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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 3: Inter-regional learning Deliverable 3.1: Report on study visits

Authors: FORTH (Artemis Saitakis, George Papamichail), DOBONTECH (Julián Monedero), SEA (Jan Janzen), SE (Bernd Garbers) and GOBCAN-ITC (Lucía Dobarro)

For further information please contact: inres@itccanarias.org

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Dissemination level - Confidentiality		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	



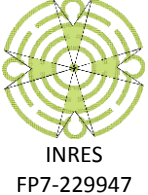

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1. Introduction

The INRES project aims to enhance integration and cooperation among three European island regions, the Canary Islands (Spain), Crete (Greece) and Samsø (Denmark) in the development of their regional RES policies and strategies through the establishment of a mutual learning process and collaborative relationships among regional research-driven clusters. The consortium, made up of 10 partners, targets the development of an inter-regional strategy, in view of EC recommendations and support, for developing the take up of innovative measures included in the regional energy plans that move towards new collaboration among regional players, especially SMEs who are involved in the dynamics of the RES energy technology in the framework of a higher local economic efficiency and environment safeguard. Considering the previous experience in regional policies and networking, the project partners have decided to form the consortium based on the idea of putting together regional research-driven clusters dealing with renewable energy concerns and gathering bodies from governmental, research and industrial areas in order to address energy-related problems and create a common strategy for the development of renewable energy technologies, supporting finally the self-sustainability of the islands.

2. Contextualization of the deliverable

WP3 is designed to support the mutual learning process of the regional clusters. Thus, the activities foreseen are mostly concentrated on the RES experience of each of the clusters as well as on the possibilities to learn and exchange experiences among them and from good practices identified in Europe.

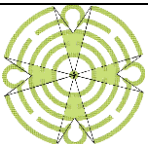

An important lesson learned from the particular case of Samsø Island, where concrete steps have been implemented towards a 100% RES economic and energetic based system, with the highest participation and consensus of the local people. To this it is added the good practice coming from the Spanish island of El Hierro, which is currently promotes its plan for 100% RES and the strategic energy plan of the region of Crete, towards EU2020 strategy.

The short term exchanges coordinated by the Work Package leader FORTH.

3. Scope of the deliverable

The short-term exchange of personnel/visits between the involved regions were promoted. These exchanges scheduled to be carried out over a time span of six months, starting from month 12 until 18. In total, up to 6 visits were scheduled to take place and the dates were agreed on during the course of the project, depending on the final choice of the “training participants”.

Finally, during the time span of 26 months, starting from month 1 until 26, a total of 11 study visits were organized up to May 2011, one in Crete (2010), 4 in the Canary islands (2009 and 2011), one in Italy (2010), one in Germany (2011) and 4 in Denmark (2009, 2010 and 2011). Where possible, the exchanges took place subsequent to project meetings, and they lasted up to three days. All study visits were open to all the project partners. This had the consequence for different lessons to be learnt. Experiences in differently organised regional offices, internal procedures related to the implementation of innovation programmes including the timing and the way of working were possible to be exchanged. Furthermore,

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also scientific and industrial actors participated, learning about issues such as new research techniques on advanced applications as well as the benefit of RES technologies within industrial production processes. These activities supported very much the link between the involved regions and enhanced the development of new ideas.

The 15 study visits organized in all participating regions and in Rimini and Hamburg area, according to the following schedule:

Study visits schedule					
1	Technical visits Gran Canaria	April 24, 2009	ALL partners	Gran Canaria	Spain
2	Technical visits Samsø	September 23, 24 2009	ALL partners	Samsø	Denmark
3	Technical visits Crete	April 28, 2010	ALL partners	Heraklion, Crete	Greece
4	Technical visits Samsø	September 29, 30 2010	ITC, SEA, Seacademy, Brdr Stjerne KS	Samsø	Denmark
5	Technical visit ECOMONDO 2010	November 4, 5 2010	ALL partners	Rimini	Italy
6	Technical visits Tenerife	February 8, 9 2011	ALL partners	Tenerife, Canary Islands	Spain
7	Technical visit El Hierro	February 10, 2011	ALL partners	El Hierro, Canary Islands	Spain
8	Technical visit, University of La Laguna	February 11, 2011	ALL partners	La Laguna, Canary Islands	Spain
9	Technical visits Hamburg	May 24, 2011	ALL partners	Hamburg	Germany
10	Technical visits Denmark	May 25, 2011	ALL partners	Brande Gråsten	Denmark
11	Technical visits Denmark	May 26, 27 2011	ALL partners	Samsø	Denmark
12	Technical visits Crete – BIOSOL conference	September , 2011	FORTH, REAC, SEA	Chania	Greece
13	Technical visits Gran Canaria	February 1-2, 2012	ITC, SE, BS, Dobontech, and Samsø stakeholders	Gran Canaria	Spain
14	Technical visits El Hierro	February 2-3, 2012	ITC, SE, BS, Dobontech, Samsø stakeholders and Isle-Pact partners	El Hierro	Spain
15	Technical visit, University of La Laguna	February 10, 2012	SEA, Innova and Dobontch	Tenerife	Spain

