</p>
Special features	


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Research profile	
Organisation	ITER – Instituto Tecnológico de Energías Renovables
Title	Solar Plane Project: Feasibility study and prototype of a solar airplane.
Sector	Solar energy
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>ITER has started the feasibility study for the construction of a solar airplane with the development of the first prototype, whose final aim is the construction of a complete autonomous airplane, non-pollutant and with applications in the fields of observation and monitoring of the Earth.</p> <p>Financed by National Plan of Scientific Research, Development and Technological Innovation, Aerospace sub-program.</p> <p>Coordinated by Institute of Technology and Renewable Energies of Tenerife (ITER)</p>
Special features	Among the main challenges that can be found when carrying out this project, are the aerodynamic design, the power generation system based solely on the use of photovoltaic solar cells and the energy storage system, as well as the navigation and tracking systems that include the information transference to the base or bases on land. The construction of a demonstrative prototype has started to better understand all these aspects related to the manufacturing, durability of equipment, etc., going parallel to the general feasibility study.

2.2.2. Available RES technologies

Section 2.2.2 gives an overview on the outcomes of conducted research projects, describing main technologies/prototypes developed for the RES sector.


Technology profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	HYDROHYBRID: Hybrid Renewable Energy Hydrogen Production System
Sector	Wind and solar for hydrogen production
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it 	Hydrogen production system at small scale for its further use for transportation. Energy is obtained from solar photovoltaic panels and a small wind turbine. The system also includes an electrolyzer. This avoids the pollution due to hydrogen production with conventional methods.

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from? <ul style="list-style-type: none"> ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	
Special features	Hydrogen for transportation is obtained using wind and solar energy.
Innovative aspects	Integration of wind and solar photovoltaic for hydrogen production using an electrolyser.
Main advantages of the technology (main economic advantages/benefits)	
Current stage of development ¹	Laboratory tested
Intellectual Property Rights ²	

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market


⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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Technology profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	EODIESEL 15/20: 20 kW wind diesel system
Sector	Wind energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	Wind-diesel power station for electrification of isolated villages in remote areas. The system includes a 20 kW wind turbine and a diesel gen set with an autonomous automatic control.
Special features	
Innovative aspects	Compact design in container for its easier installation in isolated areas without any buildings.
Main advantages of the technology (main economic advantages/benefits)	Possible replication in coastal areas in west Africa, where a potential market has been detected.
Current stage of development ¹	Field tested
Intellectual Property Rights ²	

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market


⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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Technology profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	DESSOL C: desalination with photovoltaic solar energy
Sector	Solar energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	Potable water production in remote coastal areas (far away from electrical grid) composed of a reverse osmosis sea water desalination plant driven by an off-grid photovoltaic system.
Special features	
Innovative aspects	Integration of energy recovery systems.
Main advantages of the technology (main economic advantages/benefits)	Reverse osmosis driven by photovoltaic systems is a solution for drinking water scarcity in coastal villages isolated from electrical grid.
Current stage of development ¹	Field tested
Intellectual Property Rights ²	1

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market


⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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Technology profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	AEROGEDESA-C: Desalination plant driven by an off-grid wind turbine
Sector	Wind energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	Reverse osmosis desalination plant with a nominal production of 17 m ³ /d coupled to a 15kW wind generator. It includes an electronic control system and energy dissipation charges. The systems produces drinking water for the population from sea water or brackish water.
Special features	Optimisation of conventional ways of desalination, energy saving and environmental aspects.
Innovative aspects	
Main advantages of the technology (main economic advantages/benefits)	Drinking water production without any fossil fuels and making use of simple components in the desalination and production procedure.
Current stage of development ¹	Field tested
Intellectual Property Rights ²	1

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market


⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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Technology profile	
Organisation	Instituto Tecnológico de Canarias. R&D Division
Title	AEROFRIGO: Cold store driven by wind energy
Sector	Wind energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	Cold store coupled to a wind generator for cold production with off-grid operation. Cold production in remote areas without any access to the electrical grid and with needs of cooling for food preserving.
Special features	
Innovative aspects	Thermal energy accumulation what minimizes the use of electrochemical batteries.
Main advantages of the technology (main economic advantages/benefits)	This is a solution in fishing villages isolated from electrical grid for fish preserving.
Current stage of development ¹	Field tested
Intellectual Property Rights ²	1

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market


⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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Technology profile	
Organisation	Universidad de Las Palmas de Gran Canaria Mechanical Engineering Department
Title	Analysis and design of a wind generator: Application in off-grid operation
Sector	Wind Energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	<ul style="list-style-type: none"> • Development of a variable speed wind generator prototype • For an optimised use of wind energy, better than a conventional induction generator. • Less loses in electronic systems as they do not transfer the entire wind energy to the electric grid.
Special features	Induction electric machine with winding rotor
Innovative aspects	
Main advantages of the technology (main economic advantages/benefits)	Less disruption in the penetration of wind energy in the electric grid, as it 's controllable.
Current stage of development ¹	Laboratory tested.
Intellectual Property Rights ²	

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market


⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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Technology profile	
Organisation	Universidad de Las Palmas de Gran Canaria Mechanical Engineering Department
Title	Sea-water desalination system driven through wind energy fot off-grid operation
Sector	Wind Energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	<ul style="list-style-type: none"> • Feasibility study of drinking water production without use of electricity from the electric grid. • It can be used anywhere without any electrical grid • Drinking water production without any fossil fuels
Special features	Drinking water production without any fossil fuels and making use of simple components in the desalination and production procedure.
Innovative aspects	
Main advantages of the technology (main economic advantages/benefits)	Energy saving and low amortization costs
Current stage of development ¹	Laboratory tested.
Intellectual Property Rights ²	

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market


⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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Technology profile	
Organisation	Universidad de Las Palmas de Gran Canaria Mechanical Engineering Department
Title	TECOAGUA project
Sector	Wind Energy. Sea water desalination
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	<ul style="list-style-type: none"> • Feasibility of the use of renewable energies in water production • It can be used for mass water production • Water production without fossil fuels
Special features	Water production without fossil fuels
Innovative aspects	
Main advantages of the technology (main economic advantages/benefits)	Energy saving and low amortisation costs
Current stage of development ¹	Development phase.
Intellectual Property Rights ²	

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market


⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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Technology profile	
Organisation	Universidad de Las Palmas de Gran Canaria Mechanical Engineering Department
Title	Hydrogen production system through médium and high temperature solar thermal energy (thermosolar systems)
Sector	Wind Energy. Hydrogen sector
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	<ul style="list-style-type: none"> • Development of a simulation model showing the system operation. • It is used for the study and analysis of different hydrogen production prototypes • Hydrogen production through renewable resources
Special features	Hydrogen production through renewable resources
Innovative aspects	Use of solar energy for hydrogen production
Main advantages of the technology (main economic advantages/benefits)	Non pollutant technology
Current stage of development ¹	Development phase
Intellectual Property Rights ²	

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market

⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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2.2.3. International research cooperation

R&D activities in the Canary Islands are mainly carried out within the two regional universities, and the two research centres specialized in renewable energy R&D fields. Activities are financed by funding from the European Commission, the Central Spanish Government, and the Regional Government of the Canary Islands. Most projects are carried out in collaboration with other European universities and research centres.


R&D institutions from the Canary Islands have a strong cooperation with institutions in other European island regions, especially with the European Outermost Regions the Azores and Madeira, in the framework of the European INTERREG programme.

There has been also activity to develop and adapt technologies suitable to be transferred to neighbouring West African Countries, and experience exists in installation, maintenance and operation of renewable energy and water desalination technologies in these countries. Projects aim primarily to demonstrate technologies that can have an important positive impact in contributing to economic growth of rural areas of less developed countries. Extensive cooperation has been established with the University of Nouakchott, for promoting renewable energy projects in Mauritania. As part of this cooperation, the Canary Islands Institute of Technology has installed different systems at the University which are helping to support the training of personnel to support installation, operation and maintenance of renewable energy systems. Cooperation is also being reinforced in Cape Verde, both with the University of Cape Verde and with the UNIDO renewable energy centre for the ECOWAS region. Most of the projects have been financed by either Spanish or Canary Islands Official Development Assistance.

The Canary Islands are natural laboratories for a wide range of research fields. Of special interest are the possibilities associated to the marine ecosystems and the high potential of renewable energies. Even some problems currently faced by the islands such as the restrictions of maximum RES penetration due to the small and weak island electrical grids, or the impact of economic activity on the fragile ecosystems, represent challenges that offer interesting perspectives for developing technologies to overcome these barriers.

The following institutions are carrying out work in renewable energies:


- Universidad de Las Palmas de Gran Canaria (ULPGC)
- Universidad de La Laguna (ULL)
- Instituto Tecnológico de Canarias (ITC) - Canary Islands Institute of Technology
- Instituto Tecnológico y de Energías Renovables (ITER):
- Agencia Canaria de Investigación, Innovación y Sociedad de la Información

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2.3. SWOT – Regional assessment – Research Perspective

In the following the regional research perspective is illustrated by means of a SWOT analysis. The main core competencies and shortcomings with regard to knowledge production and technology transfer capabilities in the RES sector in the region are highlighted.

<p>Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the STRENGTHS, i.e., capabilities to provide comparative advantages in the RES sector in the Region?</p>	<p>Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the WEAKNESSES, i.e., absent resources, activities not carried out in the proper way?</p>
<ul style="list-style-type: none"> - Highly skilled personnel - Strong research base (research infrastructure) - Development of innovative RES technologies by research players - International cooperation activities of regional research community 	<ul style="list-style-type: none"> - Low level of budget for conducting RTD activities in the RES sector - Poor linkage between research entities and enterprises (weak understanding between researchers and industry complicates joint projects) - Low exploitation of funding potential by research community - Not enough start-ups resulting from research
<p>Focusing on aspects outside control, where are the OPPORTUNITIES for RES- regional actors, i.e. open up possibilities to capitalise?</p>	<p>Focusing on aspects outside control, where are the THREATS for research organisations, i.e. close off future possibilities?</p>
<ul style="list-style-type: none"> - Availability of EU RTD funds for research - Networking possibilities (RICAM Cluster) - Favourable territorial and environmental conditions for adopting RES technologies - Surplus of well educated researchers - Increasing number of collaboration between research & industry - Regional funding programmes/ grants for public-private partnerships for developing R&D projects 	<ul style="list-style-type: none"> - Bureaucracy barriers - Low awareness of regional research capacity from companies' side - Brain drain of research community - Technical solutions not adapted to islands' characteristics - High costs of investment

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2.4. Industrial RES performance


In section 2.4 the performance of the industrial community is taken under investigation. The following subsections deal with distributed and adopted technologies, research conducted by private actors and international cooperation activities performed by the industrial RES community.

2.4.1. Distributed and Adopted RES technologies

Main distributed and adopted technologies in the regions are illustrated.


Technology profile	
Company	DOBON'S TECHNOLOGY, S.L.
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	R&D, Engineering and Consultancy
Title	Two-axis Sun Tracking System (TETRA-TRACK®)
Sector	Solar Energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p>TETRA-TRACK® is a low cost two-axis sun tracking system that captures maximum solar energy from the sun. The system is based on a tetrahedral structure with higher wind gust resistance than conventional pedestal tracking systems.</p> <p>Main Advantages:</p> <ul style="list-style-type: none"> • Capture more solar energy, for the same installed power than fixed systems (between 30% to 48% more annual energy, depending on location). • Saves space, for the same collected energy and a crane is not required for assembly. • Improves inverters and pumping performance in PV applications. • Requires less foundation and is more wind stable at lower cost than pedestal tracking systems. • Foundation is not required, if installed over rocky ground.

Technology profile	
Company	DOBON'S TECHNOLOGY, S.L.
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	R&D, Engineering and consultancy
Title	Controlled Atmosphere Concentrator (CAC)
Sector	Solar Energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:	<p>The concept is based on a PV line Focus Reflexive Concentrator with a concentration ratio between 30 and 100x, with only one optical stage.</p> <p>Features:</p> <ul style="list-style-type: none"> • Transparent glass cover. • Surface similar to a flat module, but considerably thicker.

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<ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<ul style="list-style-type: none"> • It has not organic materials exposed to the solar radiation to ensure a long life-time. Degradation is smaller than in flat-plate panels because it has no EVA. • The constructive system allows the cells to be cooled down by natural convection as well as by low temperature water. • The whole optic and photovoltaic system is protected from the open air so it is not necessary to clean mirrors, only the glass window if required. • Both single and dual devices can be manufactured.
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Technology profile	
Company	DOBON'S TECHNOLOGY, S.L.
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	R&D, Engineering and consultancy
Title	Concentrator of Reflexive Cavities (CRC)
Sector	Solar Energy
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p>The PV module Concentrating Reflexive Cavity (CRC) uses no image optics and regular one sun silicon cells technology. A module is composed by a certain number of cavities. The transparent glass cover is common for the cavities.</p> <p>Features:</p> <ul style="list-style-type: none"> • Compared to flat panels, it saves about 10 times the silicon necessary for the same power. • It has not organic materials exposed to the solar radiation to ensure a long life-time. Degradation is smaller than in flat-plate panels because it has not EVA. • It has a good response to the dispersed solar radiation (the cells can see a good portion of sky) • It is very tolerant to mistracking (high angular response). • It can be standardized applying the flat-plate panel normative. • Cells have additional gains due to concentration. The power under normal operation conditions (NOC) increases because the cells are refrigerated. • The most important buses do not made shades over the silicon because they are situated out of the radiated area. • Most of the reflected radiation has only one reflection inside the cavity and it needs neither collimator nor secondary optic elements. • It does not require optic adjustments during the manufacturing process. • Low technological risk because well-known technologies are used. • The module can be repaired (cell or cavity replacement). • Less appealing to thefts because it is thicker and more difficult to transport and solar tracking is required.

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Technology profile	
Company	CONSTANTE SOLAR, S.L.
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Flat Plate Thermal Solar Collector (CPPs)
Sector	Solar Energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	Set of different models whose main innovative aspect is focused for designers (Architects and Engineers), allowing them to carry out building integrated designs such us: Siding on roofs, facades type in blinds, awnings, pergolas, etc. All made of materials specially selected to withstand extreme outdoor conditions with high resistance to saline climates.

Technology profile	
Company	CONSTANTE SOLAR, S.L.
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Double Effect Heat Exchangers
Sector	Solar Energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	European Patent. Energy harvesting system for multifamily dwellings where facilities are projected with inertia tanks. Its double effect by direct exchange or by thermosiphon effect increases their performance by 35% over traditional systems.

Technology profile	
Company	R&LB ENGINEERING CONSULTING, S.L.
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Engineering and consultancy
Title	Power Generator System that uses renewable energy sources (solar and wind) with an optimised innovative electronic consumption distribution system
Sector	Solar Energy
Abstract: Please give a brief description of the technology (< 500 characters). The	Equipment ideal for rural electrification in isolated nuclei, in which the transport of electricity by conventional means is not profitable, hybrid wind and photovoltaic power prototypes


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<p>abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p>reinforced by a diesel generator that supplies electricity stored in batteries supplied to the villages.</p> <p>This system, already in use, has an innovative computer control electronics which can be run from anywhere using remote control to achieve optimization of resources produced. The production of such energy efficient and intelligent use of it is what brings the suitability of this equipment. The remote-system is responsible for maintaining optimal parameters and allows remote maintenance.</p>
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2.4.2 Private research

Research activities accomplished during the last five years by private players in the Canary Islands are illustrated in the following tables.

Research profile	
Company	DOBON'S TECHNOLOGY, S.L.
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	R&D, Engineering and consultancy
Title	Research and Development in Renewable Energy and Energy Efficiency Systems
Sector	Solar Energy
<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<ul style="list-style-type: none"> • The company is geographically located in Tenerife Island, in the Canary Island Archipelago. • The Company is a private corporation offering research, development, engineering, prototyping and industrial series manufacturing. • The research has been focused in development of solar tracking systems for solar energy, photovoltaic and thermal concentrators. Desalination, Technical Studies, Energy Projects, Energy Audits, Building Energy Certification, PV laboratory. • The company follows the process from the concept idea to the market solution, developing new products in the renewable energy sector. • The multidisciplinary team is highly well trained and large professional experience in R&D. Wide relationship with companies and institutions around the world.
Special features	New development from the theoretical study to prototyping and manufacturing of short industrial series.
Innovative aspects	Well trained multidisciplinary staff. The company possesses own innovative and proprietary inventions and ideas.


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Research profile	
Company	CONSTANTE SOLAR, S.L.
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Test laboratory and the solar platform.
Sector	Solar Energy
<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<ul style="list-style-type: none"> • The company is geographically located in Tenerife Island, in the Canary Island Archipelago. • The Company is a solar thermal collector manufacturer founded in April 2006 and has an engineering department with expertise in the field of Solar Thermal Energy. • The research and development has been focused in the test laboratory and the solar platform, for the constant improvement of product development. • His technical team is in constant interaction with the problems of adaptability of the systems in everyday life plots, a fact that encourages the involvement of the company to provide specific technical solutions, through continuous R & D & I.
Special features	<ul style="list-style-type: none"> • Thermal Solar Collector Manufacturing Low Temperature, Equipment and Systems for Solar Thermal Energy Facilities. • Realization of projects, studies, consultancy, energy audits, training courses and programs and calculations. • Design and Manufacture of Components: finned tubes with selective surfaces by ultrasonic welding or by mechanical attachment fittings own patent.
Innovative aspects	<ul style="list-style-type: none"> • Flat Plate Thermal Solar Collector (CPPs) • Double Effect Heat Exchangers

2.4.3. International cooperation

The cooperation activities in the RES industrial community in the Canary Islands have been traditionally poorly linked with each other. All activities have been carried out individually by certain specific companies but mostly by research institutions. The link between research institutions and local companies has also been traditionally very poor.

Recently, a Cluster of RES Companies and institutions has been created, named **RICAM (Renewable Energy, Environment and Water Resources of the Canary Islands)**. The Cluster is composed by about 250 companies from the whole region, from which approximately 100 come from the RES sector. It has been a long path to achieve an operative and stable structure for this Cluster in the region. There was a first attempt for the creation of the Cluster in the year 2003 but it was not until 2007 that the first solid proposal to start-up was presented through the signing of an agreement between ITC and the established RES industrial associations. The agreement was established for the preparation of a Strategic

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Plan draft for the RES sector for the years 2008-2011 and also a draft version of the rules and articles that should be governed the Cluster.

The new Spanish regulations for Cluster subsidies consist in submitting a high quality Strategic Plan that should be ranked as "Excellence" by the Spanish Minister of Industry, Tourism and Commerce (MITYC) in order to be registered in a National Cluster register. It is mandatory to be in this national Spanish register in order to be beneficiary of national subsidies. The RICAM Strategic Plan awarded the rating of "Excellence" by the MITYC and was registered to the Cluster register of the MITYC in 2008. The objectives of the RICAM Cluster Strategic Plan are:

- Enhancing entrepreneurship in society.
- Encourage the creation of new businesses and business growth.
- Increase the capacity for innovation and knowledge transfer.
- Promote the internationalization.
- Represent the largest number of companies, technology centres and research groups.
- Increase private investment in R&D projects of common interest of inter-firm cooperation.


There are six strategic targets within this Plan:

- Research, Development and Innovation.
- Network and Collaboration.
- Promotion, Institutional Relations and Finance.
- Manpower and Training.
- Regional Expansion and Internationalization.
- Improve Business Management.