ANNEXES – Individual reports on staff exchange / study visits

ANNEX I: Gran Canaria, April 2009

ANNEX II: Samsø, Sept. 2009



ANNEX III: Crete, Apr. 2010

ANNEX IV: Samsø, Sept.2010

ANNEX V: Ecomondo 2010, Nov, 2010

ANNEX VI: Tenerife, Feb. 2011

ANNEX VII: El Hierro, Feb. 2011

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- ANNEX VIII: La Laguna, Feb. 2011
- ANNEX IX: Hamburg, May 2011
- ANNEX X: Brande, Gråsten, May 2011
- ANNEX XI: Samsø, May 2011
- ANNEX XII: BIOSOL conference, Chania, September 2011
- ANNEX XIII: Gran Canaria, February 2012
- ANNEX XIV: El Hierro, February 2012
- ANNEX XV: La Laguna, February 2012



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ANNEX I

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

Gonzalo Piernavieja, Lucía Dobarro, Adriana Regidor, Salvador Suárez (GOBCAN-ITC), Julián Monedero (DobonTech), Nikolas Zografakis (REAC), Artemis Saitakis, George Papamichail (FORTH), Bernd Garbers (SE), Marcel Meijer (BS), Antje Klaesener (INNOVA)

Hosts:

Instituto Tecnológico de Canarias (ITC)
Agencia Canaria de Investigación, Innovación y Sociedad de la Información del Gobierno de Canarias (GOBCAN)

Date: 23rd of April 2009

Technical visit to R&D facilities in Pozo Izquierdo

During the kick-off meeting, the INRES partners had the opportunity to visit the R&D facilities of ITC in Pozo Izquierdo. The group visited the different labs and prototypes, presented by Gonzalo Piernavieja, RTD director of ITC.

ITC is very active in R&D, technology transfer processes and demonstration projects. The RTD division focuses its efforts on water technologies, biotechnology, environmental analysis and renewable energies, taking advantage of its strategic location facilities particularly in the RES sector (wind, sun and sea). In this regard, ITC has facilities for developing and testing RES, as the renewable energies department is the biggest one of the centre. The technology developed by this department is not only oriented to the local sector but also to being transferred to developing countries (solar installations, desalination systems, etc). Apart from that, the RTD division is composed of other departments, such as the Biotechnology Department concentrating on algae (labs, production plants and biomass processing installations), the Environmental Analysis Department (organic pollutants), the Mechanical Engineering Department (vertical RDT line in medical sector) and the Software Engineering Department (vertical lines in supercomputing



Figure 1. INRES consortium with hydrogen vehicle



Figure 2. Gonzalo Piernavieja, with Nikolas Zografakis, Artemis Saitakis, Marcel Meijer and Julian Monedero, in biotech lab.



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management and virtual reality through open software)

The ITC R&D facilities are located in the southeast of Gran Canaria, next to the coast, occupying a 109.000 sqm plot on a site with excellent renewable energy conditions (annual mean wind speed 7.8 m/s, with wind energy potential of more than 4,000 equiv. hours/year; Solar irradiation on an horizontal Surface: 5.7 kWh/m²; day Sun Hours: 3,000 h/year). The staff of ITC is made up of 185 professionals from a wide range of disciplines, with 40 engineers and physicists working directly in renewable energy-based production systems for water desalination, cooling, heating and hydrogen production.

RES projects and services. ITC main fields of research in renewable energies are:

- Electricity production from renewable energy sources
- Fresh Water production (water desalination) using renewable energy systems
- Cold and ice production using renewable energy systems
- Development of small to medium sized wind energy systems (incl. wind-diesel)
- Testing of solar thermal collectors and systems
- Penetration of renewable energy systems in weak electrical grids
- Production of hydrogen by renewable energy systems
- Wind And solar prediction tools (based on climatic model MM5)

ITC is currently involved in several projects related to energy storage, and its integration with renewable energy technologies, for both stationary and mobile applications. The focus is currently centred on hydrogen technologies for which it currently operates two hydrogen production prototypes powered by renewable energies installed at its premises in Pozo Izquierdo, one of them producing and storing hydrogen at 200 bar for transportation. Other short-term interests include studying the possibilities of battery technologies for storing renewable energies, and its possible applications to transport.



Figure 3. R&D facilities of ITC in Pozo Izquierdo, Gran Canaria (109.000 sqm)



Figure 4. LABSOL: Solar collector test facility. The high direct radiation conditions makes ITC site at Pozo Izquierdo an excellent testing platform for high temperature solar thermal systems, and very suitable to host a solar furnace. One example is the Solar Collector Test Laboratory LABSOL, a platform TESTS for components of RES systems, first ENAC-qualified laboratory in Spain, and well positioned within the European context. LABSOL is providing services related with: (1) testing of solar cells; and (2) quality of photovoltaic plants.



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ANNEX II

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT
Lucia Dobarro (ITC), Penelope Ramirez (ITC), Nikolas Zografakis (REAC), Antje Klaesener (INNOVA),
Evangelos Atzoletakis (CANDIA), Artemis Saitakis (FORTH)
visited *Samsø*.

Hosts:
Jan Jantzen (SEA), Bernd Garbers (SE), Marcel Meijer and Ole Hemmingsen (BS)

Date: 22-24 Sep 2009

In connection with the ordinary INRES project meeting, the INRES partners visited the energy sites on the island of Samsø. The partners learned about the renewable energy project, which made Samsø a 100% renewable energy island.

Renewable energy island

We say that the island of Samsø is 100% renewable. This is counted on an annual basis, however, not every minute (Fig. 1). The island has an electric cable to the mainland, and there is traffic both ways; on a calm day the island imports electricity, and on a windy day the island exports electricity.

The main components are 10 wind turbines offshore and 11 wind turbines onshore. The construction project turned the net annual electricity import into export in 2003. There are also other kinds of renewable energy, but wind is the major source (Fig. 2).

The island has 3 900 inhabitants, and the number is decreasing.

Energy sites

Neighbours are often unhappy about wind turbines, because they think they spoil the landscape, make noises, and they fear the value of their property will decrease, due to the nearby industrial plant. It can be difficult to find space for all the wind turbines planned in Denmark; therefore offshore wind turbines have been developed.

An offshore turbine is more expensive and more difficult to build and maintain (Fig. 3), but the wind at sea is stronger and steadier, causing a better energy yield. In total, however,

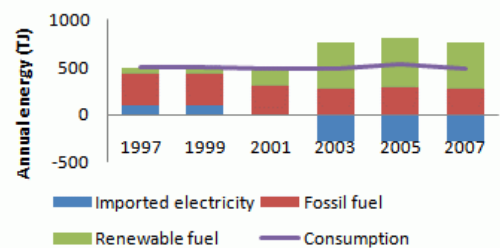


Figure 1. The Samsø energy balance.

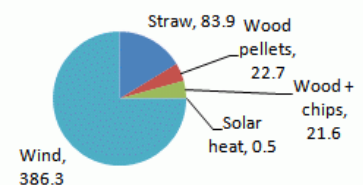


Figure 2. Renewable energy at Samsø.



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onshore wind turbines are a better investment. A wind turbine operates 6000 - 7000 hours per year, which is more than a car during its whole lifetime. Maintenance is thus critical.

Four district heating plants at Samsø provide communal heating to their neighbourhoods. Three of the four plants run on straw grown and delivered by local farmers. The fourth plant burns wood chips supplied by the local forest owner. The fourth plant is equipped with a supplementary solar thermal plant, which produces 20% of its energy.

Many private owners have installed renewable energy in their homes. These include solar thermal panels, ground source heating, straw burners, wood pellet burners, and also some photovoltaic panels. The latter have a rather long payback period (18-20 years), so there are still relatively few on the island.

The Energy Academy is both a building and an organization (Fig. 4). It is the final outcome of the official energy project which lasted from 1997 to 2007 (Jorgensen, Hermansen, Johnsen, Nielsen, Jantzen and Lunden 2007). The building is the home of EU projects, training and education, local and international energy work, promotion and dissemination.

Conclusions

The Samsø project is rather specific and the island is small, therefore the project cannot be copied and scaled to larger extents. It rather acts as an exhibition, and many visitors are interested in the social aspects. Politicians, journalists and students ask: How did you manage to convince the population to join the project? Therefore the island has become a study object from the viewpoint of several disciplines.

References

Jorgensen, Hermansen, Johnsen, Nielsen, Jantzen and Lunden 2007 "Samsø -- A Renewable Energy Island". Samsø Energy Academy, project report.

www.energiakademiet.dk/images/imageupload/file/UK/RE-island/10year_energyreport_UK.PDF.

Link

The Energy Academy

www.energiakademiet.dk/default_uk.asp



Figure 3. From the construction of 10 wind turbines south of Samsø.



Figure 4. The Energy Academy.



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Time	Agenda	Hosts	Description
22 Sep 2009 19:00 - 20:50	Ferry from Kalundborg to Samsø	SEA, SE	Slide presentation in a reserved room on the ferry. General overview of the Samsø energy project 1997 - 2007.
23 Sep 2009 11:15 - 13:00	Tour of Samsø south.	SEA, SE, BS	Car ride to see a large pig farm (abandoned) and stand under a wind turbine. Lunch in a restaurant.
23 Sep 2009 15:30 - 16:00	Drive to a district heating plant.	SEA, SE, BS	Presentation of the Ballen-Brundby straw fired district heating plant. The plant delivers heating for 250 consumers in two villages. The plant produces hot water which is distributed to the houses in a network of insulated underground pipes.
24 Sep 2009 11:15 - 15:00	Tour of Samsø north.	SEA, SE, BS	Visit to the blacksmith (BS) that specializes in renewable energy installations. Visit to farmer Erik Andersen in Besser, who owns a plant oil tractor and car, photovoltaic panels on the roof, and a special water storage tank. Lunch in the cafe of Samsø Bryghus in the north island. Visit to the Nordby-Maarup district heating plant, which burns wood chips supplemented by a field of solar thermal heat panel (2500 square metres).
24 Sep 2009 15:00 - 16:45	Return trip and transfer to ferry	SEA, SE, BS	Car ride to see the villages, and the wind turbine locations in the landscape.