The methodology of the realization of the plan was composed by the following structure:

- Management Committee (Cluster Promoters).
- Strategic Committee (Industry experts).
- Advisory Committee (Relevant Public Figures).
- 5 Working Groups (Specific Industry experts): Wind Power, Solar Thermal, Solar Photovoltaic Energy, Environment and Water Resources.
- Presentation of Plan (Whole)


In 2008, a grant was also submitted and granted by the MITYC for the start-up of the RICAM coordination and management structure. The same year, RICAM signed an agreement with PROEXCA, the Canary Island Government International Commerce Agency, for the execution of an Internationalization Plan for the Renewable Energy, Environment and Water Resources industry. As a result of this agreement, an institutional and corporate mission to Cape Verde was carried out in order to establish a first contact with the administration of the Cape Verde archipelago and entrepreneurs, and to visit the islands infrastructure to extract an initial analysis of the sector.

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In 2009, RICAM was independently constituted from its original founders in order to gain greater autonomy and power management. The election of the Steering Board was also carried out. A grant was submitted and granted by the ACIISI (Canary Islands Government) for financing the structure of management and coordination of RICAM.

One of the most important results of the Cluster in the period 2009-2010 is the execution of two international projects in Cape Verde in alliance with the Canary Island Directorate General for Cooperation with Africa. One of the projects is devoted for the electrification of a rural village with photovoltaic solar energy. The other project is for the creation of a technological and training reference centre of Renewable Energy in Cape Verde.


At present, the agreement with PROEXCA has been renewed and more actions in the international cooperation scenario are envisaged, especially in African countries.

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2.5. SWOT – Regional Assessment – Industrial Perspective

The following SWOT gives an overview on the core competencies and shortcomings with regard to knowledge production and technology transfer capabilities in the RES sector from industrial perspective.

Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the STRENGTHS , i.e. capabilities to provide comparative advantages in the RES sector in the Region?	Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the WEAKNESSES , i.e., absent resources, activities not carried out in the proper way?
<ul style="list-style-type: none"> - Highly skilled personnel - Adoption of highly innovative technologies in production processes and facilities 	<ul style="list-style-type: none"> - Low level of financial resources for conducting RTD activities in the RES sector from private side - Poor linkage between enterprises and research entities (weak understanding between researchers and industry complicates joint projects) - Low innovation commitment of companies - No international orientation of regional companies
Focusing on aspects outside control, where are the OPPORTUNITIES for RES- regional actors, i.e. open up possibilities to capitalise?	Focusing on aspects outside control, where are the THREATS for research organisations, i.e. close off future possibilities?
<ul style="list-style-type: none"> - Availability of EU RTD funds for research - Networking possibilities (RICAM Cluster) - Favourable territorial and environmental conditions for the adoption of RES technologies - Increasing number of collaboration between research & industry - Regional funding programmes/ grants for public-private partnerships for developing R&D projects - REF: Economic and Fiscal Regime of the Canary Islands - Use of the tourism sector as test field of RES technologies 	<ul style="list-style-type: none"> - Bureaucracy barriers - Low awareness of regional research capacity - Technical solutions not adapted to islands' characteristics - High costs of investment

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3. Regional RES- ID Card – Crete

3.1. Regional RTD and innovation policy framework

The following table 2 gives evidence to the legal and political framework of the region of Crete as particularly regards the RES sector.




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Table 2 – Overview on RTD and innovation policies - Crete


RES- related RTD and innovation policies	RTD and innovation programmes/Legislative references/Public incentives/Projects/Others initiatives (help desks, networks, etc.)	Title	Short description	RES sector	Budget spent, Source of funding	Time scale
	Legislative reference	Investment Incentives Law (3522/2006)	Financial support for investments concerning the modernisation of existing companies and the creation of new companies	Energy Investments including all forms of RES, energy saving and rational energy use	<ul style="list-style-type: none"> - Cash Grant, up to 60%, - Leasing Subsidy, up to 60%, - Wage Subsidy, up to 60%, - Tax Benefit up to 60% 	The measure represents an update of a relatively older framework. It is constantly “open” for submissions.
	Legislative reference	Operational Programme Competitiveness II	Providing incentives to enhance competitiveness of SMEs, by focusing on technological modernisation and innovation, total quality, considering environmental issues, such as the development of sustainable energy systems (RES, RUE, energy innovation)	<ul style="list-style-type: none"> - All RES - Energy Saving - Rational Use of Energy 	In general: EUR 6,3 billions (50% public funding, 50% private funding); Variations according to the localisation of the company and the kind of company's activity	2007-2013
	Legislative reference	Operational Programme Competitiveness I	Providing incentives to enhance competitiveness of SMEs in globalized conditions, by focusing on technological modernisation innovation, considering	<ul style="list-style-type: none"> - All RES - Energy Saving - Rational Use of Energy 	In general: 50% public funding, 50% private funding. Variations according to the localisation of the company and the kind of company's	2000-2006

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		environmental issues, such as the development of sustainable energy systems (RES, RUE, energy innovation)		activity.	
Legislative reference	Law 3661/2008 for Energy Saving in Buildings (Measures for reduction of Energy Consumption in Buildings) according to the European Building Directive (2002/91/EC)	Action and Implementation plan, New Thermal Building Code for reducing CO2 emissions and energy consumption in buildings (including RES integration)	<ul style="list-style-type: none"> - Bioclimatic Architecture - Energy Saving - RES 	There will be financial and tax incentives for building owners; Combination with the Operation Programme of Competitiveness II	Start: 19/5/2008
Legislative reference	Law 3468/2006: Generation of Electricity using Renewable Energy Sources and High-Efficiency Cogeneration of Electricity and Heat	Promote electricity and heat production by Renewable Energy Sources (all forms). Promoting hybrid systems. Promoting cogeneration. Licensing procedure and environmental assessment	All RES and Cogeneration	<ul style="list-style-type: none"> - National Funds (3522/2006) - Operational Programme Competitiveness I - Operational Programme Competitiveness II 	Start 2006 (summarization and modernization of older relative existed Frameworks)
Legislative reference	Greek Legal framework (3734/2009) for licensing procedure and the financial support of Photovoltaic installations	Refers to regulations concerning energy pricing coming from photovoltaics according to the localisation of PV plant and size. Specific licensing procedure for small PV plants (up to 100-150 kW)	Photovoltaics	<ul style="list-style-type: none"> - National Funds (3522/2006) - Operational Programme Competitiveness II - Feed-in tariff 	Start 2007
Legislative reference	Special program for Development of PV systems on roofs of buildings - FEK	Regulation for installing PV systems (10 kWp maximum) on the roofs and side-walls of existing	Photovoltaics (PV roofs)	<ul style="list-style-type: none"> - Operational Programme Competitiveness II 	2009-2019

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	1079/B/04.06.2009	buildings (concerning houses and small businesses)		- National Funds (feed-in tariff)	
Legislative reference	Legal plan for biofuels (2005), concerning law 3054/2002	Legal framework for biofuels -and other renewable fuels- penetration in the Greek market	Biofuels (mainly biodiesel for transport)	- National Funds - Possible combination with Operational Programme Competitiveness II	2005 onwards
Public incentive	"I AM CHANGING MY AIR-CONDITIONING DEVICE"	Provision of incentives to recycle old air-conditioning units and replace them with energy saving appliances (inverters, high energy class devices)	Energy Saving (electricity power) Peak electricity shave	EUR 15 millions, arising from: - European Regional Development Fund (ERDF) - National funds - Operational Programme Competitiveness II	10/6/2009-31/12/2009
Public incentive	"I SAVE ENERGY": Specific energy programme for Municipalities	Provision of incentives to reduce energy consumption in the urban environment emphasising on building sector (buildings before 1980) Bioclimatic architecture Sustainable transport	- Energy Saving - RES - Sustainable transport - Bioclimatic city planning	EUR 100 millions, arising from Operational Programme Competitiveness II	2009-2015
Public incentive	Establishment and operation of the Regional Energy Agency of Crete	- Contribution to the formation of the Regional Energy Policy. - Promotion (through information, dissemination) of	- Regional Energy policy and planning - RES of all forms - Rational Use of Energy - Awareness and	- Regional and EU co-financing - Competitive European Programmes (ALTENER, Leonardo da	1993-onwards

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			<p>programmes, technologies and applications of renewable energy sources, rational use of energy, energy saving etc., awareness of citizens, consumers and energy users.</p> <ul style="list-style-type: none"> - Realisation of training programmes, seminars, technical visits, conferences, etc. - Information of investors. - Promotion of energy innovation. - International cooperation. - European programmes and projects 	<ul style="list-style-type: none"> - Information innovation - Sustainable transport - Climate change 	<p>Vinci, SAVE, FP5, FP7, INTELLIGENT ENERGY, INTERREG...)</p> <ul style="list-style-type: none"> - National Programmes 	
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3.1.1. Detailed policy analysis

After the first overview on the RTD and innovation scenario in each region, a more exhaustive description for the most important identified policies is provided.

NAME OF THE MEASURE	New Investment Incentives Law (3522/2006)
TIME SCALE	Start 2006
BUDGET	
KEY ACTORS <i>(i.e. funding institution)</i>	- Greek Ministry of Economy and Finance
RATIONALE <i>(why the initiative has been set up in the region)</i>	Greece's Investment Incentives Law governs the terms and conditions of direct investment in Greece and provides for the incentives available to domestic and foreign investors. In the Region of Crete – energy sector – this law is suitable because of: <ul style="list-style-type: none"> - High interest for investments (especially in energy investments – RES, RUE) - Big hotel sector - Big Research Centres (FORTH) - Existing Industrial Zones, Technological Parks, Business incubators
SECTOR <i>(if possible related to RES)</i>	Investment incentives are applicable to primary sectors (agriculture, mining), secondary sectors (manufacturing), and tertiary sectors (services) and cover a wide variety of business endeavours (including energy sector, e.g. renewable energy sources, energy saving and rational use of energy).
TARGET GROUPS	<ul style="list-style-type: none"> - Domestic and foreign investors for all sectors - Engineers and Consultants - Companies (especially SMEs) – enterprises - Energy Companies and Investors (Renewables, RUE and Energy Saving) - Chambers, Technology and Innovation Transfer Bodies
RATIONALE	Give incentives for related actors to promote and implement entrepreneurship in all sectors including energy
AREA OF INTEREST	Investment projects are divided into two categories, with category 1 receiving higher benefits. <u>Category 1</u> <ul style="list-style-type: none"> - Renewable Energy Sources - Modernization of hotel units (including RES, energy saving and rational use of energy) - Special forms of tourism investments (includes conference centers, golf courses, ski resorts, spas, marinas, health or sports tourism units etc.) - Logistics and Supply Chain Centers - Technology and Innovation (includes software development, broadband expansion, Microelectronics, etc.) - Environmental Protection (includes water recycling, desalination, energy saving etc.) - Research Laboratories <u>Category 2</u> <ul style="list-style-type: none"> - Primary Sector (agriculture, mining) - Manufacturing - Establishment or expansion of hotel units - Biomass-Biofuels - Desalination - Recovery and rehabilitation centers
FOCAL POINTS	Investors may take advantage of: cash grants and/or leasing subsidies, wage subsidies


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AND SPECIFIC OBJECTIVES	for new employment created by an investment, or tax allowances through the creation of a tax reserve. The benefit in each instance may go up to 60 percent of the overall investment cost.												
KEY ACTIVITIES	<p>For investment projects that fall under the provisions of the law, the following incentives are available:</p> <ul style="list-style-type: none"> - Cash Grant, up to 60%, that covers part of the expenses for the investment project by the State; and /or - Leasing Subsidy, up to 60%, that covers part of the payable installments by the State relating to a lease that has been entered into for the use of new mechanical or other equipment; or - Wage Subsidy, up to 60%, provided for employment created by the investment; or - Tax Benefit up to 60%, that allows income tax exemption on non-distributed gains. The benefit is effective upon completion of the investment for the first ten years of operation and is created through a tax-exempt reserve. <p><u>Terms and Conditions</u></p> <ul style="list-style-type: none"> - Equity participation by the investor must be at minimum 25% - Eligibility of investor for incentives is confirmed by local, regional, or national authorities within five working days and full approval in two months - 50% of cash grant is released upon completion of 50% of the project or advance payment with a bank guarantee and the remaining 50% is released upon full completion of the project - Cash grants for wages are released every six months, following an application submitted by the investor 												
FUNDING INFORMATION	<p>For the purpose of promoting investment in outlying and less developed regions of Greece, the country is divided into three zones, A, B, and C, with zone A being the most industrialized areas of Greece, including the prefectures of Attica and Thessaloniki, and zone C being the most remote and less developed. Crete belongs to zone B.</p> <p>The subsidy percentage per zone (A, B and C) is presented in the following table:</p> <p>Cash Grant / Leasing subsidy for the investment cost or Wage subsidy for employment created or Tax Benefit</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Investment Category</th> <th style="text-align: center;">Zone A</th> <th style="text-align: center;">Zone B</th> <th style="text-align: center;">Zone C</th> </tr> </thead> <tbody> <tr> <td>Category 1</td> <td style="text-align: center;">20%</td> <td style="text-align: center;">30%</td> <td style="text-align: center;">40%</td> </tr> <tr> <td>Category 2</td> <td style="text-align: center;">15%</td> <td style="text-align: center;">25%</td> <td style="text-align: center;">35%</td> </tr> </tbody> </table> <p>To medium size enterprises, as these are from time to time defined in the E.U. legislation, an additional percentage of subsidy up to 10% is granted up to the aided cost of fifteen millions (15.000.000) euro. To small and very small enterprises an additional percentage of subsidy up to 20% is granted up to the aided cost of ten millions (10.000.000) euro.</p>	Investment Category	Zone A	Zone B	Zone C	Category 1	20%	30%	40%	Category 2	15%	25%	35%
Investment Category	Zone A	Zone B	Zone C										
Category 1	20%	30%	40%										
Category 2	15%	25%	35%										
EX-POST EVALUATION (main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)	The incentives on offer are among the most competitive in the European Union.												


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CONTACT AND REFERENCE DATA	<ul style="list-style-type: none"> - Greek Ministry of Economy and Finance http://www.mnec.gr - Invest in Greece Agency http://www.investingreece.gov.gr/ - Greek Center of Investments www.elke.gr
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NAME OF THE MEASURE	Law 3468/2006: Generation of Electricity using Renewable Energy Sources and High-Efficiency Cogeneration of Electricity and Heat
TIME SCALE	Start 2006
BUDGET	
KEY ACTORS (i.e. funding institution)	<ul style="list-style-type: none"> - Regulatory Authority for Energy, - Greek Ministry for the Environment, Energy and Climate Change (former Ministry for Development) - Hellenic Transmission System Operator SA (for islands: Public Power Corporation), - Greek Ministry of Economy and Finance,
RATIONALE (why the initiative has been set up in the region)	<p>It is a framework Law for the development of RES and Cogeneration in Greece (it integrates and updates all former laws concerning RES and cogeneration). It has a big importance for Crete as the island reveals:</p> <ul style="list-style-type: none"> - Huge potential for RES (solar, wind, etc.) in Crete and big annual increase of energy demand (especially during summer peak hours due to air-conditioning). - Great interest of companies and investors in energy sector - Contribute to the achievement of national targets for RES and Climate Change
SECTOR (if possible related to RES)	<ul style="list-style-type: none"> - RES (all forms) - Cogeneration Electricity and Heat
TARGET GROUPS	<ul style="list-style-type: none"> - Investors, - Companies, - Consulting Services, - Buildings' owners, - Engineers
RATIONALE	Give incentives to all relevant stakeholders for the development and implementation of all RES energy forms
AREA OF INTEREST	<ul style="list-style-type: none"> - Renewables: wind energy, solar energy, wave energy, tidal energy, biomass, gases released in sanitary landfills and biological treatment plants, biogases, geothermal energy, and hydraulic energy utilized in hydroelectric stations - Cogeneration Electricity and Heat - Energy Saving
FOCAL POINTS AND SPECIFIC OBJECTIVES	<p>The purpose of this law is:</p> <ul style="list-style-type: none"> - on one hand, the transposition of Directive 2001/77/EC of the European Parliament and Council of September 27, 2001, <i>on the promotion of electricity produced from renewable energy sources in the internal electricity market</i> (OJ L 283/27.10.2001) and, - on the other hand, the promotion, by granting priority to the generation of electrical power from Renewable Energy Sources (RES) and high-efficiency co-generation of electricity and heat plants in the internal electricity market, on the basis of rules and principles.

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	Generation of electricity from:	Price of energy (Euro/MWh)	
		Interconnected System	Non-interconnected islands
	(a) wind energy	73	84.6
	(b) wind energy from sea wind farms	90	
	(c) hydraulic energy exploited in small-scale hydroelectric plants with an installed capacity up to fifteen (15) MW	73	84.6
	(d) Solar energy utilized in photovoltaic units with an installed capacity less than, or equal to one hundred (100) kW, and which will be installed in a lawfully owned or possessed property or in adjacent properties of the same owner or lawful possessor	450	500
	(e) Solar energy exploited in photovoltaic units with an installed capacity of over one hundred (100) kW	400	450
	(f) Solar energy exploited in units employing a technology other than that of photovoltaics with an installed capacity up to five (5) MW	250	270
	(g) Solar energy exploited in units employing a technology other than that of photovoltaics with an installed capacity of over five (5) MW	230	250
	(h) Geothermal energy, biomass, gases released from sanitary landfills and biological treatment plants and biogases	73	84.6
	(i) Miscellaneous RES	73	84.6
(j) High-efficiency cogeneration of heat and electricity	73	84.6	
FUNDING INFORMATION	According to the Developmental Law (financial support for Investments) and the Operation Programmes of Competitiveness		
EX-POST EVALUATION (main outcomes/indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)	<p>On-going procedure.</p> <p>Many Renewable installations (wind, solar thermal, PV, geothermal) are being established under its framework in Crete (using in combination the investment financial support by operational Programme of Competitiveness I and II and the Development Law). Tourist sector is a very active actor, with many of the above systems as well as Energy Saving systems to be installed in Cretan hotels.</p>		
CONTACT AND REFERENCE DATA	<ul style="list-style-type: none"> - Greek Ministry for the Environment, Energy and Climate Change (former Ministry for Development) www.ypan.gr - Regulatory Authority for Energy www.rae.gr - Regional Energy Agency of Crete www.crete-region.gr 		

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NAME OF THE MEASURE	Operational Programme Competitiveness II
TIME SCALE	2007-2013
BUDGET	
KEY ACTORS <i>(i.e. funding institution)</i>	<ul style="list-style-type: none"> - Greek Ministry for Environment, Energy and Climate Change (former Ministry for Development) - Greek Ministry of Economy and Finance - Interim Body of Operational Programme Competitiveness (EFEPAE)
RATIONALE <i>(why the initiative has been set up in the region)</i>	<p>The programme is addressed to the whole country and covers a big range of entrepreneur activities and interests. An important part of this programme deals with Energy sector.</p> <p>There are also the national targets for preventing Climate change, which create a favourable environment for investments to be subsidised by this programme.</p> <p>Crete is a Region with:</p> <ul style="list-style-type: none"> - Isolated Energy insular system - High interest for investments (especially in energy investments – RES, RUE) - Big hotel sector - Big Research Centres (FORTH) - Industrial Zones, Technological Parks, Business incubators - Important Universities and Technological Educational Institutes - Many RES installations due to its huge potential in Renewable Energy Sources - There are also huge potential for RUE installations (mainly in tourist sector but also in industrial sector).
SECTOR <i>(if possible related to RES)</i>	<ul style="list-style-type: none"> - Investments for Business development and modernisation - Energy Investments (RES, RUE) - Research /Innovation - Business/entrepreneurship/Environment/New jobs
TARGET GROUPS	<ul style="list-style-type: none"> - Companies (especially SMEs) - enterprises - Universities, Research Centres, Technological and Educational Organisations and Institutes, Bodies of Public and private sector - Technological Parks, Incubators etc. - Chambers, Technology and Innovation Transfer Bodies - Energy Companies and Investors (Renewables, RUE and Energy Saving)
RATIONALE	Give incentives for related actors to promote and implement entrepreneurship in all sectors
AREA OF INTEREST	Energy, Renewables, Energy Saving, Innovation, Tourism, Entrepreneurship, Competitiveness
FOCAL POINTS AND SPECIFIC OBJECTIVES	<p>Improvement of Competitiveness of Greek Enterprises with emphasis in (energy) innovation</p> <ul style="list-style-type: none"> - Promotion of innovation in all economic sectors, supported by research and technological development - Strengthening of Businesses (quality of products - services with environmental sustainability) - Improvement of Business environment (Legislative framework, Supportive structures) - Modernisation and strengthening of national Energy System towards Sustainability (energy supply safety, promotion of renewable energy sources, energy saving,