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ANNEX III
Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STUDY VISIT REPORT
Lucia Dobarro Delgado and Salvador Suárez García (ITC), Julian Monedero (Dobontech), Agustin J. Gonzalez Martin (RICAM), Jan Jantzen and Bernd Garbers (SEA) and Ole Hemmingsen (Brdr. Stjerne) visited Heraklion, Crete

Hosts:
FORTH/Science Technology Park of Crete
Regional Energy Agency of Crete (REAC)
TEAB S.A.

Mövenpick Hotels & Resorts - Crete (Candia Maris Hotel)
Technological Educational Institute of Crete (TEI Crete)
Kipriotakis Solar Systems SA
Kelarakis G. – Creta Sun SA

Date: 28 April 2010

Four different technical visits have been carried out in April, 28, 2010. The main purpose of these visits was to present local innovative applications of RES and energy saving in large-scale users (i.e. in the tourism industry), RES scientific innovative approaches conducted by Academia, and RES innovations from local industries. General information for the visits is presented as follows:

1st VISIT: MOEVENPICK HOTEL

The INRES study visit and staff exchange provided the opportunity to the project partners to visit extensively all the innovative energy systems of the **Mövenpick Crete Hotel**. The hotel combines the operation of a solar thermal system (one of the biggest solar thermal fields in South Europe) and a sea cooling system.

1st VISIT: TEI OF CRETE

The 2nd visit was organized in the **Technological Educational Institute (TEI) of Crete, Wind Energy Laboratory** divided into main parts: 1st Part: Presentation of the “Bioclimatic Building” of the Wind Energy Laboratory. The design of the laboratory is based on the “Bioclimatic Architecture”. There is no use of oil for heating during winter and there is no use of electricity for air-conditioning during summer (there is an exemption in the web-server room where there are special air-conditioning needs). The frame of the building foresees the maximum exploitation of the sun during winter for natural heating and the exploitation of natural ventilation for cooling during summer. Furthermore, the roof and the walls are isolated suitably in order to maximize the energy efficiency of the



Photo 1: From the visit to CANDIA MARIS SA



Photo 2: From the visit to CANDIA MARIS SA



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building. The scientific team has started to promote bioclimatic technologies in the specific climatic conditions of Crete by performing measurements of different bioclimatic parameters. The 2nd Part included Presentation of the scientific activities of the Wind Energy Laboratory.

3rd VISIT: KIPRIOTAKIS SOLAR SYSTEMS SA

The 3rd visit took place in the manufacturing company of “**Kipriotakis Solar Systems**” SA located at the Industrial Area of Heraklion. Kipriotakis Solar Systems designs and manufactures Hot Water Solar Systems.

It is an innovative company which adapted the relevant technologies designing and manufacturing products ideal for the regional conditions. The company manufactures the copper boilers and assembles the solar thermal collectors (normal and selective surface). The owner of the company presented the installations, the products and the production chain. He presented the regional situation of the solar market analyzing the local perspectives and obstacles. He expressed also a great interest for the new “smart metering system” which has been developed in Samsø. The partners from Samsø provided the necessary information about the technology and its perspectives of the new smart metering system.

4th VISIT: CRETA SUN SA

The last technical visit was implemented in the company **Kelarakis G. – Creta Sun S.A.** in the Industrial Area of Heraklion. The company manufactures solar thermal systems. It is a local company with many-year experience in the field of solar thermal systems. The owner of the company presented its products and the production chain. He presented also technical data of solar thermal systems e.g. for the boilers, the solar panels etc. and he provided information of the manufacture and the assembly of the systems. He presented also a damaged system due to the bad quality of the water analyzing the typical problems of the open-circuit systems in Crete. The project partners had a brief overview of the facilities and they had a fruitful discussion with the owner of the company exchanging experiences.



Photo 3: From the visit to KYPRIOTAKIS SA



Photo 4: From the visit to KYPRIOTAKIS SA



Photo 5: From the visit to KYPRIOTAKIS SA



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**STAFF EXCHANGE AGENDA, HERAKLION, CRETE
APRIL 28, 2010**

Time	Agenda	Hosts	Description
9:30 - 11:00	Technical Visit	Evangelos Atzoletakis (Maris Hotel)	Touring in Mövenpick Hotels & Resorts - Crete (Candia Maris Hotel) RES infrastructure
11:00 - 12:00	Technical Visit	Dr. Dimitiris Katsaprakakis (Technological Educational Institute of Crete)	Visit in the Wind Energy Laboratory of the Technological Educational Institute of Crete, Prof. Dimitris Christakis and Dr. Dimitris Katsaprakakis
12:00 - 13:30	Technical Visit	Kipriotakis Solar Systems Mr. George Kypriotakis	Visit in the "Kipriotakis Solar Systems" SA company. The owner of the company presented the installations, the products and the production chain. a great interest for the new "smart metering system" which has been developed in Samsø was expressed. The partners from Samsø provided the necessary information about the technology and its perspectives of the new smart metering system.
13:00 - 14:30	Technical Visit	Creta Sun SA Mr. George Kellarakis	The owner of the company presented technical data of solar thermal systems e.g. for the boilers, the solar panels etc and provided information of the manufacture and the assembly of the systems. The project partners had a brief overview of the facilities and they had a fruitful discussion with the owner of the company exchanging experiences.



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ANNEX IV

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

Salvador Suarez (ITC) visited Samsø

Hosts:
Samsø Energy Academy (SE)
Samsø Energy Agency (SEA)
Brdr Stjerne (BS)

Date: 29-30 September 2010

Salvador Suárez (Canary Islands Institute of Technology, ITC) attended the staff exchange organized by the Samsø partners of INRES.

The main aspects that Salvador Suárez highlights from the staff exchange experience was the opportunity to see heat pumps equipment currently being commercialized in Samsø, for ground heat, and the existing district heating facilities, making use of available biomass (woodchip and straw). A technology that might be suitable for small communities in the Canary Islands located in the mountains. Although probably a more interesting application for the Canary Islands would be district cooling; a system based on the same idea, but that could integrate CHP (Combined Heat and Power) with absorption chillers, in order to produce cold water that could allow to distribute cooling to consumers in a similar way that hot water is currently distributed to Samsø consumers.

Besides technical aspects, there are also other issues of interest, related to the business models that Samsø has implemented in these district heating projects, and its possible adaptation to the Canary Islands.

Of interest was also the visit to a very interesting “smart” house displaying a high degree of ITC technologies which are contributing, not just to improve the conformability of the house, but more important, its energy efficiency, by automatically regulating heat and lighting, and disconnecting energy systems when no people are in the house.

A visit to a private wind farm was also made, and it was



Figure 1. The Nordby-Maarup district heating plant.



Figure 2. From left to right: Ole Hemmingsen (BS), Jan Jantzen (SEA), Marcel Meijer (BS), Salvador Suarez (ITC), and Bernd Garbers (SE). In the background wood burners for private heating.




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explained how the profits from energy production is contributing to increase the disposable income of island farmers.

The visit by Salvador Suarez, ITC, was an opportunity to discuss technology and future opportunities in depth. It was a busy visit, and some topics were left untouched; Samsø has for instance an electrician who develops his own diode lamp for the commercial market, but the electrician was away on holiday, so we must look for another opportunity to make the match with ITC. We identified some possible areas of future collaboration. The table below shows the activities of the staff exchange, and the description of each sub-topic has a conclusion.

Time	Agenda	Hosts	Description
DAY 1			
13:00 - 16:00	Tour of the island	Soren Hermansen, SE, and Jan Jantzen, SEA	<p>Bus ride with a group of visitors to see the island and its energy production sites.</p> <p>Visit to the Nordby-Maarup district heating plant¹. Runs on wood chips and a 2500 square metres solar field supplies 1/5 of the energy. Owned by the energy company NRGi.</p> <p>Visit to the Ballen-Brundby district heating plant². Runs on straw. Owned by the consumers. The picture shows straw bales on a conveyor belt that feeds the furnace.</p>  <p>Visit to a wind turbine. Size 1 MW, situated in a row of 5</p>

¹ <http://seacourse.dk/wiki/Nordby-Maarup+District+Heating+Plant>

² <http://seacourse.dk/wiki/Ballen-Brundby+District+Heating+Plant>



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Time	Agenda	Hosts	Description
			turbines. Owned privately by a farmer.
DAY 2			
09h00	Training and education	Jan Jantzen, SEA	Handbook of Renewable Energy Economics. ³ Renewable Energy course catalogue. ⁴ INRES staff exchange course. ⁵ Salvador solves an online assignment and completes module 1. Conclusion: SEA could offer teaching to staff or others in Canary Islands
	Automatic controllers for solar heating	Bernd Garbers, SE	Posters and demo kit with of more than ten temperature and heating controllers in hardware ⁶ Conclusion: ITC could set up a test rig with a control loop. We will use them for teaching about temperature control.
	Questionnaire for INRES	Jan Jantzen, SEA	Before+after investigation of SME awareness of tech transfer possibilities. Conclusion: SEA will draft a questionnaire to be applied at the Samsø regional event October 2010.
12h15 – 13.15	Lunch at BS, tour of the showroom, group picture		
13:30	INRES phone meeting	Ole Hemmingsen, Marcel Meijer, BS	Phone meeting with the other INRES partners. Separate agenda.
	Plan trip to Italy	same	Next INRES meeting in Rimini, Italy. Dates fixed at the phone meeting.
	Regional workshop	same	On 16-17 Oct 2010 BS will host a regional workshop at Samsø with an exhibition.
15:00	Bernd's house	Bernd Garbers, SE	Demo of heating control. Solar collectors, PV panels, large storage tank, temperature control. The picture shows a temperature controller (Sorel TDC) that starts a circulation pump when the temperature of the solar collector is higher than the temperature of the tank.