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	<p>energy innovation and sustainable transport, fulfilment of national environmental obligations, liberalisation of energy market, international electrical and natural gas transportation grid)</p>
KEY ACTIVITIES	<ul style="list-style-type: none"> - Promotion (by funding) of Networks, Research Centres, Regional Innovation Centres, etc. - Creation of innovative cooperation clusters in high interest sectors - Strengthening of SMEs by promotion of RTD actions - Creation of new companies for transform of Research results into new market products - Promotion of entrepreneur spirit for the young people - Integrated Business plans for supporting investments in order the status of Greek companies to be strengthened in national and international market - Certification of products - Promotion of Environmental and Energy Companies - Integrated and innovative actions for modernisation of tourist sector (RES in tourism, tradition tourist dwellings, ports development etc.) - Establishment of new companies in areas with high unemployment and for the population groups with less business activity (women, young people, etc.) - Development of new financial support structures and mechanisms of funding motives - Modernisation and simplification of existing legislative (including energy) framework - Modernisation of Business Parks - Completion and Modernisation of tourism infrastructures (new forms of tourism, museums, archaeological sites, etc. - Promotion of Greek products and Services <p style="background-color: #e6f2ff; margin-top: 10px;"><u>Especially for Energy sector:</u></p> <ul style="list-style-type: none"> - Natural Gas in more Greek areas (including liquefied natural gas stations) - Connection of islands with the main land electrical grid - Modernisation and extension of the National Transmission Electricity Grid - Energy Investments in islands - Investments in Renewable Energy Sources exploitation (Wind farms, PV, Geothermy, Biomass, water energy, solar thermal, etc.) - Investments in energy efficiency improvement in Secondary and Tertiary sector - Energy investments in Public and Domestic Sector (e.g. National Programme: "I Save Energy" for Municipalities, small PV projects, PV roofs, replacement of A/C, building insulation measures) - Rational management of Natural Sources. - Training energy programmes for professionals
FUNDING INFORMATION	<p>There is public financial support for the above activities. Especially for energy sector there a co-financing between 30-50% of the initial installations cost.</p>
EX-POST EVALUATION (main outcomes/ indicators available, e.g. number of	<p>There is an ex-post evaluation for Operational Programme Competitiveness II.</p> <p>Previous Similar programme (Operational Programme Competitiveness I) had a huge success in the Region. Many Companies and investors have participated promoting the energy investments in the island.</p>


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start-ups, beneficiaries, implemented projects, etc.)	
CONTACT AND REFERENCE DATA	<ul style="list-style-type: none"> - Operational Programme Competitiveness www.antonistikotita.gr - Greek Ministry for the Environment, Energy and Climate Change (former Ministries for Development and Public Works and Environment) www.ypan.gr www.minenv.gr - Intermediate Body for Operational Programme Competitiveness www.efepae.gr

NAME OF THE MEASURE	Operational Programme Competitiveness I
TIME SCALE	2000-2006
BUDGET	1,04 billions €
KEY ACTORS (i.e. funding institution)	<ul style="list-style-type: none"> - Greek Ministry for the Environment, Energy and Climate Change (former Ministry for Development) - Greek Ministry of Economy and Finance
RATIONALE (why the initiative has been set up in the region)	<p>The programme is addressed to the whole country and covers a big range of entrepreneur activities and interests. An important part of this programme deals with Energy sector.</p> <p>Crete is a Region with isolated Energy insular system, big hotel sector, high Business interest (especially in energy investments – RES, RUE). In parallel there is huge potential for Renewable Energy Sources, RUE and Energy Saving (mainly in tourist sector but also in industrial sector)</p>
SECTOR (if possible related to RES)	<p>Its actions (among other actions concerning entrepreneurship) focus on supporting entrepreneurship in the following areas:</p> <ul style="list-style-type: none"> - Energy (Renewables, Energy Saving) - Industry – Services - Research/Technology/Innovation - Tourism - Commerce – Consumer - Human Resources
TARGET GROUPS	<ul style="list-style-type: none"> - Companies (especially SMEs) - enterprises - Universities, Research Centres, Technological and Educational Organisations and Institutes, Bodies of Public and private sector - Technological Parks, Incubators etc. - Chambers, Technology and Innovation Transfer Bodies - Energy Companies and Investors (Renewables, RUE and Energy Saving)
RATIONALE	Give incentives for all related actors to promote and implement entrepreneurship in all sectors.
AREA OF INTEREST	<ul style="list-style-type: none"> - Energy, Renewables, Energy Saving, Innovation, - Tourism, Entrepreneurship, Competitiveness
FOCAL POINTS AND SPECIFIC OBJECTIVES	The Operational Programme 'Competitiveness' under the Former Greek Ministry of Development utilises CSF3 funds, and focuses on sectors which are expected to generate long-term growth for the Greek economy (including the energy sector).
KEY ACTIVITIES	Energy Improve the contribution of energy toward increasing the competitiveness of the Greek


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	<p>economy, while respecting the country's environmental commitments. The priorities of this sector are as follows:</p> <ul style="list-style-type: none"> - to improve the security of energy supplies not just in Greece but also in the European Union – keeping in mind the impending enlargement, - to facilitate adaptation of the energy system to EU directives mandating deregulation of the energy sector, - to help the Greek economy meet the Kyoto objectives for gas emissions, and to ensure that the environment is granted more consideration in energy policy. <p>In terms of infrastructure, the interventions include projects in the natural gas sector; improving the infrastructures for transmission and distribution of electric power; supporting the operation of the deregulated energy market, and; the utilization of natural resources.</p> <p>Concerning State aid, the programme's interventions include support for businesses involved in renewable energy, co-generation and energy-saving and in mineral resources.</p> <p>Industry-Services</p> <p>The objective of the programme in the secondary sector is to re-structure production and upgrade technology by strengthening the competitive capacity of existing businesses and by creating new businesses which will leverage innovation and apply new technologies. This objective will be attained through the following policy priorities:</p> <ul style="list-style-type: none"> - Apply measures to simplify and improve the business environment - Employ technology in business - Encourage entrepreneurship - Promote business collaborations - Reorient business activity to respect the environment - Upgrade human resources in business <p>Research/Technology/Innovation</p> <p>The planning of the programme actions in Research / Technology / Innovation - in the framework of its general strategy to support quality-oriented competitiveness - focuses on a number of strategic targets: to encourage the creation of new businesses in knowledge-intensive fields by exploiting the results of research by research agencies; and to lend support to new or existing networks of research and technological activities that create competitive advantages</p> <p>Tourism</p> <p>The part of the programme dedicated to tourism seeks to secure the position of Greece as one of the world's top tourist destinations, and also enhance the Greek tourist product with quality features that differentiate it from other destinations and allow it to meet the needs of new vigorous tourist markets</p> <p>Commerce-Consumer</p> <p>The Operational Programme 'Competitiveness' includes support for commercial businesses in all sectors, allowing them to participate in a range of actions (among others: incentives for private investments in energy; promotion of SME networking/clustering; organizational modernization of SMEs leading to accreditation; operation of the Small and Micro Enterprise Loan Guarantee Fund TEMPME; actions to support entrepreneurship; occupational training actions).</p> <p>The Programme also supports the commercial sector through two actions: one involves the existing General Commercial Register; the other a new Register of Public Sector Suppliers.</p>
FUNDING INFORMATION	There is public financial support for the above activities. Especially for energy sector there a co-financing between 30-50% of the initial installations cost.

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EX-POST EVALUATION <i>(main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)</i>	The programme had a very serious success in the Region. Many Companies and investors have participated promoting the energy investments in the island. Many Renewable installations (wind, solar thermal, PV, geothermal) were established under its framework. Tourist sector was a very active actor, with many of the above systems as well as Energy Saving systems to be installed in Cretan hotels.
CONTACT AND REFERENCE DATA	<ul style="list-style-type: none"> - Operational Programme Competitiveness www.antonistikotita.gr - Greek Ministry for the Environment, Energy and Climate Change (former Ministries for Development and Public Works and Environment) www.ypan.gr www.minenv.gr

NAME OF THE MEASURE	Law for Energy Saving in Buildings (<i>Measures for reduction of Energy Consumption in Buildings</i>)
TIME SCALE	Start 2009
BUDGET	
KEY ACTORS <i>(i.e. funding institution)</i>	<ul style="list-style-type: none"> - Greek Ministry of Economy and Finance, - Greek Ministry for the Environment, Energy and Climate Change (former Ministries for Development and Public Works and Environment)
RATIONALE <i>(why the initiative has been set up in the region)</i>	<ul style="list-style-type: none"> - Big energy consumption in domestic sector, in big buildings (hotels, hospitals, etc.) - High increase of population and living standards - Problem of sufficient electricity power during summer - High electricity consumption due to air-conditioning - Poor insulation of old buildings
SECTOR <i>(if possible related to RES)</i>	Buildings (RUE and RES)
TARGET GROUPS	<ul style="list-style-type: none"> - Building owners - Engineers (architects) - Companies dealing with RUE and RES in building sector
RATIONALE	<ul style="list-style-type: none"> - Implementation of new EU directive for buildings (2002/91/EC) - Greek Law No 3661/2003 (KENAK) - Interest in building, renting and selling of buildings - New jobs for Scientists (engineers)/Technicians/Building companies and Enterprises
AREA OF INTEREST	Rational Use of Energy, Energy Saving, RES in buildings
FOCAL POINTS AND SPECIFIC OBJECTIVES	<p>Its main target is the reduction of Energy consumption in buildings and the resulted direct and indirect reduction of CO₂ emissions (energy saving and climate change mitigation)</p> <p>It introduces the “Buildings Energy Efficiency Regulation” (new Greek Law No 3661), the “Energy Efficiency Certificates” and the “Energy Inspectors”.</p>
KEY ACTIVITIES	The “Buildings Energy Efficiency Regulation (KENAK)” determines the minimum energy standards new buildings should have in order to be licensed. Bigger than 1.000 m ² buildings should have additionally at least one alternative energy supply system. The


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	<p>Regulation's obligations are also applicable for existing - under renovation - buildings over 1.000 m2.</p> <p>This Regulation determines the calculation method of buildings energy efficiency, the content of the necessary energy efficiency studies and audits, the procedure to be followed, etc. and energy rating-energy certification for buildings.</p> <p>It imposes regular inspections of the central heating and air-conditioning systems, as well as water consumption. Additionally it requires the publication of energy efficiency certificates (10 years duration) for all new buildings, all renovated buildings over 1.000 m2 and all existing buildings when sold or rented. (Exceptions: historical buildings, churches, temporary buildings or buildings with less than 4 months use)</p> <p>These certificates will be issued by responsible certified "Energy Inspectors" and the Regulation foresees the procedure for the calculation of its issue cost.</p>
FUNDING INFORMATION	The Regulation foresees the possibility through the responsible Ministry to establish ways of co-funding the cost of the energy efficiency audits' elaboration, as well as the possibility of financial support of the specific interventions (insulation, double glazes, new windows, etc.).
EX-POST EVALUATION (main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)	<p>The specific program is on start-up phase. It seems that proper windows' (double glasses, good insulation characteristics, etc.) installation for older buildings – built before 1980 – in degrading areas will be the first priority.</p> <p>Great initial interest has already been expressed. The implementation procedure will be assisted from all Municipality Centres for Public Information (KEΠ).</p>
CONTACT AND REFERENCE DATA	<ul style="list-style-type: none"> - Regional Energy Agency of Crete Crete www.crete-region.gr - Greek Ministry for the Environment, Energy and Climate Change (former Ministries for Development and Public Works and Environment) www.ypan.gr www.minenv.gr - Centre for Renewable Energy Sources www.cres.gr

NAME OF THE MEASURE	"I SAVE ENERGY": Specific energy efficiency programme for Municipalities
TIME SCALE	Proposals' submission: 01.04.2009 until 22.07.2009 Approved actions have to be implemented until 2015.
BUDGET	100.000.000 €
KEY ACTORS (i.e. funding institution)	<ul style="list-style-type: none"> - Greek Ministry for the Environment, Energy and Climate Change (former Ministry for Development) - Greek Ministry of Economy and Finance - Central Association of Greek Municipalities and Communities (KEDKE)
RATIONALE (why the initiative has been set up in the region)	Crete has 4 Prefecture Capitals and several Municipalities with population over 10.000 inhabitants. Many Municipalities have already expressed their interest to participate in programs and initiatives for improving the energy efficiency (RES and RUE) and climate policies in their Municipal buildings and infrastructures, as well as their public transportation networks.
SECTOR	Energy Saving, Renewable Energy Sources, Bioclimatic techniques applied to Municipal


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(if possible related to RES)	Buildings and infrastructures Public transportation networks – Sustainable Transports and mobility
TARGET GROUPS	Municipalities with population over 10.000 inhabitants and capitals of Prefectures (all over the country)
RATIONALE	<ul style="list-style-type: none"> - Implementing the National Targets for Energy Saving, Renewable Energy Sources and Sustainable Transport, as well as Climate Change Policy - Promotion of “Covenant of Mayors” EU initiative - New energy regulation for building (EU directive for buildings - 2002/91/EC and Greek Law No 3661/2003-KENAK)
AREA OF INTEREST	<ul style="list-style-type: none"> - Energy and Natural Resources Saving by Municipalities - Rational Use of Energy - Environment Protection and Sustainable Development - Renewable Energy Sources, Bioclimatic architecture, Sustainable mobility and transport - Energy Cogeneration
FOCAL POINTS AND SPECIFIC OBJECTIVES	Implementation of actions and proved good practices by the local-municipal bodies, for energy saving in urban environment. Special emphasis for municipal buildings and energy efficiency in public transportation networks and municipal facilities.
KEY ACTIVITIES	<ul style="list-style-type: none"> - Technical interventions <ul style="list-style-type: none"> o Existing Municipal buildings / Bioclimatic technologies o Communal areas (parks, athletic facilities, squares, etc.) / Bioclimatic technologies o Pilot interventions in Public transportation networks / Sustainable mobility - Public campaigns and awareness raising <ul style="list-style-type: none"> o Dissemination and promotion actions o Networking o Information campaigns
FUNDING INFORMATION	<p>The maximum budget, each Municipality can submit for funding, depends on its population:</p> <ul style="list-style-type: none"> - 10.000 - 45.000 inhabitants, up to 700.000 € - 45.001- 90.000 inhabitants, up to 1.000.000 € - 90.001- 150.000 inhabitants, up to 1.500.000 € - 150.001- 300.000 inhabitants, up to 3.000.000 € - more than 300.001 inhabitants, up to 6.000.000 €. <p>Minimum budget: 500.000 €.</p> <p>The funding can reach 70% of the budget.</p>
EX-POST EVALUATION (main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)	KEDKE evaluated the serious impact of the programme concerning the energy programming at municipal level, the municipal climate policies, the energy saved, the energy produced by RES, as well as the increase of awareness level at municipalities and the upgrade of the municipal environment due to sustainable transport and mobility
CONTACT AND	- Central Association of Greek Municipalities and Communities (KEDKE)

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REFERENCE DATA	www.kedke.gr - Greek Ministry for the Environment, Energy and Climate Change (former Ministry for Development) www.ypan.gr - Regional Energy Agency of Crete www.crete-region.gr
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NAME OF THE MEASURE	Greek energy programme: "I AM CHANGING MY AIR-CONDITIONING DEVICE"
TIME SCALE	10.06.2009 – 31.12.2009
BUDGET	15.000.000 €
KEY ACTORS (i.e. funding institution)	<ul style="list-style-type: none"> - Operational Programme for Competitiveness II (through the European Regional Development Fund) - National funds (through Operational Programme Competitiveness II) - Greek Ministry for the Environment, Energy and Climate Change (former Ministry for Development)
RATIONALE (why the initiative has been set up in the region)	Due to the climate in Crete (long period of high temperatures – very hot summer) and the huge tourist sector there is an extremely high number of air-conditioning systems in use and for many hours per day (especially during peak hours). Most of them are of old technology with increased energy consumption. This particular programme has addressed mainly to the residential and small business sectors, where the maximum co-financing was 500 € for each house or small company. This programme is also applied to the whole Greece.
SECTOR (if possible related to RES)	<ul style="list-style-type: none"> - Energy Saving - Buildings' electrical consumption reduction
TARGET GROUPS	Citizens, Business owners, Shops of electrical apparatus, etc.
RATIONALE	Give incentives to house owners and renters, and to the small companies for enhancing energy efficiency of their A/C.
AREA OF INTEREST	Energy Saving – Recycling of all old air-conditioners and cooling liquids.
FOCAL POINTS AND SPECIFIC OBJECTIVES	Subsidy for replacement and recycling of old energy consuming air-conditioning systems with new energy efficient ones (inverter technology, class A and higher). The action refers to all the country with specific amount of subsidies per Region.
KEY ACTIVITIES	<p>The action concerns all citizens/consumers who own old energy consuming air-conditioning systems and want to replace them. Each consumer can replace up to two air-conditioning devices with new energy efficient.</p> <p>All electrical apparatus shops can participate in the action, as long as they submit the necessary certificates and official documents the action demands and after the relative control procedures.</p> <p>The old systems are forwarded for recycling.</p>
FUNDING INFORMATION	35% of the total price, but only up to 500 €. The citizen pays 65% to the shop and the shop receives the rest by the State.
EX-POST EVALUATION (main outcomes/ indicators available, e.g. number of start-ups,	The budget was limited from the beginning, therefore the continuing demand could not be satisfied totally. In a while, data will be published about the number of air-conditioning units replaced and the electricity and CO ₂ saved.


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beneficiaries, implemented projects, etc.)	
CONTACT AND REFERENCE DATA	<ul style="list-style-type: none"> - Greek Ministry for the Environment, Energy and Climate Change (former Ministry for Development) www.ypan.gr - Greek Union of Electric Apparatus Merchants - Regional Energy Agency of Crete www.crete-region.gr

NAME OF THE MEASURE	Greek Legal framework for the financial support of Photovoltaic installations
TIME SCALE	Started 2009 (changed previous law in force)
BUDGET	Subsidy up to 40% of the installation cost
KEY ACTORS (i.e. funding institution)	<ul style="list-style-type: none"> - Regulatory Authority for Energy, - Hellenic Transmission System Operator SA (for islands: Public Power Corporation), - Greek Ministry of Economy and Finance, - Greek Ministry for the Environment, Energy and Climate Change (former Ministry for Development)
RATIONALE (why the initiative has been set up in the region)	<p>Crete has a huge potential of solar energy (high solar radiation many hours per day, many days per year). Big share of energy (electricity) demand – including electricity demand during summer peak hours - can be covered by the PV installations but due to the high investment cost such installations would be viable only if the feed-in tariff for the investor is guaranteed (including a significant subsidy for the initial installation). PV plants up to 80kW are subsidised. For the islands there is a certain total PV installation capacity for each island, not to be exceeded.</p> <p>PV roofs are also supported (not on islands for the time being) up to 20kW with a “light” licence procedure and guaranteed feed-in tariff (no initial installation subsidy). The procedure will be extended to a larger PV plant (MW order of magnitude).</p>
SECTOR (if possible related to RES)	Photovoltaics
TARGET GROUPS	Investors, Companies, Consulting Services, Buildings’ owners, Engineers
RATIONALE	Give incentives for small and “medium” investors for PV installations up to 80 kW and to PV roofs on houses up to 10 kW (not valid for the islands at this moment).
AREA OF INTEREST	Photovoltaics investments
FOCAL POINTS AND SPECIFIC OBJECTIVES	<p>The Law determines a “lighter” license procedure and the prices for the market of electricity produced by Photovoltaics. The prices are referred per produced electric MWh (Euro/MWh). The prices will be determined according to the penetration of PV technology in the energy system and the level of achievement of the national RES targets, as well as on the area (mainland or islands).</p> <p>Each PV electricity producer candidate (investor) signs an agreement with the responsible (for electrical grid) Body. This agreement has duration of 20 years and includes the current initial price (guaranteed feed-in tariff). The price will be changed each year in relation to the “Consumer’s price index” of the previous year, as this is given by the Bank of Greece. The subsidy of the installation cost can reach the 40%.</p> <p>This Law also provide detailed information about the procedure (steps, timetable, responsible Public Authorities etc.) and the necessary official documents, which the interested investor should submit in order to be included in the favourable provisions of</p>

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	<p>the Law (according to the size and the place of the planned investment).</p> <p>There is also a new regulation (<i>Special program for Development of PV systems on roofs of buildings - FEK 1079/B/04.06.2009</i>) for smaller PV installations - up to 10kW - on the roofs and side-walls of existing buildings and the market's conditions for the electricity produced. The license procedure for these installations is much simpler and the regulation will be in force till 31.12.2019. For these installations there is no subsidy on installation cost but there is guaranteed high prices of photovoltaic kWh (feed-in tariff).</p>
KEY ACTIVITIES	<ul style="list-style-type: none"> - Establishment of PV Parks, - Installations of Photovoltaics on buildings' roofs and side-walls
FUNDING INFORMATION	Subsidies up to 40% of the installation's cost / Guaranteed feed-in tariff for 20 years for PV plants up to 80 kW.
EX-POST EVALUATION (main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)	<p>These PV investments are on the initial implementation phase and there is not yet ex-post evaluated. A great initial investment interest has been expressed, leading to the limitation of the public financial support.</p> <p>For the region of Crete there has been an initial approval of 1000 PV plants of 80kW each. It is estimated that 700 of them will get all the required licences and they will be finally installed. Concerning the PV roofs a specific provision is being waited for determining the permissible PV Megawatts (on roofs) for each Greek islands (including Crete).</p>
CONTACT AND REFERENCE DATA	<ul style="list-style-type: none"> - Public Power Corporation www.dei.gr - Greek Ministry for the Environment, Energy and Climate Change (former Ministry for Development) www.ypan.gr - Greek Association of Photovoltaics www.hellopco.gr - Regional Energy Agency of Crete www.crete-region.gr

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3.2. Regional research agenda


In the following research activities of the public scientific RES community in the region are demonstrated. A questionnaire has been used as supporting tool for being able to gather consistent and easy comparable data.

3.2.1. Research focus and current research activities

Research projects the research community has been working on during the last five years are illustrated as well as currently being carried out projects.


Research Profile	
Organisation	TECHNICAL UNIVERSITY OF CRETE, DEPT. OF ENVIRONMENTAL ENGINEERING, LABORATORY OF RENEWABLE AND SUSTAINABLE ENERGY SYSTEMS
Title	Autonomous biodiesel production unit "Daedalus"
Sector	Bioenergy
Abstract: Please give a brief description on the conducted research activity (<500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>In the framework of this project, the world's first autonomous biodiesel production unit was designed and developed. This innovative unit was developed in the Technical University of Crete (GREECE) and is already operational at the University Campus, producing biodiesel from different feed-stock.</p> <p>The data required for the optimum design of this unit were obtained from a wide study on the existing literature and experience on biodiesel units. In addition, for the quality tests EN approved methods have been used in order to determine the different quality parameters. Energy balances have been applied in order to estimate the greenhouse gases emissions that are avoided per cycle of use due to the use of renewable energy for covering the production energy needs.</p> <p>The goal of the project was the development of a prototype for autonomous small scale biodiesel production. The energy autonomy is based in the exploitation of the solar radiation for the efficient production of heat and electricity.</p>
Special features	"Daedalus" can be used as a tool for improving the sustainability of biodiesel production through the decrease of fossil fuels use during the production process.
Innovative aspects	The combination of different renewable energy sources transform this unit to an innovate product which can serve rural developing communities which present high biomass and solar potential.

Research Profile	
Organisation	TECHNICAL UNIVERSITY OF CRETE, DEPT. OF ENVIRONMENTAL ENGINEERING, LABORATORY OF RENEWABLE AND SUSTAINABLE ENERGY SYSTEMS
Title	Biodiesel from olive pomace oil – Optimization of production through the quantification of the physical and chemical processing parameters
Sector	Bioenergy

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<p>Abstract: Please give a brief description on the conducted research activity (<500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>In order to sustain liquid biofuel production active, research and industry community is expanding their efforts on exploiting waste streams (used cooking oils, bleaching earths) or by-products from other production processes. For the Mediterranean region, a suitable feedstock for biodiesel production could be the olive pomace oil. Olive pomace oil is produced by solvent extraction from olive pomace, a solid residual from the olive oil extraction process. Nowadays, it is being used as feedstock in the soap making industry or as a low-quality addition in mixtures of olive oils.</p> <p>The project is aiming on optimizing the various parameters of biodiesel production process from olive pomace oil. To provide a comprehensive study on the biodiesel production and quality from olive pomace oil and to prepare an alternative market option of the olive pomace oil.</p>
Special features	Byproduct exploitation
Innovative aspects	

Research Profile	
Organisation	Region of Crete - Regional Energy Agency of Crete
Title	MARKET INTRODUCTION STRATEGY FOR BIODIESEL PRODUCED FROM WASTE OILS ON THE ISLAND OF CRETE
Sector	Biofuels
<p>Abstract: Please give a brief description on the conducted research activity (<500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Taking into account the capabilities of using used cooking oils – in relation to the great development of tourism in Crete – for biodiesel production, a market study and an evaluation of the potential of used cooking oils for biodiesel production in Crete has been elaborated. All the potential sources of waste vegetable oils, suitable for biodiesel production, have been quantified according to several scenarios. The market of conventional diesel oil (quantities and types of vehicles) also has been assessed. Finally a technical and financial approach of establishing a biodiesel production unit in Crete has been made.</p>
Special features	<p>The collection of the used and residual oils will be organized in a way to secure the lowest possible cost and the maximum quantity collected.</p> <p>Crete can use as raw material for the production of Biodiesel:</p> <ul style="list-style-type: none"> • Used cooking oils from restaurants • Used cooking oils from canteens • Used cooking oils from fast-foods • Used cooking oils from hotels • Used cooking oils from households • Used cooking oils from supermarkets • Residual oils from olive oil industries
Innovative aspects	<p>The field and market research carried out in this project shows that biodiesel of acceptable quality can be produced in the island of Crete from the waste and used oils. Mainly the intensive tourist activity – and secondary other activities can provide the appropriate quantities</p>

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	of the feedstock and at the same time, this conversion of the waste and used oils to biodiesel, constitutes an excellent environmentally acceptable solution for their disposal. (e.g. big hotels units certified with ISO 14001)
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Research Profile	
Organisation	Wind Energy and Power Synthesis Laboratory, Technological Education Institute of Crete
Title	04 AKMQN 63
Sector	Wind Energy
Abstract: Please give a brief description on the conducted research activity (<500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	The ultimate target of this project was to establish the laboratory experience and infrastructure in knowledge and technology to produce reliable cognitive expertise in new areas.
Special features	The development of new concepts and theory, such as the quality of electric power, the analysis and evaluation of moving systems, the diagnostic method for the adequacy bearing structures, assessing and monitoring the development process and product design with the first application in the development of small wind turbines.
Innovative aspects	Power Quality measurement Entropic Kinesiometry


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3.2.2. Available RES technologies

In the following, the outcomes of conducted research projects are demonstrated, describing main technologies/prototypes developed for the RES sector.


Technology Profile	
Organisation	Technological Educational Institute of Crete / Department of Natural Resources and Environment at the Branch of Chania / Laboratory of Renewable Energy Engineering
Title	EEBD (Electronic Energy Buildings Directive), A comprehensive web-based information platform for experts for the take-off of the EU Buildings Directive
Sector	
Abstract: Please give a brief description on the conducted research activity (<500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>The project consortium is consisted of partners from the United Kingdom, Greece, Bulgaria and Austria. The Greek Partner is the Department of Natural Resources and Environment of the Technological Educational Institute of Crete (Chania campus).</p> <p>It covers the identification of the vocational training needs in the EU regions, the development of the training material and the development of the electronic tool that it will provide a suitable mean to obtain the technical competence that allows the better understand and use of the Directive 2002/91/EC and relevant national regulations. In addition it provides a design, maintaining and operation of the buildings with higher energy efficiency.</p> <p>The project s specific objectives are: examination of vocational training needs related to EPBD, collection and filtering of available material, development of the training modules, development of the dynamic part specifications (interactions with the trainees), evaluation of the tool, dissemination of the tool.</p>
Innovative aspects	This tool incorporates the state-of-the art information in modules and is automatically updated according to the end users requirements
Main advantages of the technology (main economic advantages/benefits)	
Current stage of development 1	Done
Intellectual Property Rights 2	N/A

Technology Profile	
Organisation	Technological Educational Institute of Crete / Department of Natural Resources and Environment at the Branch of Chania / Laboratory of Renewable Energy Engineering
Title	Clearinghouse Support
Sector	

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<p>Abstract: Please give a brief description on the conducted research activity (<500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Clearinghouse Support is contributing to facilitate implementation of energy savings in buildings and is linked with EU policy goals. It is a pilot initiative for the practical implementation of the EU Green Paper on Energy Efficiency goals. The consortium consists of Denmark <u>Latvia</u>, <u>Lithuania</u>, <u>Poland</u>, Czech Republic Greece, Slovenia, Germany and Belgium</p>
Innovative aspects	
Main advantages of the technology (main economic advantages/benefits)	<p>The ClearSupport action is expected to serve a vehicle for the development of a European Clearinghouse for small-medium scale sustainable energy projects, and giving feedback to the EC on the implementation process. Its main direct impact will be the initiation of a considerable number of RUE in building projects processed through the PSF. Its further potential is to streamline project handling under a Clearinghouse, thereby addressing the huge need for sustainable energy investments in EU less developed regions</p>
Current stage of development 1	Done
Intellectual Property Rights 2	None


Technology Profile	
Organisation	Region of Crete - Regional Energy Agency of Crete
Title	Pilot use, monitoring and testing of high biodiesel mixtures into the public transport busses of Eastern Crete
Sector	Biofuels
<p>Abstract: Please give a brief description on the conducted research activity (<500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>The Regional Energy Agency of Crete, in the framework of the implementation and promotion of the European Directive for Biofuels, has implemented – according to a working programme of many months for testing and evaluation in real conditions – a pilot use of high biodiesel mixtures into the public transport busses in the Eastern Crete. It is the first time in Greece that such a pilot project is implemented in real conditions with the cooperation of so many important actors (authorities, organizations, institutes). The Region of Crete – Regional Energy Agency of Crete, the Public Bus Company of Eastern Crete, the Technical Centre of Vehicles Control of Heraklion and the National Technical University of Athens were the main cooperating actors.</p>
Innovative aspects	<p>This demonstration project is a pioneer activity in the field of biofuels in transport not only for Crete but also for Greece! In this innovative project biodiesel mixtures of much higher concentrations than the ones legislated,</p>

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	have been tested, taking into account the experience and the know-how of European Organizations, which are using biodiesel mixtures of 100% in public transport.
Main advantages of the technology (main economic advantages/benefits)	<p>Advantages / Benefits:</p> <ol style="list-style-type: none"> 1. The smoke density (opacity) of the busses has been reduced up to 50%. 2. Emissions of Hydrocarbons (HC) were decreased. 3. Carbon Monoxide (CO) emissions were decreased. 4. The avoided emissions of Carbon Dioxide (CO₂) due to the biodiesel consumption instead of oil contributing to the prevention of Climate Change. 5. The use of biodiesel in the Public Transport sector increases the energy security of the insular supply, by the exploitation of the used cooking oils produced by the local tourist industry. 6. There is a significant contribution to the creation of a “niche market” for biodiesel in the Public Transport sector, contributing to the reduction of the cost for imported energy. 7. The project implementation has provoked the establishment of new fried oil collection companies.
Current stage of development 1	The demonstration phase has been completed successfully.
Intellectual Property Rights 2	The scientific results as well as the outcomes of the project have been published by the Region of Crete – Regional Energy Agency of Crete to the International Biomass Conference and Expo.

⁽¹⁾ (1) Development phase – laboratory tested; (2) Available for demonstration – field tested; (3) Already on the market


⁽²⁾ (1) Patent applied for; (2) Patents granted; (3) copyright protected; (4) exclusive rights; (5) secret know-how; (6) Others – registered design, plant variety right, etc.

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3.2.3. International research cooperation

A). The Region of Crete – Regional Energy Agency has implemented or implements the following European Competitive Projects in various sectors (RES, RUE – Energy Saving, Sustainable Mobility, Climate Change, Energy Innovation etc):

1. Urban Solid Wastes Management and Recycling (Experience Exchange Program DGXVI)
2. Setting up a Regional Network and Development of a Software Environment for the Establishment of Prefeasibility Studies for Renewable Energy Investments (ALTENER)
3. The Market of Recyclable Products in Europe (DGXI-Environment: Our Common Future for a Quality of Life)
4. Wood Exploitation for Energy in the Mountainous Islands of Mediterranean (Experience Exchange Program DGXVI)
5. Assessment Method of Developmental Projects related to Local and Renewable Energy Sources in Europe (ALTENER)
6. Energy Management in Public Buildings (SAVE)
7. Energy and Urban Environment in Mediterranean Countries Network 4: Energy management of Municipal and Agricultural Solid Wastes (SYNERGY Programme)
8. Developing Decision – Making Support Tools for the Utilisation of Renewable Energies in Integrated Systems at the local Level-Drill (JOULE)
9. The Development of Trigeneration in the insular and continental European Regions (Experience Exchange Program DGXVI)
10. PV Markets in the Mediterranean – Assessment of Potential and Barriers, Action Plan for Development (THERMIE-B)
11. Setting up a Regional Developmental and Advisory Energy Team in the Region of Crete (PERU)
12. Implementation Plan for the large scale deployment of Renewable Energy Sources in the island of Crete (ALTENER)
13. Integrated Resource Planning for the Island of Crete (SAVE)
14. Demand Side Management Action Programme for the Public Sector of Selected Island Cities in Greece (SAVE)
15. European Islands Energy and Environment Network (PERU-SAVE)
16. The establishment of Agencies in the Mediterranean for the Management of Energy Demand and Supply (PERU-SAVE)
17. Rational Use of Energy in Tourist Industry (SAVE)

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18. Addressing Social and Institutional Barriers for Wind Energy Installations (THERMIE-B)
19. Job Opportunities from Biomass (ALTENER)
20. Market Introduction Strategy for Biodiesel produced from Waste Oils as an Environmentally Friendly fuel on the Islands of Gran Canaria, Crete and Cyprus (ALTENER)
21. New and Renewable Energy Sources for Islands and Remote Regions – Euro Islas (5th FP)
22. Project 238: Studies on the Exploitation of Carob for Bioethanol Production (ALTENER)
23. Best Practice of Energy Services in Public Buildings – from pilot projects to market penetration (SAVE)
24. Waste management in island Communities: Strategy to integrate Waste to Energy Policies (FP5)
25. Renewable Energy Driven Desalination Systems (ALTENER)
26. Joint Opportunities for European Biomass (ALTENER)
27. Persuasive power of children towards energy consumption in the local community (ALTENER)
28. Developing Distance Training Courses for Smart Buildings Energy Management (LEONARDO DA VINCI)
29. Countering Opposition to Renewable Energy and Facilitating Regional RE Business Development – CORE Business (ALTENER)
30. Implementation of 100% RES Project for El Hierro Island –Canary Islands- (Main action: Wind-Hydro Power Station). First Phase (5th FP)
31. European Renewable Energy Islands (ALTENER)
32. GREEN HOTEL - Integrating self supply into end use for sustainable tourism (5th FP)
33. Specific actions for experimental fry oil collection from small users, to promote biodiesel production at local level (ALTENER)
34. Force for Energy by children through education – FEEDU (Intelligent Energy Europe)
35. Development of an interactive vocational Web training tool for the take-off of the Buildings DIRECTIVE 2002/91/EC – EEBD (Intelligent Energy Europe)
36. Energy'regio - Action Programme for Strengthening the Energy Efficiency and Source Saving by Sustainable Local Development in European Regions (INTERREG III C East)
37. E-learning for training Energy Agencies in mobility management and alternative fuels – E-TREAM (Intelligent Energy Europe)
38. 3-Fold initiative for Energy planning and sustainable development at local level – 3-NITY (Intelligent Energy Europe)
39. Young Energy People – YEP (Intelligent Energy Europe)

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40. Biofuels and Electric Propulsion Creating Sustainable Transport in Tourism Resorts – BIOSIRE (Intelligent Energy Europe)
41. Energy Agency of Ios (Intelligent Energy Europe)
42. Establishment of the Cyprus Energy Agency (Intelligent Energy Europe)
43. INSular regions cooperation for maximising the environmental and economic benefits from the research in Renewable Energy Sources – INRES (FP7-REGIONS-2008-1)
44. Small and Medium Insular Light Industries Enhancement and Support – SMILIES (INTERREG-MED)
45. The Pact of Islands: Islands committed to local sustainable energy – ISLE-PACT
46. Regional cooperation towards Adaptation to Climate Change – RegioClima (INTERREG IVC)

B). The Technical University of Crete, Dept of Environmental Engineering Laboratory of renewable and sustainable energy systems has established international public and private collaborations and networks in the field of renewable sources. These include the following:

1. *Promoting the use of Photovoltaic Systems in the Urban Environment through Demo Relay Nodes* (Spain, Basque Country, Portugal, Netherlands, Italy, Slovakia)

PURE project promoted the installation of Building Integrated PV systems in European regions characterized by large solar potential and lack of installed PV systems. The objectives were addressed through the concept of “Demo Relay Nodes”, under the form of a facility of 50-100 m² housing exhibition, dissemination and promotion activities. Five Demo Nodes were installed in Spain, Italy, Portugal, Greece and Slovakia.


2. *Integration of Renewable Energy Technologies in Rural Insular Areas (UK, Cyprus, Italy)*

The development and application of an integrated methodological approach supporting the development of Sustainable Energy Communities in islands and ecologically sensitive areas is a priority in order to support the increase of RES share in the energy mix and therefore, to support the implementation of several European initiatives and legislations on energy, environment and the sustainable development of the European Communities.


3. *Removal of the non-technological barriers to solar cooling technology across southern European islands (UK, Cyprus, Spain, Italy)*

Removal of the barriers that hamper the diffusion of solar cooling plants.

C).The Laboratory of Renewable Energy Engineering of the Technological Educational Institute of Crete has strong networking activities with a range of different European and international organizations. Successful research collaborations come from the UK, Austria, Romania, Czech Republic in the fields of Renewable energy sources, Energy saving and Buildings etc.

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Another Laboratory from the Technological Educational Institute of Crete, the Wind Energy and Power Synthesis Laboratory deals with a wide range of research activities covering numerous fields. Initially lab's research was dealing exclusively with small wind-turbine units. In time more technological fields were added. Since then the Laboratory deals with research on Pumped Storage Systems, Bio climatic Design of Buildings, Kinisiometry and other subjects. Several research co-operations have been undertaken with an important network from Denmark, France, Cyprus, Switzerland and others.