³ <http://seacourse.dk/wiki/ree>

⁴ <http://seacourse.dk/moodle/>

⁵ <http://seacourse.dk/moodle/course/view.php?id=7>

⁶ <http://www.sorel.de>



Time	Agenda	Hosts	Description
			 <p>Conclusion: If measurement data were online, it could be used for teaching purposes, even remote to Canaries.</p>
16:30	Thomas Jacobsen's house	Thomas Jacobsen	<p>Demo of smart house. Thomas is an electrician and he has performed 100 smart house installations. His own house is thoroughly automated.</p> <p>Conclusion: Home automation could be part of a teaching module and of interest to citizens and businesses in Canaries.</p>
17:30	Jan's house	Jan Jantzen, SEA	<p>Demo of ground source heating, PV panels, heat pump.⁷ The picture shows the heat pump (small box), and a water storage tank of 250 litres (large box).</p>  <p>Conclusion: Data collected through 10 years are teaching material. Payback period is determined in a pre-calculation based on sales material, and in a post-calculation based on actual data and prices. The two are compared.</p>
19.00	Dinner at Flinch's Hotel (Salvador, Jan, Bernd). Departure by ferry next morning at 7:10.		

⁷ <http://seacourse.dk/wiki/Ground+Heat+in+a+Private+House>



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ANNEX V

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

Lucía Dobarro, Salvador Suárez (GOBCAN-ITC), Julián Monedero (DobonTech), Artemis Saitakis (FORTH), Evangelos Atzoletakis (CANDIA), Jan Jantzen (SEA), Garbers (SE), Marcel Meijer (BS), Antje Klaesener (INNOVA)

Hosts:

ECOMONDO 2010

14th International Trade Fair of Material & Energy Recovery and Sustainable Development
Rimini Fiera, Italy

www.ecomondo.com

Date: 4th – 5th November 2010

Technical visit to ECOMONDO 2010

ECOMONDO is a fair of green technologies and new lifestyles, organised on an annual basis at Rimini (Italy). The exhibition is a special forum where businesses in the environmental and sustainability sectors can meet institutional stakeholders, trade associations, local/central government, NGO's and all types of industries and goods manufacturers, to discuss new models of economic growth driven by a focus on innovation, clean technologies and a new approach to urbanization and social contexts.

ECOMONDO was identified by INRES consortium as an opportunity to exchange ideas, to have access to European RES news and to increase the project visibility.

Together with the 4th consortium meeting, the INRES consortium visited the fair and participated in the *CLUSTER THE CLUSTERS* event, a Spanish – Italian cluster meeting organized by the Enterprise Europe Network. During this meeting, INRES project as well as the Canary Island cluster of RES, RICAM, were presented to the audience, looking for synergies and potential partnerships with the rest of participants.

On the other hand, all three INRES islands participated in the business to business event (speed dating).



Figure 1. INRES consortium at ECOMONDO



Figure 2. Lucía Dobarro presents INRES to the other clusters at the Ecomondo fair



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now 3rd, 6th November 2010 Rimini Fiera Italy
www.ecomondo.com

action, technology, sustainable business

14th International Trade Fair of Materials & Energy Recovery and Sustainable Development

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Figure 3. ECOMONDO visitor entrance.



Figure 4. Biogas engine at ECOMONDO fair



Figure 5. All three INRES islands participated in the business to business event (speed dating).



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ANNEX VI

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

The following participants:

Bernd Garbers (Technical Advisor at Samsø Energiakademi)

Jan Jantzen (Engineer and Manager at Samsø Energy Agency)

Ole Hemmingsen (COE at Brdr. Stjerne K.S.)

Artemis Saitakis (Director of Science & Technology Park of Crete, FORTH)

Evangelos Atzoletakis (Architect and Consultant at TEAB S.A. MARIS HOTELS)

Antje Klaesener (Project Manager at INNOVA S.p.A)

visited some Renewable Energy Projects and sites at Tenerife (Canary Islands)

Hosts:

Dobon's Technology, S.L. (Dobontech)

Instituto Tecnológico de Canarias (ITC)

Agencia Canaria de Investigación, Innovación y Ciencias de la Información (ACIISI)

Collaboration by:

Ricam Cluster

Constante Solar, S.L.

Instituto de Astrofísica de Canarias (IAC)

Date: 08-09 February 2011

The above participants attended the staff exchange organized by the Canary Island partners of INRES (Dobontech, ITC and ACIISI) and in collaboration with the Ricam Cluster, the Company Constante Solar, S.L. and the Canary Islands Institute of Astrophysics (IAC). The staff exchange consisted on six technical visits; three organized the day 08/02/2011 and three the next day (09/02/2011). The technical visits took place both days in the afternoon.

The first day, three installations were visited combined with a larger group of visitors using a Bus service for transportation.

The second day, another three technical visits were organized but in this occasion, the participants were limited to the staff exchange persons of the INRES project. The transportation between locations was carried out by car.

The technical sites visited were the following:

First day:

- Roof top PV Tracking System of Dobontech at the IAC.



Figure 1. Visit to the roof top PV Tracking System of Dobontech at the IAC.



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- Solar Collector Manufacturing Plant at Constante Solar premises.
- Biodigester Installation at a Chicken Farm.

Second day:

- ITER Renewable Energy Installations
- Hydrogen Solar Dish.
- Arico PV Plants.
- Tenerife Energy Agency, AIET



Figure 3. Visit to ITER Renewable Energy Installations.



Figure 2. Visit to the Solar Collector Manufacturing Plant at Constante Solar premises.



Figure 4. Visit to Biodigester Installation at a Chicken Farm.



Figure 5. Visit to Arico PV Plants.



Figure 6. Visit to Hydrogen Solar Dish.



Figure 7. Visit to the Tenerife Energy Agency at ITER. Training facilities in the visitor centre.

The technical visits allow the participants to learn from the experiences carried out in Tenerife from first hand and the main actors.

The table below shows the activities of the staff exchange and the description of each of them.



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Time	Agenda	Hosts	Description
DAY 1			
15:00 – 16:15	Visit to a sun tracking PV installation at the Instituto de Astrofísica de Canarias (IAC)	Julián Monedero (Dobontech), Germán Pescador (IAC).	Bus ride with a group of visitors to see the site. An explanation took place about the 10kW PV system installed at the rooftop of the IAC building.
16:15 – 18:15	Visit to the Solar Thermal Collector Manufacturing Plant at Constante Solar premises	Carlos Pérez (Constante Solar), Miguel Vera (Constante Solar) and Julián Monedero (Dobontech)	Bus ride with a group of visitors to see the site. Carlos Pérez and Miguel Vera (Constante Solar) explained the different products being manufactured by the company such as solar collectors, dual-effect heat exchange system, etc.).
18:15 – 20:00	Visit to a Biodigestor installation at a Chicken Farm	José Peraza (freelance) and Francisco Dobón (Dobontech)	Bus ride with a group of visitors to see the site. José Peraza (freelance) explained the Biodigestor installation. A methane flame obtained from the chicken farm biodigestor could be observed by the visitors.
DAY 2			
15:00 – 16:15	Visit to ITER Renewable Energy Installations.	Francisco Dobón (Dobontech), Braulio Martín (Dobontech) and Lucía Dobarro (ITC)	Car ride with all the group of participants to see the site. A guided tour was booked to visit the technological walkway and the visitor's center. There was a rain storm and some constructions works were in progress, so the tour was cancelled, but the participants could see the Institute large PV plants and Wind Farms.
15:00 – 17:30	Visit to Tenerife Energy Agency, AIET (Antje Klaesener and Jan Jantzen).	Monica Alonso Lopez, Marta Hernandez-Abad Alarco, Elsa Lopez Suarez	Visit to 20 MW photovoltaic array, energy path, inside three bioclimatic buildings, the visitor centre, meeting in the office of AIET. Conclusions: We have overlapping activities within awareness campaigns regarding public energy savings; there is a good potential for exchange of training material and experiences; we shall collaborate in a new EU project as a result of INRES.
16:15 – 18:00	Visit to Hydrogen Solar Dish	Francisco Dobón (Dobontech), Braulio Martín (Dobontech) and Lucía Dobarro (ITC)	Car ride with part of the group of participants to see the site. Francisco Dobon guided the participants to see a large Solar Dish prototype for the production of Hydrogen.



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Time	Agenda	Hosts	Description
18:00 – 19:00	Visit to Arico PV Plants	Francisco Dobón (Dobontech), Braulio Martín (Dobontech) and Lucía Dobarro (ITC)	Car ride with part of the group of participants to see the site. Francisco Dobon guided the participants to see the large PV plants located at Arico in the South side of the Island.



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ANNEX VII

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

Antje Klaesener (INNOVA), Evangelos Atzoletakis (CANDIA), Artemis Saitakis (FORTH), Francisco Dobon (Dobontech), Ole Hemmingsen (BS), Bernd Garbers (SE), and Jan Jantzen (SEA)
visited *El Hierro island*.

Hosts:

Mr. Javier Morales, Vice President of Cabildo de El Hierro,
in collaboration with ITC

Date: 10 Feb 2011

Summary. During the week of the ordinary INRES project meeting a group of INRES partners visited the island of El Hierro southwest of Tenerife. The objective was to learn about the renewable energy power station, which is under construction there. The island will become a 100% renewable energy island without a cable connection to the outside. We achieved a lot more than that, because Mr. Javier Morales kindly spent the whole day with us. He gave us a slide presentation of the UNESCO biosphere reserve, and we saw many examples of projects that were successfully joined together in a network by means of an unusual systems approach. We were interviewed to the local television of the Canary islands (RTVC), and we generated at least two newspaper articles. It seems that the degree of sustainability at El Hierro is at a very advanced stage.

Renewable energy island

In 2007 the Spanish Ministry for Industry, Tourism and Commerce announced that El Hierro was to become the first island in the world to be energy self-sufficient by means of renewable energy exclusively (Spain Review.net 2011). The island has 10 700 inhabitants, and the number is increasing.

The main component, a hydro-electric power station, is under construction (Gorona del Viento n.y.). Wind turbines will power the pumps that elevate water to an upper reservoir in a volcano crater 700 metres above sea level. At times of low winds the water falls to the lower reservoir where it drives a turbine and generator. A rotating flywheel, which can be quickly engaged to the generator (six seconds), enhances the stability of the electric network.



Figure 1. Javier Morales (left) at the upper reservoir of the pumping power station. From left to right: Antje Klaesener, Francisco Dobon, Artemis Saitakis (almost hidden), and Bernd Garbers.