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3.3. SWOT – Regional assessment – Research Perspective

In the following the regional research perspective is illustrated by means of a SWOT analysis. The main core competencies and shortcomings with regard to knowledge production and technology transfer capabilities in the RES sector in the region are highlighted.

Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the STRENGTHS , i.e., capabilities to provide comparative advantages in the RES sector in the Region?	Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the WEAKNESSES , i.e., absent resources, activities not carried out in the proper way?
<ul style="list-style-type: none"> - Increasing number of collaboration between research and industry - Highly skilled personnel - Strong international cooperation activities 	<ul style="list-style-type: none"> - Not enough start-ups - Low level of budget for conducting RTD activities in the RES sector - Poor linkage between research entities and local enterprises - Poor research base in the sector
Focusing on aspects outside control, where are the OPPORTUNITIES for RES- regional actors, i.e. open up possibilities to capitalise?	Focusing on aspects outside control, where are the THREATS for research organisations, i.e. close off future possibilities?
<ul style="list-style-type: none"> - Availability of EU RTD funds for research and national funds for RES projects - Surplus of well educated researchers - Networking possibilities at European level (Clusters, Technology Platforms, etc.) - Strong RES - technology demand from industrial actors (i.e. from the tourism sector) 	<ul style="list-style-type: none"> - Bureaucracy barriers - Few incentives for public-private partnerships - Low awareness of regional research capacity - Brain drain - Isolation (insular region)

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3.4. Industrial RES performance

In section 3.4 the performance of the industrial community is taken under investigation. The following subsections deal with distributed and adopted technologies, research conducted by private actors and international cooperation activities performed by the industrial RES community.

3.4.1. Distributed and Adopted RES technologies


Main distributed and adopted technologies in the regions are illustrated.

Technology profile	
Company	Corissia Group Hotels (S.A.)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Shallow Geothermal System in Hotel
Sector	Geothermy (Shallow)
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u></p> <p>“Corissia Group Hotels” consists of two main hotels (Corissia Beach Hotel with 77 rooms and Corissia Princess Hotel with 65 rooms). A system of shallow geothermal has been installed for space heating and cooling as well as for heating of water (hot water for use, swimming pool - spa).</p> <p>It consists of:</p> <ol style="list-style-type: none"> a) 3 water drillings b) 2 buffer tanks c) 2 boilers d) 4 geothermal heat pumps e) fan coil units <p>Shallow Geothermal system has been exploited:</p> <ol style="list-style-type: none"> a) During Summer for <ol style="list-style-type: none"> 1. Hot water for use, 2. Hot water for swimming pool –spa, 3. Cooling b) During Winter for <ol style="list-style-type: none"> 1. Hot water for use, 2. Hot water for swimming pool – spa, 3. Heating <p>The economic benefits are:</p> <ol style="list-style-type: none"> a) 38,2% reduction of hourly cost for heating of water (hot water for use and for swimming pool - spa) b) 26,5% reduction of hourly cost for space cooling c) 66% reduction of hourly cost for space heating <p><u>Innovative aspects</u></p> <p>The innovative aspects is that the shallow geothermy system is adopted and implemented in the hotel sector in Crete, both for heating (space and water) and for cooling. These systems up to now are mainly implemented in northern climates. The adaptation of the systems in south climates, the operation</p>

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	<p>experience gained, the energy balances obtained and the financial appraisal constitute innovative aspects for Crete and especially for hotel sector. It has also to be underlined the importance of saving cooling loads – due to classic air conditioning units – during the summer peak electricity demand in Crete.</p> <p><u>Main advantages</u> The wide implementation of this technology will lead:</p> <ul style="list-style-type: none"> – to important electricity cost savings for the hotel owners, – to the alleviation of electricity system of Crete (less cooling loads), – to the CO₂ reduction (due to much less electricity used for providing cooling loads, because of the geothermal pumps used), – to the contribution to the “green image” of the hotels and for Crete as a “green and sustainable tourist destination” and – to the contribution of the regional and national targets for sustainable energy and climate mitigation and adaptation. <p>These innovative energy technologies will create new activities, new companies and new jobs.</p>
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Technology profile	
Company	Mechatron (S.A.)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Innovative Tracker System for Photovoltaics
Sector	Solar Energy (Photovoltaics)
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u> Mechatron is an innovative company created by young scientists / engineers mostly as “spin-off” company of the Technological Educational Institute of Crete. Having expertise in industrial automotation and having built numerous hybrid autonomous energy systems (PV, small wind turbine and genset) in Crete, recently has focused its activities to PV energy and specifically to PV trackers (adaptation, manufacture, selling, installation). Mechatron has exploited, ameliorated and adapted the sun trackers technology in order to design and manufacture a specific Sun Tracker for Photovoltaics installed in Greece (Crete) – ATLAS System.</p> <p>Technical features:</p> <ol style="list-style-type: none"> a) Up to 150 m² of Photovoltaics can be installed in the system b) Size: 15m x 10m c) Weight: 4.500 kg d) ATLAS system uses an astronomic algorithm for achieving the maximum accuracy in motion. e) A thunder protection system is installed in the


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	<p>system.</p> <p>f) The system is manufactured to be resistant to high wind speeds and protected from malicious actions (stealing).</p> <p>g) It disposes also a complete monitoring system.</p> <p>ATLAS system offers:</p> <p>a) Up to 40% increased production of energy in relation to motionless PV systems</p> <p>b) 50% increase of the Net Present Value (NPV) of a typical PV installation</p> <p>c) Economic of scale to the materials and works due to the lower number of materials per installation</p> <p>d) Less works at the worksite due to the high standardisation and integration of the materials in the factory</p> <p><u>Innovative aspects</u></p> <p>A dynamic innovative company created by new scientists – engineers mainly coming from the Regional Educational Institutes and Universities. They focus on renewable energy systems and energy innovation strongly linked to the high local and national potential of renewable energy sources (solar, wind). Recently they focus on PV exclusively because PV market in Greece and Crete is in very high expansion phase. Their PV tracker “ATLAS” is regarded to be one of the best systems in the national and local market certified and adopted to local conditions, having already been implemented in several PV plants.</p> <p><u>Main advantages</u></p> <ul style="list-style-type: none"> – Local scientists created local “innovative” value in the SMEs energy sector. – They intent to be expanded at the Mediterranean PV market. – The have adapted the PV tracker’s technology to local conditions and they manufacture it in Heraklion industrial area. – The company participates in sectoral and local trade fairs in Crete, Greece and elsewhere. <p>Their innovation example is an “open innovation” case concerning mostly the “adaptation” and “optimisation” of already existed relative energy systems.</p>
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Technology profile	
Company	C. ROKAS SA
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Installer – Constructor and Operator
Title	Installation and Operation of Wind Parks and Photovoltaic Park


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Sector	Wind Energy (Wind Parks) Solar Energy (Photovoltaic Park)
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u></p> <p>Rokas Renewables has R.E.S. installations of 21.6 MW in Wind Parks and 171.6 KW in Photovoltaics in Crete. Rokas was one of the first companies which installed wind parks on the island of Crete, therefore it has long-time manufacture and operation experience of Wind Farms. Additionally, it is the first company which installed a Photovoltaic Park in Crete (2001). Nowadays is part of the Iberdrola Group of Companies.</p> <p style="text-align: center;"><u>Wind Parks in Crete</u></p> <p>a) Location: Modi, Sitia (1st) Operation: since April 1998 Power: 10,2 MW W/G: 17 x 600 KW Type of W/G: Bonus Energy A/S Cost of investment: 12,9 million €</p> <p>b) Location: Mitato, Sitia Operation: since December 2003 Power: 3 MW W/G: 5 x 600 KW Type of W/G: Bonus Energy A/S Cost of investment: 3,1 million €</p> <p>c) Location: Modi, Sitia (2nd – extension of the 1st one) Operation: since May 2006 Power: 4,8 MW W/G: 8 x 600 KW Type of W/G: Bonus Energy A/S Cost of investment: 5 million €</p> <p>d) Location: Kalogiros, Heraklion Operation: not yet Power: 3,6 MW W/G: 6 x 600 KW Type of W/G: Siemens Power Generation (ex Bonus) Cost of investment: 4 million €</p> <p style="text-align: center;"><u>Photovoltaic Park in Crete</u></p> <p>a) Location: Sitia Operation: since 2001 Power: 171,6 KW Type of PV panels: BP Solar Cost of investment: 1,27 million €</p> <p><u>Innovative aspects</u></p> <p>Rokas is one of the first private companies investing in wind energy in Crete, and in PV parks for electricity production. Situated in one of the most windy areas of Crete, it has accumulated valuable experience for the operation of wind generators at very high speeds in a complex terrain. One of the</p>

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	<p>first investors for PV parks, accumulating operational experience and scientific results. The above experience assisted the company to expand to other locations in Crete and Greece. The wind parks in Crete is also a “capitalization” of company’s existed experience in metal works.</p> <p><u>Main advantages</u></p> <ul style="list-style-type: none"> – Successful implementation and operation of the wind parks in Crete. – Accumulation of local operational experience and scientific results for the wind parks and PV parks. – Constructive and smooth relations with the local nearby societies. Employment of local scientists and technicians. Cooperation with local development organizations (OAS) and contribution to the “environmental and energy education” programs of local schools and to the development of “local energy tourism”.
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Technology profile	
Company	Municipal Enterprise for Water Supply and Sewage of Heraklion
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Production of Biogas from the Waste Water Treatment Plant (Anaerobic Digestion)
Sector	Bioenergy (Biogas)
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u></p> <p>The waste water treatment plant (1997) – which serves almost 164.000 citizens – comprises anaerobic fermentation plant for the sewage sludge which produces biogas since February 1998.</p> <p>Technical features of anaerobic digestion and biogas production and use:</p> <ol style="list-style-type: none"> a) Volume of tanks: 2 x 1700 m³ b) Temperature: 35°C c) Feedstock: 100 tn / day (first grade) d) Sludge: 98 tn / day e) Total biogas production: 1.041.514 m³ / year f) Volume of biogas in generator for electricity: 275.680 m³ / year g) Generator for electricity production: G 3406 Caterpillar h) Production of electricity: 413.523 KWh / year i) Volume of biogas in boiler for heating: 88.980 m³ / year j) Volume of biogas in torch (loss): 676.780 m³ / year <p>Biogas is used for:</p>

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	<p>a) production of electricity (covering part of the needs for unit's electricity \approx 10%)</p> <p>b) space heating (for a building of 100 m²) by the rejected heat of the biogas to electricity regenerator (cogeneration)</p> <p>c) heating of the anaerobic fermentor (35°C)</p> <p><u>Innovative aspects</u> One of the few anaerobic systems in Greece, operating for such a long time. Combination of anaerobic digestion to cogeneration of electricity (for the buildings) and heat (space heating of office premises). Valuable operational experience in anaerobic digestion and cogeneration – adaptation to the local conditions (temperature, nature of substrate, engineering etc.).</p> <p><u>Main advantages</u></p> <ul style="list-style-type: none"> – One of the first anaerobic digestion plants in Greece and Crete. – Robust and continuous operation for many years. – Successful implementation – adaptation to the local conditions (open innovation). – Exchange of experience with similar organisations for the specific technology. <p>Contribution to the environmental education projects of the local schools.</p>
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Technology profile	
Company	A & M Humerianos (Alexandros & Miltos Humerianos)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Manufacture of Biomass Burners – Boilers for Heating
Sector	Bioenergy (Biomass)
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u> A & M Humerianos designs and manufactures specific biomass burners – boilers for heating. Their main applications are in:</p> <ul style="list-style-type: none"> a) houses b) hotels c) greenhouses d) factories – olive mills e) cheese dairy units f) bakeries g) country houses <p>Feedstock:</p> <ul style="list-style-type: none"> a) these biomass burners – boilers use mainly the olive kernel produced as by-product by the extraction of olive oil from olives b) they can also use waste woods, pellets, coal, fruits

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	<p>kernel etc.</p> <p>c) alternatively they can be easily transformed to use LPG, natural gas and diesel</p> <p>The biomass boilers are made for various capacities ranging from 60.000 kcal to 1000.000 kcal.</p> <p>The cost of heating with biomass burners boilers is over than 50% lower than the cost of heating with diesel.</p> <p>The company implements:</p> <ol style="list-style-type: none"> a) adaptation of the technology to the local conditions (open innovation) b) specific adaptation of the technology for each application and client (flexible installation) <p>A & M Houmerianos has also produced the traditional oven "ALEXANDROS". ALEXANDROS is a wood burning oven. It takes the advantage of an indirect heating system to deliver healthy and continuous baking, without releasing fumes and toxic gases in the baking chamber and the environment. It is highly fuel efficient. Warming up the oven requires 3 – 4 kg of oven rakes and the maximal baking temperature is achieved in approximately 25 minutes.</p> <p><u>Innovative aspects</u></p> <p>A specific and dedicated company for the manufacturing of local systems for the energy valorisation of local biomass (olive husks) with long time experience. Specific adapted biomass burning system (olive husks) which is widely used in Crete. Many different implementations (hotels, greenhouses, houses, industry etc.). Sound financial success of the system. Many years of manufacturing and maintenance experience. Continuation nowadays with a younger owner – manufacturer.</p> <p><u>Main advantages</u></p> <ul style="list-style-type: none"> – Development of local technology for energy valorisation of an abundant local energy source (olive husks) – Many implementations in Crete in different sectors: industry (olive mills), greenhouses, houses, hotels etc. – "Exports" to the rest of olive producing areas of Greece, to Cyprus and to other Mediterranean countries <p>"Open – innovation" scheme strongly adapted to the local needs and valorisation of a local renewable energy source (agricultural biomass)</p>
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Technology profile	
Company	Moevenpick Resort & Thalasso Crete (Ex Candia Maris)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Solar Thermal and Shallow Geothermal System in Hotel
Sector	Solar Energy - Solar Thermal

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Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:

- Special features
- Innovative aspects
- Main advantages

Special features

“Moevenpick Resort & Thalasso Crete” has 285 rooms and suites as well as 6 separate Bungalow buildings holding 59 rooms and suite units.

The hotel combines the operation of a solar thermal system and a sea geothermal system. These systems are used for:

- a) Space Heating
- b) Air conditioning – Cooling
- c) Hot water for use
- d) Hot water for swimming pools, spa etc.

The solar thermal system consists of 1.980 m² of solar panels. Additionally, there is in operation a complete Building Management System (BMS) and a Desalination Unit.

The geothermal system consists water drillings, buffer tanks, boilers and geothermal heat pumps.

80 – 85 % of thermal demand is covered by the use of solar thermal and shallow geothermal systems.

The installation of BMS saves maintenance costs and allows time programming and temperature control. It saves 30 – 35 % of energy.

Solar energy use is ameliorated implementing the maximum storage of solar energy.


The company has used well known R.E.S. technologies but it has taken into account the local conditions (open innovation) as well as the specific needs of the hotel.

Innovative aspects

A very good example (demonstration project) of integration of many innovative and new energy technologies in a hotel sector (big solar thermal field for heating purposes, geothermal system using sea water, desalination of sea water, energy saving technologies – building management system). Integrative design of different energy technologies (high added value), visible “energy innovation”, sound financial performance. Concrete and visible case of a “green hotel”, an “example” for local citizens, hoteliers but also for tourists.


Main advantages

- Demonstration project of combined new and innovative energy technologies
- Sound financial programme of the energy innovative technologies
- Accumulation of specific experience on innovative energy – hotel systems
- Training of high qualified technicians on innovative technologies
- The innovative energy technologies are the vital and bigger part of the green and ecological identity and image of the hotel
- The innovative energy technologies is part of the management and promotion tourist policy of the hotel

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	<p>and of the hotel branch</p> <ul style="list-style-type: none"> - “Open – innovation” example with very strong and important integrative design and operation model and added value <p>Cooperation for environmental and energy education of local schools and technological institutes</p>
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Technology profile	
Company	Terra Maris
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Solar Thermal and Shallow Geothermal System in Hotel
Sector	Solar Energy (Solar Thermal) - Geothermy (Shallow)
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u></p> <p>Terra Maris is a luxury hotel in Hersonissos Crete which has a total of 141 rooms and suites.</p> <p>The hotel combines the operation of a solar thermal system and a sea geothermal system. These systems are used for:</p> <ul style="list-style-type: none"> e) Space Heating f) Air conditioning – Cooling g) Hot water for use h) Hot water for swimming pools, spa etc. <p>The solar thermal system consists of 1.100 m² of solar panels. Additionally, there is in operation a complete Building Management System (BMS) and a Desalination Unit.</p> <p>The geothermal system consists water drillings, buffer tanks, boilers and geothermal heat pumps.</p> <p>80 – 85 % of thermal demand is covered by the use of solar thermal and shallow geothermal systems.</p> <p>The installation of BMS saves maintenance costs and allows time programming and temperature control. It saves 30 – 35 % of energy.</p> <p>Solar energy use is ameliorated implementing the maximum storage of solar energy.</p> <p>The company has used well known R.E.S. technologies but it has taken into account the local conditions (open innovation) as well as the specific needs of the hotel.</p> <p><u>Innovative aspects</u></p> <p>Terra Maris belongs to a hotel chain owned by a Cretan hotelier who very early implemented innovative energy and environmental technologies and behaviour to his hotels. The solar panel is one of the biggest in the hotel sector. The combination also of two renewable energy technologies (solar and geothermal) with energy saving measures is a good live example for hotel visitors and tourists. These sustainable</p>

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	<p>technologies are also used as “green management” tools.</p> <p><u>Main advantages</u></p> <ul style="list-style-type: none"> – Important energy savings and energy costs are achieved by these innovative energy technologies – Important implementation and operation experience is gained – Technicians are becoming highly skilled <p>Tourists are realizing the contribution to the renewable energy sources, to the energy consumption and to the protection of the environment in a high concentration tourist area</p>
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Technology profile	
Company	AGGELAKIS (S.A.)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Operation of Photovoltaic Park
Sector	Solar Energy (Photovoltaics)
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u></p> <p>Aggelakis S.A. is in business of cutting, packing and distributing of meat. The company operates as a wholesale dealer of meat to the butchers’ shops, supermarkets etc.</p> <p>Aggelakis S.A. has installed a big Photovoltaic Park within the company area – “Self Producer”.</p> <p>The PV park provides the company with electricity covering part of the total needs for electricity.</p> <p>The surplus of the produced electricity is sold to the Public Power Corporation.</p> <p style="text-align: center;"><u>Features of Photovoltaic Park</u></p> <p style="text-align: center;">Location: Mesa Karteros, Heraklion Operation: since 2001 Power: 135 KW Panels: 1800 x 75 W Dimension of panels: 1,21m x 0,526m Total surface of panels: 1146 m² Type of PV panels: AP7105 AstroPower Inverter: 50 x 2,5 KW SMA (Sunny Boy) Cost of Investment: 1.110.785 € Subsidy: 70% Yearly production: 140.000 KWh / year</p> <p><u>Innovative aspects</u></p> <p>Aggelakis S.A. is a good example of use of Photovoltaics by a food industry. It is one of the first implementations of PV technology to industry in Crete. At the time of construction it was a real demonstration plan. This contributed to familiarize the Cretan industrialists to the new energy technologies and</p>

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	<p>convince them to do something similar. Operational experience in local conditions is also an innovative aspect. It achieved high co-financing rate by the State.</p> <p><u>Main advantages</u></p> <ul style="list-style-type: none"> - Familiarization of Cretan industry to PV technology - “Show case project” in small food industry for Greece and Crete - Important profit by the actual feed-in-tariff procedure (selling PV KWh to the grid) - The investor prepares new PV investments in Crete
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Technology profile	
Company	ATRION Hotel
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Heating from Biomass in Hotel
Sector	Bioenergy (biomass)
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u></p> <p>ATRION Hotel is a modern – minimal style – hotel and it has 60 rooms and suites. It was fully renovated in 2004 and it has a new conference center and business facilities. ATRION hotel uses two Biomass Boilers, producing hot water. The biomass boilers burn olive husks. Olive husk is a local biomass product and these boilers are totally adapted to this feedstock. The biomass boilers are used all year round and the hotel has no other system for central heating or for production of hot water. They have integrated this biomass system from the initial construction of the hotel (1984) and they have renewed and upgraded the biomass system during the 2004 renovation. The technology has been adapted to the local needs of the hotel. Hot water produced by the boilers is used for:</p> <ol style="list-style-type: none"> a) space heating b) showers c) kitchen d) laundry <p><u>Technical Features</u></p> <p>Feedstock: Olive husks Volume of feedstock: 100 tn / year Cost of feedstock: 6.000 € / year (2008) Saving: 70 – 75 % reduction of cost comparing with diesel Ashes: 2 times / month cleaning of the ashes which are used as manure (natural fertilization) Funnel: installation of smoke collection system / cleaning 3 – 4 times per year</p>


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	<p><u>Innovative aspects</u></p> <p>ATRION hotel is a good example of personal engagement in new energy technologies in a very central urban hotel. Many years now it uses local agricultural biomass (olive husks) for all the thermal needs. The system is used all year round, many years now, and it has been upgraded during the recent refurbishment of the hotel. All the initial conception of installation as well as the operation has been adapted to the local conditions. The biomass burned is provided by the specified local manufacturer HOUMERIANOS S.A. (see before) who assures also the maintenance. This luxury hotel proves that is perfectly compatible the high level of the services offered with the energy sustainable and energy innovated operation.</p> <p><u>Main advantages</u></p> <ul style="list-style-type: none"> - A perfect “show case” in hotel sector of many years energy innovation in a luxury urban hotel, using a difficult renewable local energy source: agricultural biomass (olive husks) - Energy saving and very important energy cost saving (thermal uses) - Perfect combination of high level hotel services with a renewable energy use - Very good vertical integration and combination of a local manufacturer (biomass boilers and burners) with a local user (ATRION hotel) - Cooperation with environmental – energy education projects of local schools
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Technology profile	
Company	Kipriotakis Solar Systems
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Manufacture of Hot Water Solar Systems and Pellet Stoves
Sector	Solar Energy (Solar Thermal) - Bioenergy (biomass)
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u></p> <p>KIPRIOTAKIS Solar Systems designs and manufactures:</p> <ol style="list-style-type: none"> a) Hot Water Solar Systems b) Pellet Stoves <p>It is an innovative company which adapted the relevant technologies designing and manufacturing products ideal for the regional conditions.</p> <p><u>Technical features of Hot Water Solar Systems</u></p> <p>Types of solar water heaters:</p>


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	<p>a) Opened Circuit b) Closed Circuit Guarantee: 10 years Surface of solar panels: a) 1,75 m² b) 2,30 m² c) 2,75 m² Tank capacity: a) 120 lt b) 160 lt c) 200 lt d) 300 lt Collectors: a) Aluminum frame b) Security crystal c) Water skeleton from copper pipes d) Collector surface is from copper plates of perfect contact achieved by welding e) Insulation of rock fiber f) Base of support is by formed galvanized 2mm without welding</p> <p><u>Technical features of Pellet Stoves</u></p> <p>Feedstock: pellets 6mm Tank capacity: 25 Kg Consumption: 0,70 – 2 Kg / h Max power rate: 11KW – 9.500 Kcal Min power rate: 5 KW – 4.300 Kcal Heat yield: 79% Autonomy at min range: 24 h ca. Autonomy at max range: 8 h ca. Dimension: 60cm x 54 cm (x 94 cm) Weight : 110 Kg</p> <p><u>Innovative aspects</u> Local solar systems manufacturing is a very important economic activity (new companies, new jobs) as well as an innovative industrial branch in the renewable energy sector. “Kipriotakis Solar Systems” manufactures the copper boilers and assembles the solar thermal collectors (normal and selective surface). It has certification for its products and it wishes to be fully certified for having bigger sales in the local, national and Mediterranean market. It participates to the National Association of Manufacturers of Solar Markets, as well as, to trade fairs and exhibitions. It has cooperated also with National Research Bodies (DEMOCRITUS) and it wished to expand its activities to the pellet’s stoves (biomass).</p> <p><u>Main advantages</u> – Local manufacturing expertise in solar thermal systems which are widely used in Greece and Crete</p>
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	<ul style="list-style-type: none"> - Open to standardization and to certification procedures for the solar thermal systems - Open to energy innovation by collaborating with research bodies <p>Open to technological evolution because of the younger generation of manufacturers</p>
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Technology profile	
Company	OLYMPIC SUN
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Manufacture of Hot Water Solar Systems and Market of PV and Wind Energy Systems
Sector	Solar Energy - Wind Energy
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u></p> <p>OLYMPIC SUN has dealing with alternative energies since 1978. It specialises in the assembly of solar, thermal, photovoltaic and wind energy systems. Their main manufacturing activity is the solar thermal systems.</p> <p>Olympic Sun manufactures:</p> <ol style="list-style-type: none"> a) Solar hot water systems (open and closed loop) b) Solar systems for swimming pools <p>Hot water storage tanks are manufactured completely from copper and inox:</p> <ol style="list-style-type: none"> a) Single wall tanks (DIN 4802) b) Double wall tanks (DIN 4804) c) Vertical tanks (DIN 4810) <p><u>Collectors:</u></p> <p>Absorber plate: copper fins ultrasonically welded to copper risers provide excellent heat transfer between the fins and risers. Absorbability = 0.95 Emissivity = 0.12</p> <p>Tubing grid: 10 mm copper risers brazed to 22 mm manifolds with an optimal flow distribution</p> <p>Solar glass glazing: 4 mm tempered low iron oxide content (0.03%) glass with solar transmittance of 91% with rubber support to ensure insulation and shock resistance</p> <p>Insulation: Fibber glass insulation 50 mm thickness</p> <p>Frame: Collector frame 0.5 mm and additionally coated with special electrostatic aluminum powder for maximum absorbency</p> <p>Olympic Sun markets also:</p> <ol style="list-style-type: none"> a) Mono and polycrystalline solar photovoltaic modules for electricity between 10 and 80 Watts b) Accessories for Photovoltaic systems c) Wind generators for electricity between 300 and 800 KW, for power, pumping, solar/wind systems

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	<p>Olympic Sun provides solar energy studies for Buildings and Hotels.</p> <p><u>Innovative aspects</u> Olympic Sun is a dynamic company of the western part of Crete, open to “innovation” and to the new uses of solar thermal systems. Having an important part of the market of the western Crete, it wishes to ameliorate its products. It participates to local fairs and exhibitions and wishes to expand its activities to the rest of Greece and to the Mediterranean (Italy, North Africa). It has scientific collaboration with the Technical University of Crete and its owner is a young engineer “open” to new ideas.</p> <p><u>Main advantages</u></p> <ul style="list-style-type: none"> – Important part of the market of the solar thermal systems of the Western Crete – Open to the energy innovation – young entrepreneur / manufacturer – Wishing to expand to the Mediterranean <p>Scientific collaboration and educational energy – environment activities</p>
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Technology profile	
Company	HELIOETHERMA KYPROS – K. MAVROMATIS
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Manufacture of Hot Water Solar Systems
Sector	Solar Energy
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p><u>Special features</u> HELIOETHERMA KYPROS – K. MAVROMATIS has been manufacturing solar energy systems for 35 years (first manufacturing company in Crete). It specialises in the production of hot water solar systems implementing also specific studies of solar systems for big hotels, having great part of Cretan market.</p> <p>HELIOETHERMA KYPROS – K. MAVROMATIS:</p> <ol style="list-style-type: none"> a) Manufactures and markets hot water solar systems for households b) Manufactures and markets solar systems for big hotels – implementing also specific studies according to the needs and the local conditions: <ul style="list-style-type: none"> – Grand Hotel – Vasia Beach – Blue Sea – Mistral Mare <p>etc.</p>


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	<p>c) Provides a ten-year guarantee</p> <p>d) Adapt the technology to the specific needs of each client</p> <p>e) Employs expertise and experienced personnel</p> <p>f) Install solar energy systems taking into account the aesthetics and the local landscape</p> <p>g) Achieved a great market in Crete ≈ 30.000 clients so far</p> <p><u>Innovative aspects</u> HELIOTHERMA KYPROS – K. MAVROMATIS is the first company of solar thermal manufacturers in Crete and the older one. Also today is the biggest one having a lot of manufacturing installation and operation experience. It manufactures also solar thermal systems for hotels. Although not very “open” to scientific innovation it has a high commercial success in the local market, “assimilating” properly and adapting rightly the specific technology.</p> <p><u>Main advantages</u></p> <ul style="list-style-type: none"> – Many years of experience – Successful “assimilation” of the technology – Highly skilled personnel – Technical innovation implemented – Very high commercial success <p>Potential of further development if “opened” to scientific innovation</p>
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3.4.2 Private research

In the following, strong research activities accomplished by private players are presented.


Research profile	
Company	Corissia Group Hotels (S.A.)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Shallow Geothermal System in Hotel
Sector	Geothermy (Shallow)
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? 	“Corissia Group Hotels”, as a big user, has already an innovation policy by implementing a technology which is at its first steps in Greece – Crete. The consulting company has adapted the system to the local conditions and to the hotel’s requirements and resolves the subsequent problems.

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<ul style="list-style-type: none"> ▪ What is it aimed for? ▪ What are the main advantages? 	
Special features	
Innovative aspects	


Research profile	
Company	Mechatron (S.A.)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Eyesight and Piloting – Driver’s Attention Warning System
Sector	
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Mechatron participated in the consortium of the European project Eyesight and Piloting.</p> <p>Mechatron implemented the project in Crete in cooperation with the University of Crete and specifically the Laboratory of Eye’s Transplantation and Microsurgery.</p> <p>The project aims to develop a specific module in order to give a solution for the most typical causes of car accidents:</p> <ol style="list-style-type: none"> a) drowsy b) distracted driving c) inattention to the steering wheel
Special features	Funding: The project was co-funded by the European Commission (50%). The other 50% was covered by own sources. Project period: October 2006 – September 2008
Innovative aspects	The outcome of the project is the design and pilot manufacture of a driver’s attention warning system taking into account the local requirements and conditions as well as the behaviour of the locals. This module will be very important also for professional drivers (busses, trucks etc.).

Research profile	
Company	C. ROKAS SA
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Installer – Constructor and Operator
Title	Cluster Pilot Project for the Integration of RES into European Energy Sectors using Hydrogen – RES2H2
Sector	Wind Energy and Hydrogen Technologies
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:	<p>C. ROKAS S.A. participated in the consortium of the European project RES2H2.</p> <p>The coordinator of the project was the Centre for Renewable Energy Sources (CRES).</p> <p>The objective of this Project is the clean production of</p>

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<ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	hydrogen while exploiting a renewable energy source, such as wind power, to overcome, on the one hand, the problem of storing surplus energy (so frequent with renewable energy sources) and, on the other hand, the production of clean hydrogen that effectively meets the demands of an energy vector that is compatible with sustainable development.
Special features	<p>Funding: The project supported by the European Commission under the 5th Framework Programme within the Energy, Environment and Sustainable Development (50% co-funding). The other 50% was covered by own sources.</p> <p>Project period: 2001 – 2006 (5 years)</p> <p>Total Project Value (€): 5.400.000 €</p>
Innovative aspects	The innovation of this project is the design, install and study of two systems which will combine wind energy with hydrogen technologies. C. ROKAS S.A. participated in the design, install and operation of the system in order to achieve the pilot production of hydrogen from wind energy.


Research profile	
Company	Municipal Enterprise for Water Supply and Sewage of Heraklion
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	End-user
Title	Sludge Exploitation of the Municipal Enterprise for Water Supply and Sewage of Heraklion for the production of compost
Sector	Biomass
<p>Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>The Municipal Enterprise for Water Supply and Sewage of Heraklion participated in the programme PAVE in order to implement a project for exploiting the sludge of the waste treatment plant.</p> <p>The Technological Educational Institute of Crete participated in the project as a scientific and research partner.</p> <p>The aim of the project was the exploitation of the sludge for producing specific compost to be used as a bio-fertilizer.</p>
Special features	<p>Funding: The project was implemented under the “Industrial Research Development Programme (PAVE)” of the Operational Programme for Research and Technology (48,7% co-funding). The other 51,3% was covered by own sources.</p> <p>Project period: 1999 – 2000 (18 months)</p> <p>Total Project Value (€): 191.000 €</p>
Innovative aspects	The outcome of this project is the production of compost (bio-fertilizer) and the development of a bio-filter system. Taking into account that agriculture is very important for the Cretan economy, the production of compost contributes to:

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	<p>a) Use of compost instead of chemical fertilizers b) Reduction of imports in fertilizers c) Reduction of the environmental damages from chemical fertilizers</p> <p>Reduction of health problems due to the chemical fertilizers from the chain of agriculture – chemical fertilizers – food – people.</p>
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Research profile	
Company	A & M Houmerianos (Alexandros & Miltos Houmerianos)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Manufacture of Biomass Burners – Boilers for Heating
Sector	Bioenergy (Biomass)
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>“A & M Houmerianos” has been contacted by local Universities and Technological Institutes for further research, but there are no further concrete results. Five years ago it had a cooperation with the Biomass department of the Centre for Renewable Energy Sources (National Research Organisation for R.E.S. situated in Athens). Their cooperation was mainly for construction pilot installations for energy exploitation of agricultural biomass (island of Naxos etc.). Their role was as subcontractor for construction and technical advisor for innovative installations.</p>
Special features	
Innovative aspects	


Research profile	
Company	Moevenpick Resort & Thalasso Crete (Ex Candia Maris)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Solar Thermal and Shallow Geothermal System in Hotel
Sector	Solar Energy - Solar Thermal
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? 	<p>“Moevenpick Resort & Thalasso Crete” is a big and very innovative end user of several R.E.S. technologies in the hotel sector. They have good and continuous cooperation with their scientific and technical consultants and it is a successful example of “open innovation” in combining various R.E.S. technologies.</p>

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<ul style="list-style-type: none"> ▪ What is it aimed for? ▪ What are the main advantages? 	
Special features	
Innovative aspects	


Research profile	
Company	Terra Maris
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Solar Thermal and Shallow Geothermal System in Hotel
Sector	Solar Energy (Solar Thermal) - Geothermy (Shallow)
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>“Terra Maris” is part of a bigger group, “TEAV”, which has integrated many innovative R.E.S. installations in its hotels of its premises. As a partner of this project INRES (CANDIA hotel) is open to “open innovation” or to apply research actions, starting developing cooperation with Technical Universities, Technological Institutes etc.</p>
Special features	
Innovative aspects	

Research profile	
Company	AGGELAKIS (S.A.)
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Operation of Photovoltaic Park
Sector	Solar Energy (Photovoltaics)
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>“Aggelakis S.A.” was the first SME in Crete installing a big PV park. It has been visited by students who are involved in R.E.S. research projects.</p>

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Special features	
Innovative aspects	

Research profile	
Company	ATRION Hotel
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	End-user
Title	Upgrade the System of Heating from Biomass and Assess the Performance of the Boiler
Sector	Bioenergy (Biomass)
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>ATRION hotel has integrated the biomass system for heating since the initial construction of the hotel (1984). They decided to upgrade and assess the new system of biomass during the 2004 renovation. They cooperated with the company "A & M Houmerianos" and the "Centre for Renewable Energy Sources - CRES". A & M Houmerianos provided and installed the new biomass system and CRES took over the assessment of the system. In order to assess the performance of the boiler, a heat meter has been installed on the closed serpentine circuit, which was able to measure flow rates up to 12 m³/h. Besides the flow rate, the water inlet and outlet has been also measured and it has displayed directly the heat that is provided to the water tank by the hot water of the serpentine. The heat reading has been recorded every day. The Centre of Renewable Energy Sources has installed for two years monitoring systems for monitoring and evaluation of the biomass combustion system.</p>
Special features	<p>Funding: The whole budget of the project was covered by own sources (ATRION). Project period: 2003 - 2004 (8 months)</p>
Innovative aspects	<p>The new biomass system provided an extent exploitation of hot water for more uses compared to the old one. The upgraded biomass system adapted to the new requirements of the hotel (2004) and produced hot water for:</p> <ul style="list-style-type: none"> e) space heating f) showers g) kitchen h) laundry <p>The owners of the hotel consider the results as very successful. The operational technological results have been assessed by the Centre of Renewable Energy Sources.</p>

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Research profile	
Company	Kipriotakis Solar Systems
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Manufacture of Hot Water Solar Systems and Pellet Stoves
Sector	Solar Energy (Solar Thermal) - Bioenergy (biomass)
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	“KIPRIOTAKIS Solar Systems” has cooperated with the National Center “DEMOCRITUS”, five years ago, for ameliorating the quality standards of the produced systems. This cooperation continues even today seeking funding by the Greek Operational Programme for Competitiveness (Energy).
Special features	
Innovative aspects	

Research profile	
Company	OLYMPIC SUN
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Manufacture of Hot Water Solar Systems and Market of PV and Wind Energy Systems
Sector	Solar Energy - Wind Energy
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	“OLYMPIC SUN” is a dynamic company which cooperates with the Technological Educational Institute of Crete, the Technical University of Crete and the Regional Energy Agency of Crete. It investigates the possibility to collaborate in research projects.
Special features	
Innovative aspects	

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Research profile	
Company	HELIOOTHERMA KYPROS – K. MAVROMATIS
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	
Title	Manufacture of Hot Water Solar Systems
Sector	Solar Energy
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	“HELIOOTHERMA KYPROS – K. MAVROMATIS”, despite the fact that it is the oldest solar systems manufacturing company in Crete having great technical and implementation experience, it is not oriented to research activities.
Special features	
Innovative aspects	


3.4.3. International cooperation

“**Corissia Group Hotels**” cooperates with the company “Aid Engineering”. “Aid Engineering” is an energy company mostly in the space of productive activity and building installations as well as in Renewable Energy Sources. Their cooperation has started since the installation of the shallow geothermal system for the hotel. They have taken over the yearly maintenance and assessment of the geothermal system.

“**MECHATRON**” cooperated with the “Technological Educational Institute of Crete” in order to ameliorate and adapt the technology of Sun Trackers for Photovoltaics. Since the final form of the company (S.A.) they have commercial cooperation with other companies for the promotion of Sun Trackers. Furthermore they cooperate with specific companies which produce specific parts of the Sun Trackers (subcontractors) in order to be assembled in the central manufacture building of Mechatron.

“**C. ROKAS S.A.**” cooperates with the global company “Iberdrola Renovables” in the field of Wind Energy. ROKAS has a leading position in the field of wind energy at national level and Iberdrola Reneables has a leading position in the field of wind energy at global level. Since 2004, ROKAS is an Iberdrola Renewables company. ROKAS cooperates also with the “Technical University of Crete” and the “Technological Educational Institute of Crete” providing internships for students as well as educational visits at currently operating wind farms.

The “**Municipal Enterprise for Water Supply and Sewage of Heraklion**” cooperates with the “Centre for Renewable Energy Sources (CRES)” providing yearly data for the unit and specifically for the production

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and exploitation of biogas. They keep also close cooperation with the “Regional Energy Agency of Crete”. Educational visits are also implemented from personnel and students of the “Technological Educational Institute of Crete”.

“**A & M Humerianos**” has cooperated with the “Centre for Renewable Energy Sources” and the “Technical University of Crete” in research and development. They have cooperated also with the Regional Energy Agency of Crete in the promotion of Renewable Energy Sources. Furthermore, the company is certified by the “National Institute of Agricultural Development”.

“**Moevenpick Resort & Thalasso Crete**” has cooperated with the energy company “Sol Energy Hellas”. Sol Energy Hellas took over the installation and maintenance of its central solar field and the BMS. The hotel cooperates also with the Regional Energy Agency of Crete implementing technical and educational visits.


“**Terra Maris**” has cooperated with the energy company “Sol Energy Hellas”. Sol Energy Hellas took over the installation and maintenance of its central solar field and the BMS. As a part of the larger group “TEAV”, they are developing international cooperation which will include also R.E.S. innovative technologies as part of the “green hotel” conception and “green” tourist management.

“**Aggelakis S.A.**” has cooperated with the “Centre for Renewable Energy Sources (CRES)” and the “Regulatory Authority for Energy (RAE)”. Many potential investors in photovoltaics have visited the PV Park and have realised meetings with the owner.


“**ATRION Hotel**” has cooperated with the “Centre for Renewable Energy Sources (CRES)” for the assessment of its biomass installation. The hotel cooperates also with the Regional Energy Agency of Crete (REAC) implementing technical and educational visits, and it has been featured in “technology sheets” for biomass energy exploitation edited by CRES or REAC.

“**KIPRIOTAKIS Solar Systems**” keeps cooperation with Certification Bodies in order to certify and ameliorate its products. It has also close cooperation with national scientific – research bodies (e.g. DEMOCRITUS). It participates also to the National Association of Solar Industries (EBHE) and it has participated to business missions in European and Mediterranean countries. It investigates the opportunities to export and to install its systems to other neighboring countries.

“**OLYMPIC SUN**” is certified by the Greek National Institute for solar energy systems “Democritus” according to the ISO 9001:2000. It is certified by the “Hellenic Organization for Standardization ELOT” with the Certification of Solar Keymark (OLSUN 2004 ISO). It has participated in several business missions to European and Mediterranean countries with the Cretan Chamber of Commerce and Industry. It investigates the possibilities for exportation and implementation of its systems to neighbouring countries.

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“HELIOThERMA KYPROS – K. MAVROMATIS” cooperates with big hotels – hotel chains (national and international) providing specific studies for the installation of solar systems taking into account the individual needs and the local conditions.

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3.5. SWOT – Regional Assessment – Industrial Perspective

The following SWOT gives an overview on the core competencies and shortcomings with regard to knowledge production and technology transfer capabilities in the RES sector from industrial perspective.

<p>Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the STRENGTHS, i.e., capabilities to provide comparative advantages in the RES sector in the Region?</p>	<p>Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the WEAKNESSES, i.e., absent resources, activities not carried out in the proper way?</p>
<p>1. Public-Private cooperation / Increasing number of collaboration between research and industry</p> <ul style="list-style-type: none"> ❖ A relatively successful case is on solar thermal industry (research center Democritus) and the Greek Association of Solar thermal Manufacturers (EVIE) ❖ New interest for collaboration for PV trackers. <p>2. Highly skilled personnel</p> <ul style="list-style-type: none"> ❖ For simpler RES technologies (solar thermal etc.) highly skilled personnel is not a decisive advantage. <p>3. Strong financial capacity of RES – industrial actors</p> <ul style="list-style-type: none"> ❖ Comparatively low production costs compared to European level (e.g. solar thermal, biomass, PV metallic bases, PV trackers) ❖ Availability of public financial incentives for support / modernization of production processes. <p>4. Adoption of highly innovative technologies in production processes and facilities</p> <ul style="list-style-type: none"> ❖ Use and adaptation / adoption of already proven technologies (open innovation model) ❖ Possible adaptation / adoption / development of existed technologies (e.g. PV trackers, biomass burners, solar heaters etc). <p>5. Internationalization of companies</p> <ul style="list-style-type: none"> ❖ Possible internationalization at Mediterranean level or/and North Africa ❖ Possibility of international market placement of RES or RUE software packages. 	<p>1. Not enough start – ups</p> <ul style="list-style-type: none"> ❖ Nearly “no culture” of collaboration industry – research for new start – ups ❖ The rapidly developing PV sector creates start – ups ❖ Enough start – ups to big hotel industry (big users). <p>2. Low level of budget for conducting RTD activities in RES sector</p> <ul style="list-style-type: none"> ❖ Nearly no budget for conducting RTD activities ❖ The rapidly developing PV sector provides some budget ❖ Budget availability from big hotel firms (users) mainly to experienced companies for RES and RUE installations. <p>3. Poor linkage between enterprises and research entities (weak understanding between research and industry)</p> <ul style="list-style-type: none"> ❖ No adequate promotion – information of RES/RUE industrial products and research services ❖ Some innovative research – innovative services are integrated to the big hotel industry through highly skilled companies and consultants ❖ A few new PV companies have created some linkages ❖ Mutual “under evaluation” of the possibilities and results of such linkages. <p>4. Low innovation commitment of companies</p> <ul style="list-style-type: none"> ❖ No internal innovation culture ❖ Late adoption of new proven – innovating approaches ❖ Young entrepreneurs or new PV companies are more open to innovation ❖ Big hotels (users) are “sufficiently” committed for innovation. <p>5. No international orientation</p> <ul style="list-style-type: none"> ❖ Some efforts and openings to Mediterranean or North Africa regions ❖ Big hotels are - by nature - open to international trends ❖ Software producers are open to international market.

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Focusing on aspects outside control, where are the OPPORTUNITIES for RES- regional actors, i.e. open up possibilities to capitalise?	Focusing on aspects outside control, where are the THREATS for research organisations, i.e. close off future possibilities?
<p>1. Availability of EU RTD funds for research</p> <ul style="list-style-type: none"> ❖ Theoretical availability of EU Funds but very complicated procedure to really use them ❖ Some EU funds for innovation – passing through national context – could be used, given that the application procedure is more simple ❖ Big hotels (users) are using these funds. <p>2. Surplus of well educated researchers</p> <ul style="list-style-type: none"> ❖ In general there is a surplus of researchers, but there are few specific and appropriate researchers in the region to be used by RES/RUE companies for innovation purposes. <p>3. There are <i>networking possibilities</i> but at the time being the networking possibilities (clusters, technology platforms) are not specified, promoted and supported.</p> <p>4. The specific RES/RUE <i>technology offer</i> by research actors at regional level is developed only for some sectors (e.g. wind energy) but it lacks behind for other sectors.</p> <p>5. There is a certain <i>technology demand</i> of big hotels (users of RES/RUE) or installers/producers (wind farms, PV parks) and for new PV companies (PV trackers). There is not enough advanced technology demand by solar thermal, biomass – to – energy etc.</p>	<p>1. Funding programmes to support research with content far from current research interests</p> <ul style="list-style-type: none"> ❖ Despite the availability of EU funds the RES companies are not informed, they don't trust the procedure and the application is extremely complicated for them ❖ The research co-funded by EU funds, is very advanced or inappropriate for the interests and the size of RES companies. <p>2. Bureaucracy barriers</p> <ul style="list-style-type: none"> ❖ Many bureaucracy barriers (licensing, investments, modernization etc) including innovation ❖ Some efforts for simplification of the application procedure of innovation have been made by the Greek Ministry (Innovation coupons) ❖ Big hotels users surmount more easily the bureaucracy barriers. <p>3. There are <i>incentives</i> for public – private partnerships but they are not used (not well focused, not fairly known etc)</p> <p>4. There is <i>low awareness</i> of regional research capacity by RES/RUE by companies. Inversely the researchers are not aware of the problems / potential of RES/RUE companies</p> <ul style="list-style-type: none"> ❖ Big hotels – through specific consultants – are more aware. <p>5. There is <i>“brain drain”</i> of appropriate researchers to big companies / organizations / Authorities to the mainland and abroad.</p> <p>6. Insularity.</p>

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4. Regional RES- ID Card – Samsø


4.1. Regional RTD and innovation policy framework

Table 3 gives an overview on the legal and political framework of Samsø, regarding in particular the RES sector.

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Table 3 – Overview on RTD and innovation policies – Samsø


RES- related RTD and innovation policies	RTD and innovation programmes/Legislative references/Public incentives/Projects/Others initiatives (help desks, networks, etc.)	Title	Short description	RES sector	Budget spent, Source of funding	Time scale
	Danish Climate and Energy Policy		The Danish energy policy has three focus points: security of supply, climate impact and cost effectiveness.	All	The Danish Energy Agency under the Ministry of Climate and Energy, www.ens.dk	2020
	Danish Climate and Energy Policy	The energy policy agreement from 2008	The goal of the agreement is to lower Denmark's dependence on fossil fuels, coal, oil and gas.	All	Government, www.ens.dk	2008 – 2011
	Danish Climate and Energy Policy	Promotion of Renewable Energy Act	Expanding the use of renewable energy in Denmark is at the core of the Danish energy policy	All	Government, www.ens.dk	2008 -
	Danish Climate and Energy Policy	Security of supply	The recipe for long-term security of supply is to reduce energy consumption through energy savings, increased use of renewables, and closer collaboration in Europe.	All	Government, www.ens.dk	2009 - 2025
	Green Growth		Agriculture as a supplier of green energy	Biogas, energy crops	Danish Ministry of the Environment (www.mim.dk)	2009 - 2015

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4.1.1. Detailed policy analysis


After the first overview on the RTD and innovation scenario in each region, a more exhaustive description for the most important identified policies is illustrated.

NAME OF THE MEASURE	The energy policy agreement from 2008
TIME SCALE	2008 – 2011
BUDGET	<ul style="list-style-type: none"> • <i>Campaigns to promote energy savings in buildings</i>: 20 million DKK shall be allocated annually in 2008-2011 and 5-10 million DKK annually thereafter. This shall be implemented immediately. • <i>Knowledge Centre for energy savings in buildings</i>: Of the 20 million DKK earmarked for promoting energy savings, up to 10 million DKK shall be allocated annually in 2008-2011. • <i>"a green fund" and a guarantee fund</i> of 10 million DKK for supporting financing of local mill guilds' preliminary studies, etc. • <i>Heat pumps for replacing individual oil burners</i>: A pool of 30 million DKK over two years for information campaigns, labelling of efficient pumps, limited sub-sidy schemes, etc. aimed at heat consumers outside of the areas with collective heat supply. This shall be implemented immediately. • <i>Small renewable energy technologies</i>: 25 million DKK per year for four years shall be allocated to small renewable energy technologies such as solar cells and wave power • The PSO research agreement of 2004 shall be extended after 2008 with 130 million DKK per year. • <i>Test scheme for electric vehicles</i>: Test scheme for electric vehicles with an allocation of 10 million DKK annually in 2008-2009 and thereafter 5 million DKK annually in 2010-2012
KEY ACTORS (i.e. funding institution)	The government (Liberals and Conservatives), Social Democrats, Danish People's Party, Socialist People's Party, Social Liberals and New Alliance
RATIONALE (why the initiative has been set up in the region)	The goal of the agreement is to lower Denmark's dependence on fossil fuels, coal, oil and gas.
SECTOR (if possible related to RES)	Energy
TARGET GROUPS	Building owners, wind turbine guilds, homeowners, developers
RATIONALE	
AREA OF INTEREST	
FOCAL POINTS AND SPECIFIC OBJECTIVES	The renewable energy target with respect to gross energy consumption must constitute 20% in 2011
KEY ACTIVITIES	Energy-savings and efficiency Renewable energy Energy taxes New and more efficient energy Technologies Transport
FUNDING INFORMATION	

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EX-POST EVALUATION <i>(main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)</i>	
CONTACT AND REFERENCE DATA	Agreement between the government (Liberals and Conservatives), Social Democrats, Danish People's Party, Socialist People's Party, Social Liberals and New Alliance on Danish energy policy for the years 2008-2011 (www.ens.dk)

NAME OF THE MEASURE	Promotion of Renewable Energy Act
TIME SCALE	2008 -
BUDGET	Legislation, for budgets see "The energy policy agreement from 2008"
KEY ACTORS <i>(i.e. funding institution)</i>	
RATIONALE <i>(why the initiative has been set up in the region)</i>	Expanding the use of renewable energy in Denmark is at the core of the Danish energy policy
SECTOR <i>(if possible related to RES)</i>	Renewable energy
TARGET GROUPS	Building owners, wind turbine guilds, homeowners, developers
RATIONALE	
AREA OF INTEREST	
FOCAL POINTS AND SPECIFIC OBJECTIVES	The government is taking pains to deliver the ambitious goal of a share of 20% renewables in gross energy consumption by 2011 and at least 30% in final energy consumption by 2020, as stipulated in the EU climate and energy package. In addition, there is a binding target of 10% renewable energy in the transport sector by 2020.
KEY ACTIVITIES	Wind power, wave power, bioenergy, nordic energy solutions
FUNDING INFORMATION	
EX-POST EVALUATION <i>(main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)</i>	


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CONTACT AND REFERENCE DATA	Act no 1392 of 27 December 2008 (www.ens.dk)
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NAME OF THE MEASURE	Security of supply
TIME SCALE	2009 - 2025
BUDGET	Policy, budget not available
KEY ACTORS (i.e. funding institution)	
RATIONALE (why the initiative has been set up in the region)	The recipe for long-term security of supply is to reduce energy consumption through energy savings, increased use of renewables, and closer collaboration in Europe.
SECTOR (if possible related to RES)	Energy
TARGET GROUPS	Companies, homeowners, players with European contacts
RATIONALE	
AREA OF INTEREST	
FOCAL POINTS AND SPECIFIC OBJECTIVES	In ten years Denmark is expected to import gas. But the country wishes to be independent of import. After the gas supply conflict between Russia and Ukraine, it has become clear to everybody that political independence and security to a high degree concerns access to reliable energy sources. That is another reason why Denmark has ambitious goals for energy savings and renewable energy.
KEY ACTIVITIES	In 2009, the Government will present a strategy for security of supply. This strategy will be a catalogue of possible, new energy-policy initiatives in the period up to 2025. The initiatives will be discussed along with the recommendations of the Government's Climate Commission to be released in 2010.
FUNDING INFORMATION	
EX-POST EVALUATION (main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)	
CONTACT AND REFERENCE DATA	Energy Policy Report 2009 (www.ens.dk)

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NAME OF THE MEASURE	Green Growth
TIME SCALE	2009 - 2015
BUDGET	13 500 million DKK (1 800 million EUR)
KEY ACTORS <i>(i.e. funding institution)</i>	Government
RATIONALE <i>(why the initiative has been set up in the region)</i>	A high level of environmental, nature, and climate protection hand in hand with a modern and competitive agriculture and food production.
SECTOR <i>(if possible related to RES)</i>	Environment, nature, agriculture, bioenergy
TARGET GROUPS	Farmers, investors, biotech companies
RATIONALE	
AREA OF INTEREST	
FOCAL POINTS AND SPECIFIC OBJECTIVES	<ul style="list-style-type: none"> - an environmental and nature plan Denmark toward 2020 - a strategy for a green agricultural and food production sector
KEY ACTIVITIES	Agriculture as a supplier of green energy
FUNDING INFORMATION	
EX-POST EVALUATION <i>(main outcomes/ indicators available, e.g. number of start-ups, beneficiaries, implemented projects, etc.)</i>	
CONTACT AND REFERENCE DATA	Danish Ministry of the Environment (www.mim.dk)

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4.2. Regional research agenda

4.2.1. Research focus and current research activities

Research projects carried out during the last five years and currently ongoing projects are presented in the following schemes.

Research profile	
Organisation	Samsø Energy Agency, SEA
Title	BIORES
Sector	Biogas
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>BIORES aims to promote technologies for energy production from biogas derived from municipal waste in European islands. Work started in November 2007 and the project has a duration of 30 months.</p> <p>Work focuses on 6 European islands, namely: Samos (Greece), Samsø (Denmark), Sardinia (Italy), Tremiti islands (Italy), Porto Santo (Portugal), and the Outer Hebrides of Scotland.</p> <p>BIORES will promote small-scale decentralised energy production from renewable energy sources. It will also link it with the energy end-use needs of the island communities. In addition, it will promote sustainable waste management.</p>
Special features	The project addresses two important issues faced by islands: energy dependency from the mainland, and waste management.
Innovative aspects	Development of a software system for decision support which includes non-technical barriers.


Research profile	
Organisation	Samsø Energy Agency, SEA
Title	Energy Ambassadors
Sector	Energy savings
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Energy Ambassadors are people already working in local authorities, non-profit organizations, healthcare or social organizations. They will follow trainings to become energy referents within the organizations they work. In a second step they will take care of the energy issues of their usual public (with home visits, phone advice, awareness raising meetings / neighbourhood conferences).</p> <p>Dealing with energy issues and social difficulties we can find solutions for the concerned people to save money and energy, and to gain other benefits as comfort and health</p>

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	improvement, then to improve their social situation. Participants from nine European countries. Original concept is from France.
Special features	Train social workers to find energy savings in households.
Innovative aspects	Combination of energy and social work

Research profile	
Organisation	Samsø Energy Agency, SEA, Samsø Energy Academy, SE, Brdr Stjerne, BS
Title	INRES
Sector	Renewable energy
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>The INRES project will aim to enhance the integration and the cooperation among three European insular regions: Canary Islands (Spain), Crete (Greece), and Samsø (Denmark). The three regions establish a mutual learning process and collaborative relationships.</p> <p>The consortium, formed of 10 partners, targets the development of an inter-regional strategy for innovative measures.</p>
Special features	Exchange of personnel, common workshops and training
Innovative aspects	Exchange of innovations between participating regions

Research profile	
Organisation	Samsø Energy Academy, SE
Title	Cradle to Cradle Islands
Sector	Renewable energy and waste
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>Lifecycle energy projects on islands, especially for waste reduction. The project intends to use the innovative Cradle to Cradle® concept in relation to islands. In the vision of Cradle to Cradle the concept is that waste does not exist anymore: 'waste equals food'. The project aim is to contribute to environmental sustainability and economic profit of the North Sea Region by:</p> <ul style="list-style-type: none"> • Applying Cradle to Cradle to develop energy responsible and sustainable solutions for island environments; • Developing networks of stakeholders to ensure transferability and dissemination of project results on the themes water, energy and materials.

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Special features	Using islands as labs and testing grounds for sustainable innovations;
Innovative aspects	Waste = food

Research profile	
Organisation	Samsø Energy Academy, SE
Title	Renewable Energy Island
Sector	Wind, biomass, geothermal, solar
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	<p>The island of Samsø is 100% self-sufficient with wind-generated electricity. About 70% of island heating needs are met with renewable energy, and the transportation energy consumption is 100% compensated by the electricity production from offshore wind turbines.</p> <p>The Samsø Energy Academy was built in 2006 and opened its doors for visitors in 2007.</p>
Special features	Local ownership
Innovative aspects	100% renewable energy

4.2.2. Available RES technologies

Main technologies/prototypes developed for the RES sector are briefly described.


Technology profile	
Organisation	Samsø Energy Academy, SE, and Samsø Energy Academy, SE
Title	Low energy building
Sector	Buildings
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	<p>The Energy Academy building is built according to principles used in ecological building. It has a healthy indoor environment with natural ventilation in large rooms. The water consumption will be minimized and rainwater is used for flushing toilets. A high level of insulation and energy glazing ensures a low energy consumption and the Academy is connected to the local straw-fired district heating plant. Low energy electrical appliances and lighting are used throughout the building.</p> <p>Windows in the building are designed to maximize heat influx in the winter time. Solar cells on the roof supply the building with electricity.</p>
Special features	Automatic control of windows to provide natural ventilation
Innovative aspects	Assembled from modules built in a local carpenter's Workshops

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Main advantages of the technology (main economic advantages/benefits)	Energy savings, good indoor environment
Current stage of development ¹	Finished 2007. Available for demonstration – field tested
Intellectual Property Rights ²	


Technology profile	
Organisation	Samsø Energy Academy, SE
Title	District heating
Sector	Biomass
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	<p>District heating has been a considerable way of distributing heat in larger cities in Denmark since the middle of the 20th century. Present larger schemes are normally based on co-generation, but district heating has spread to small schemes. District heating therefore plays a natural part in the energy planning on Samsøe.</p> <p>From the beginning of the renewable energy project in 1997 seventeen villages were planned to be included in district heating schemes. Tranebjerg, the main town of the island, has had district heating based on straw since 1993.</p> <p>Years of planning and co-operation with citizen groups has resulted in four district heating plants covering six villages.</p>
Special features	Three straw fired, one wood chip fired + a solar panel field. Different kinds of ownership.
Innovative aspects	The fuel is local.
Main advantages of the technology (main economic advantages/benefits)	Fewer losses, cheaper energy, less CO ₂ .
Current stage of development ¹	Finished 2007. Available for demonstration – field tested
Intellectual Property Rights ²	

Technology profile	
Organisation	Samsø Energy Academy, SE
Title	Individual heating of households
Sector	Biomass, solar, geothermal
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? 	<p>The energy organisations on Samsø have worked closely together with local plumbers and blacksmith firms in establishing individual renewable energy systems in the rural areas. Installations since 1998 roughly comprise: 100 solar heating systems, 120 burners based on biomass, 35 heat pump systems.</p> <p>Roughly 15% of the residences in the rural areas are now</p>

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<ul style="list-style-type: none"> ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	supplied entirely from renewable energy sources. In addition to residences 100% renewable energy supplied, a considerable number of these residents complement their energy consumption with solar heating. Also wood burning stoves give an important contribution to the conventional heating.
Special features	Citizen involvement
Innovative aspects	Brdr Stjerne have developed a special buffer tank
Main advantages of the technology (main economic advantages/benefits)	Energy savings
Current stage of development ¹	Available for demonstration – field tested
Intellectual Property Rights ²	

Technology profile	
Organisation	Samsø Energy Agency, SEA
Title	Hydrogen plant
Sector	Hydrogen
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What is being offered? ▪ What can it be used for? ▪ What are the main advantages? 	<p>An electrolysis plant beside the Energy Academy building is now a reality. The plant produces hydrogen based on electricity from the wind turbines on Samsø, and a hydrogen truck is now running on <i>clean green</i> hydrogen. Next step is hopefully more vehicles on the Island running on hydrogen.</p> <p>It is already planned that the energy supply for the future dwellings next to the Energy Academy shall be based on hydrogen. The houses, planned as passive houses, are being equipped with CHP units (Combined Heat and Power) for electricity and heating.</p>
Special features	Pressurized hydrogen gas from water with a catalyst
Innovative aspects	Hydrogen from wind turbine electricity
Main advantages of the technology (main economic advantages/benefits)	Clean, acts as an energy storage
Current stage of development ¹	Available for demonstration – field tested
Intellectual Property Rights ²	


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4.2.3. International research cooperation

The Samsø Energy Agency participates in a joint venture with the University of the Aegean, Chios island, Greece. The general topics are 'green islands, green economy'. The work consists in SEA teaching Greek students in a course once per year, possibly followed by a visit by the Greeks to Samsø. In addition SEA supplies know-how with the aim of establishing an 'energy academy' in an island in the Aegean Sea.

The Samsø Energy Academy helps the Samsø Municipality implement energy savings in all municipal buildings.


The Samsø Energy Academy and the Samsø Energy Agency have a network of university contacts which result in Master's projects and other student projects carried out at Samsø. For example a cost-benefit analysis of a district heating plant, a social-sciences study of local ownership and social acceptance of energy installations, an analysis of 100% renewable regions in Europe, an analysis of large-scale wind power in Denmark, and theses concerning the applications of hydrogen. Electronic documents are collected in a library (<http://seacourse.dk/wiki/Library>).

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4.3. SWOT – Regional assessment – Research Perspective

In the following the regional research perspective is illustrated by means of a SWOT analysis. The main core competencies and shortcomings with regard to knowledge production and technology transfer capabilities in the RES sector in the region are highlighted.

Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the STRENGTHS , i.e., capabilities to provide comparative advantages in the RES sector in the Region?	Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the WEAKNESSES , i.e., absent resources, activities not carried out in the proper way?
<ul style="list-style-type: none"> - Public-private cooperation / Increasing number of collaboration between research and industry - International cooperation activities - Strong adoption of innovative RES technologies ('off the shelf' technologies reducing research costs) - Large collaboration network 	<ul style="list-style-type: none"> - No public financial resources budget for conducting RTD activities in the RES sector (all activities are funded in a project-by-project manner with a contract with tight objectives within the organization) - Inadequate research base due to specific local framework conditions/ island characteristics - No big interest from employees' side to remain in the organisation on a long term basis - Funding is on a project-by-project basis, it is not possible for the organization to make long term plans
Focusing on aspects outside control, where are the OPPORTUNITIES for RES- regional actors, i.e. open up possibilities to capitalise?	Focusing on aspects outside control, where are the THREATS for research organisations, i.e. close off future possibilities?
<ul style="list-style-type: none"> - Availability of RTD funds for research at EU level - Access to well-educated researchers in several universities outside the island - Overwhelming interest from international media - The island has a manageable size, and there are organizations for farmers and businesses - Strong interest and involvement in the RES sector from citizens' side 	<ul style="list-style-type: none"> - Some funding programmes require large scale participation (for example smart grids), and Samsø is only a small island - EU Bureaucracy is a heavy load on a small organization like the Samsø Energy Academy - Large sensitivity to small financial changes, our economy is not robust - Very few jobs on the island/ Island depopulation - Diminished national focus on research activities for the RES sector during the last years

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4.4. Industrial RES performance

In the following sections the industrial community is taken under investigation. A questionnaire has been used as supporting tool for being able to respond to the following sections as appropriate and thoroughly as possible.


4.4.1. Distributed and Adopted RES technologies

Main distributed and adopted technologies in the regions are shown in the following schemes.

Technology profile	
Company	Vølund, Danfoss
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Heating pumps
Sector	Energy efficiency
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	Heating pumps improve the efficiency of electricity for heating purposes. Use of heating pumps is an efficient way to warm households that live outside urban areas in well-insulated buildings. Heating pumps can be used in combination with geothermal energy. Up to 50 households on Samsø use heating pumps for warming. The amount of the heating pumps on the island is rapidly growing.

Technology profile	
Company	BATEC
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Solar heating
Sector	Solar
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	Solar panels are used for both heating and hot-water supply. A typical solar panel application in Denmark can cover the demand for hot-water all year around. The efficiency of solar energy can be improved substantially by use of efficient boilers, storage tanks and flow-controls. Samsø is being involved in optimizing technology in the fields of storage-tanks and flow-controls.


Technology profile	
Company	Bagers Tømrer, Besser Tømrer, Tranebjerg Tømrer, Hårdmark Tømrer
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Installers

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distributor, installer, end-user, etc.)	
Title	Passive housing
Sector	Insulation
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p>One third of the energy-production in Denmark is used for heating. The large demand for heating makes it an important focus issue for the RES-sector. Besides focusing on renewable heating resources, insulation has a large potential for decreasing energy consumption. Passive housing focuses not only on insulation, but mainly on the use of membranes to decrease loss of energy from houses. Newest technologies make it possible for buildings to supply the demand for heating without adding energy from other energy sources than solar energy. Samsø is about to adopt a standard for energy consumption in new buildings, which is stricter than in the rest of the country. The implementation of these new regulations requires special skills of the craftsmen and special equipment for measuring air leaks ('blower door' machines).</p>

Technology profile	
Company	Vølund, Passat, HWAM
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturers
Title	Stoves
Sector	Bio-energy
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	<p>This branch of RES is based on the ancient technology of burning wood for heating. Advantages of the use of the energy type are economic, especially as quite a lot of Danes in the country own woods in different sizes. By combining the ancient wood-burning technology with modern knowledge of air-circulation stoves can become an efficient technology for heating. Modern stoves can be connected to a water-based heating-system. In this way the stove contributes to the entire heating-system of a building.</p>

Technology profile	
Company	Solar Venti
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Solar Ventilation
Sector	Solar Energy
<p>Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions:</p> <ul style="list-style-type: none"> ▪ Special features 	<p>While traditional solar energy solutions are based on heating and circulating water, Solar Venti is based on a technology that heats and circulates air. This technology makes heating solutions less vulnerable, cheap and clean. Since air cannot carry as much energy as water this RES-solution is especially suited for summer cottages or warming up a single room.</p>


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<ul style="list-style-type: none"> ▪ Innovative aspects ▪ Main advantages 	
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Technology profile	
Company	Brundby Ballen Fjernvarme, Danstoker, Logstor, LIN-KA Energy
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Distributor (BB Fjernvarme) Manufacturer (Danstoker, Logstor, LIN-KA Energy)
Title	Bio-energy for area-heating plants
Sector	Bio-energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	Bio-energetic RES resources like burning straw and woodchips can efficiently be applied for heating through small-scale area-heating plants. This application needs know-how about the use of hot-water pipelines, efficient bio-energy boilers and burners. As bio-energetic RES resources are available locally this application is economical worthwhile in comparison to traditional fossil fuel resources.

Technology profile	
Company	Schott-Glass, Scheuten
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Voltaic Solar Energy
Sector	Solar Energy
Abstract: Please give a brief description of the technology (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	Voltaic solar energy may not be as efficient in Denmark as in Southern Europe; it can still be a while worth investment. As the time of return on investments is long this solution has not been applied on a large scale basis on Samsø. Up until a certain amount the generated electricity can be fed back into the grid at consumers' price.

Technology profile	
Company	Siemens
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	Wind turbines
Sector	Wind energy
Abstract: Please give a brief description of the technology (< 500 characters). The	As technology improved wind-turbines throughout the last twenty years, wind energy now covers close to twenty percent of the total electricity supply in Denmark. Latest developments

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abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Special features ▪ Innovative aspects ▪ Main advantages 	In technology make windmills even more efficient by increasing their height from the usual 70m up to 200m. It is very unlikely that wind turbines with that height can be placed on an island by the size of Samsø.
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4.4.2 Private research

Strong research activities accomplished by private players during the last five years are illustrated.

Research profile	
Company	Solar Venti
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	
Sector	Solar Energy
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	Engineers from Samsø have been involved in designing an air-born solar ventilation system. This system is especially suited for summer cottages or warming up single rooms. Samsø engineers were among the pioneers in the field of air-based solar ventilation. The company "Solar Venti" in which engineers from the island have been involved is one of the major players in the market in Denmark.
Special features	Solar ventilation
Innovative aspects	Air-born solar energy circulation

Research profile	
Company	Sorel
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	
Sector	Solar energy
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering 	Traditional controllers measure temperatures and depending on the measured temperature switch a burner on or off. New developments make it possible to manage heating-systems by controlling the flow of water through the heating-system.. Instead of switching off a burner when temperatures rise above a certain level, flow-controls will decrease the effect of the flow-pump, which results in a lesser flow and thereby a


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it? <ul style="list-style-type: none"> ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	smaller energy adsorption. The flow-control is still being tested and fine-tuned, but is expected to be implemented and set out for sale somewhere during the year 2010. The controller is developed in cooperation with the German company "Sorel".
Special features	Flow-control
Innovative aspects	Flow-control replacing switch-regulated heating-systems

Research profile	
Company	Danfoss
Role in the RES sector (manufacturer, distributor, installer, end-user, etc.)	Manufacturer
Title	
Sector	Voltaic solar energy
Abstract: Please give a brief description on the conducted research activity (< 500 characters). The abstract should answer to the following questions: <ul style="list-style-type: none"> ▪ Where (geographically) is it from? ▪ What sort of organisation is offering it? ▪ What research is being carried out? ▪ What is it aimed for? ▪ What are the main advantages? 	Development, design and implementation of an electricity inverter for use with voltaic solar systems. The inverter changes "direct current" low voltage electricity into "alternate current" medium voltage electricity. This application is necessary for enabling voltaic solar systems to deliver electricity to the public grid. In Denmark subsidies for voltaic electricity are rather low. Delivering electricity surplus to the grid gives an ordinary consumer the possibility to gain a good price for the electricity in times of surplus solar electricity. The inverter is developed cooperation with the multinational Danfoss.
Special features	Inverting DC to AC from voltaic solar panels for delivering solar energy to the public grid
Innovative aspects	The inverter makes it possible to let the meter run backwards

It has to be pointed out that the resources to be a part of a private research agenda are rather small considering that enterprises on Samsø are small. Nevertheless Samsø is somehow or other a part of some research projects. There are no Universities or other research institutions on the island. The research efforts with which the island can contribute lie on the border between research and craftsmanship. Research is part of inventing and implementing practical and innovative solutions.

The name "Energy Academy" may sound like a research institute; in reality the organization has its strengths in other fields of the Renewable Energy sector. The organization has its strongholds in teaching professionals as well as the general public on the possibilities in Renewable Energy, raising the consciousness on global energy issues and suggesting solutions that municipalities, NGO's and ordinary families can act upon. Education about Renewable Energy is one of the main purposes of the academy. Another objective of the organization is helping other municipalities and NGO's in planning their policies in the field of Renewable Energy.

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Nevertheless private enterprises have been involved in new ways of implementing RES-solutions. Brdr. Stjerne have been participating in a project designing a new buffer tank with multiple input and output pipelines, dividing hot-water in the buffer tank in different levels for different purposes. Several of these tanks are being built every year and implementation has been without major problems.

Furthermore engineers from Samsø have been involved in designing an air-born solar ventilation system. This system is especially suited for summer cottages or warming up single rooms. This application is not unique; several other companies have designed a similar product. Samsø engineers were among the pioneers in the field of air-based solar ventilation though.

Another development in which Samsø engineers are involved is managing solar heating-systems. Traditional controllers measure temperatures and depending on the measured temperature switch on / off a burner. New developments make it possible to manage heating-systems by controlling the flow of water through the heating-system. Instead of switching off a burner when temperatures rise above a certain level, flow-controls will decrease the effect of the flow-pump. This results in a lesser flow and thereby a smaller energy adsorption. The flow-control is still being tested and fine-tuned, but is expected to be implemented and set out for sale somewhere during the year 2010. The controller is developed in cooperation with the German company by the name of "Sorel".

A last development, that Samsø engineers have been part of is the development, design and implementation of an electricity inverter for use with voltaic solar systems. The inverter changes "direct current" low voltage electricity into "alternate current" medium voltage electricity. This application is necessary for enabling voltaic solar systems to deliver electricity to the grid. In Denmark subsidies for voltaic electricity are rather low. Delivering electricity surplus to the public grid gives an ordinary consumer the possibility to gain a good price for the electricity in times of surplus solar electricity. The inverter is developed in cooperation with the multinational Danfoss.

Resuming the efforts in the private research agenda one can conclude that Samsø does not really have private research institutes, but the Energy Academy is often part of innovative processes, residing close to practitioners and craftsmen. The designed solutions have high quality and reliability and seem to function very well. Solutions are replicable, but are in fact only being replicate on a small scale. International cooperation directly to partners outside the Danish borders is not a part of the innovative effort. International contacts are sustained by means of contacting international companies like Danfoss, Sorel or Vølund.

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4.4.3. International cooperation

Many foreigners are interested in RES on Samsø, but this interest is mainly dedicated to the public dedication of the people of Samsø to the RES-philosophy. The SEA deals with these contacts and enterprise visits are often part of RES-tours on the island, but international contacts are entirely arranged through SEA and hardly ever direct from SME to the foreign company or institute.

Really international contacts within enterprises are limited through incidental contacts, friendships and visits. These contacts are arranged by SEA or the multinational enterprises that have been described in the RES ID-cards in the project. There exists however a widespread network of manufacturers and distributors that comprehends a large potential for technology transfer. The relationship between installers and manufacturers secures a technology transfer from both sides. The SME's get to know latest developments in technology and possibilities for applying newest technology in RES and the manufacturers learn about the practical problems of implementing technologies that can make them able to improve their products. As many products in the RES are newly developed this feedback from the installers is very important. Consumers will seldom be able to give a qualified feedback as their demands remain limited to "keep me warm"-level, while the installers will be able to give a high-quality feedback.

Another important aspect relates to the age of the RES-sector. As the RES sector is rather young it is also rapidly and constantly changing. SME's have to make great efforts keeping track with latest technology and knowledge of legislation concerning the sector. To make this task easier the SEA has taken the responsibility of following new technologies and legislation, transferring the knowledge of new technologies and legislation to SME's in time. The SEA transfers this knowledge to both enterprises and municipalities on as well as outside Samsø. As SEA takes an interest in stimulating the use of RES in general it is seen by the SME's as an impartial institute, not favouring any of the existing SME's in particular. Therefore SEA is the best-suited organization for making enterprises cooperating in e.g. joint offers to large projects, organizing courses, arranging technology transfer from manufacturers, public service organizations or research institutes.


The company NRGi has played a very peculiar role in the development of Samsø as RES-island. NRGi once started as a publicly owned electricity distributor based on the mainland. As the market for electricity supply in the EU was liberated, NRGi spread its activities to many different areas as sales of electronics, engineering and sales of heating-solutions. One of the more altruistic objectives of NRGi is to increase the amount of energy that is being produced by means of RES-resources in its geographical working-area. So NRGi is not only part of the technology transfer it also finances projects that increase the use of RES. The particular structure of NRGi as a halfway public, halfway private entity makes it a very powerful factor in the RES-factor, combining the values of a public institute with the liberty of acting of a private company.

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4.5. SWOT – Regional Assessment – Industrial Perspective

The following SWOT gives an overview on the core competencies and shortcomings with regard to knowledge production and technology transfer capabilities in the RES sector from industrial perspective.

Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the STRENGTHS , i.e., capabilities to provide comparative advantages in the RES sector in the Region?	Focusing on own resources (personnel, organizational aspects, financial aspects, etc.), what are the WEAKNESSES , i.e., absent resources, activities not carried out in the proper way?
<ul style="list-style-type: none"> - Strong local networks and mutual trust. Long tradition for cooperation among local enterprises. - Long tradition in working with RES - Strong local patriotism among SME leaders - Loyal customers, that are altruist and financial strong innovators - Involvement in the organisation of the Renewable Energy Agency, which is a catalyst for local initiatives 	<ul style="list-style-type: none"> - Small company size makes SME's vulnerable for brain-drain - Small company size reduces focus on innovative processes. Innovation is not situated in specialized functions or parts of the organization - Low focus on growth caused by island boundaries
Focusing on aspects outside control, where are the OPPORTUNITIES for RES- regional actors, i.e. open up possibilities to capitalise?	Focusing on aspects outside control, where are the THREATS for research organisations, i.e. close off future possibilities?
<ul style="list-style-type: none"> - Political focus on climate change - Projects and subsidies to reduce consequences of the financial crisis stimulate investments in the RES sector - Public and business-to-business market in RES generally unexploited, thus high exploitation potential - Positive image as Renewable Energy Island - Low rates of interest for bank loans, facilitating the investment in RES technology 	<ul style="list-style-type: none"> - Global financial and economic crisis - Changes in agriculture makes deliverance of RE-Sources unstable - Long periods of return for investments in RES technologies - Diminished national focus on research activities for the RES sector during the last years - RES solutions demand large capital investments from customers

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5. Outlook

The Regional RES-ID Cards demonstrate the regional state-of-the-art in the RES energy field in the three project regions Canary Islands, Crete and Samsø. Regional core competencies have been identified and current research agendas demonstrated. Information on the innovation policy management and available funding resources for the RES sector has been given, together with an outline of available RES technologies. Finally, a SWOT analysis for each region assessed the core competencies and shortcomings with regard to the regions' capacity to produce and transfer innovative RES technologies for the most efficient use.

The Regional RES-ID Cards revealed a vast range of research and industrial activities addressed to the RES sector. From political side different supporting schemes could be highlighted as well. The collected information provides the main input for the Comparative Analysis which will be accomplished in the following month. The analysis will highlight common strengths, weaknesses, opportunities and threats as well as strategies and priorities on which to build on in the future for reaching concerted research strategies and implementing common RTD policies related to the RES field.