Figure 2. Construction site of the lower reservoir.



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Biosphere reserve

El Hierro was considered the westernmost point of the known world by the old Europeans.

The island is now a UNESCO biosphere reserve (Marin and Morales n.y.). Fishermen have implemented a marine reserve themselves, and there is an increase in the fish stock as well as leisure divers. Waste water is treated as much as possible and thereafter used in farming, and natural catchment systems are improved to preserve the fresh water. Waste is recycled as far as possible and animal manure is used as fertilizer. Ecological fruit and vegetables are grown on a series of farms given over to young farmers in order to make the generational change easier. Many sub-sectors of production are organized around co-operatives enhancing the social participation. Most of this, if not all, is initiated by the local government and the stakeholders on the island.

Conclusions

El Hierro is socially and technologically very advanced, at least compared to Samsø. It would make good sense to start an educational collaboration. Students could receive courses, perhaps accredited by universities in Crete and Tenerife, and combine the theoretical knowledge with field trips to El Hierro and the other islands.

References

Gorona del Viento (n.y.): *El Hierro Wind-Pumped Hydro Power Station*. Handout from the meeting.

Marin C and Morales J (Ed., n.y.): *Building an Island on a Human Scale*. El Hierro Biosphere Reserve.
<http://www.islandsonline.org/biosphereRB.htm>

Spain Review.net (2011): El Hierro will become the first island in the world to be electrically self-sufficient, newspaper article, 20 Jan 2011.
<http://www.spainreview.net/index.php/2011/01/20/el-hierro-will-become-the-first-island-in-the-world-to-be-electrically-self-sufficient/>

Our presence in the press

Radio Television Canaria (2011): *Grecia y Dinamarca muestran su interés por la central hidroeléctrica de El Hierro*. Interview at El Hierro 10 Feb 2011, video 1 min 10 secs.
<http://www.rtvcc.es/noticias/grecia-y-dinamarca-muestran-su-inter%C3%A9s-por-la-central->



Figure 3. Pipeline to connect the upper and lower reservoirs with a vertical drop of 655 metres.



Figure 4. We were in the media at least three times.



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hidroe%C3%B3lica-de-el-hierro-64769.aspx

Diario El Hierro (2011): *Grecia, Italia y Dinamarca se interesan por el proyecto de la Central Hidroeléctrica*, 11 Feb 2011.

http://www.diarioelhierro.com/t26496/pag02.asp?id_registro=137003&Id=26496&BDi=INICIO&Md=

Canarias actual (2011), *El Hierro refuerza sus relaciones con territorios que trabajan para la Sostenibilidad*, 10 Feb 2011.

<http://www.canariasactual.com/2011/02/10/el-hierro-refuerza-sus-relaciones-con-territorios-que-trabajan-para-la-sostenibilidad/>

Time	Agenda	Hosts	Description
9:50 - 10:30	Flight from Tenerife North to El Hierro	ITC	Arrival at El Hierro airport and reception by Anna, ITC. We rented a minibus.
11:30 - 13:00	Presentation in Valverde	Javier Morales	El Hierro presentation by Javier Morales. Biosphere reserve and renewable energy island.
13:00 - 13:30	Drive across the island.		Javier Morales joined in the minibus, explained sites along the road, and answered questions.
13:30 - 15:00	Lunch	INRES	The group invited Javier Morales for lunch at Restaurante Mirador de La Pena with a high view of the north coast.
15:00 - 16:45	Visit to the pumped storage power plant	Javier Morales	Upper reservoir construction site, middle station with pipes and wind mast, lower reservoir construction site.
17:40 - 18:20	Return flight to Tenerife North		Arrival Tenerife and transfer to hotel.



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ANNEX VIII

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

The following participants:

- Bernd Garbers (Technical Advisor at Samsø Energiakademi)
 - Jan Jantzen (Engineer and Manager at Samsø Energy Agency)
 - Ole Hemmingsen (COE at Brdr. Stjerne K.S.)
 - Artemis Saitakis (Director of Science & Technology Park of Crete, FORTH)
 - Antje Klaesener (Project Manager at INNOVA S.p.A)
- visited the University of La Laguna at Tenerife (Canary Islands)

Hosts:

Dobon's Technology, S.L. (Dobontech)
Universidad de La Laguna (ULL)

Date: 11 February 2011

The above participants attended the staff exchange organized by the University of La Laguna and Dobontech with the participation of all INRES partners (ITC, ACIISI, SEA, SE Agency, Drdr. Stjerne, FORTH, INNOVA), as well as the RICAM Cluster, Turisfera Cluster (Tenerife Tourism Cluster) and INSIGNIA Cluster (IT Cluster).

The event took place at the University of La Laguna. The audience was composed by a total of 49 people from companies, institutions, research groups and students of the University of La Laguna.

The event was organized in a seminar format and each participant had 15 minutes for a short presentation in order to exchange experiences from Canary Islands, Samso and Crete regions, so each region learns from what the others were doing. At the end of the sessions, a round table about possible collaboration projects between the three insular regions was set.

The programme, presentations and attendance list are attached to this report.

The main conclusions of the round table are incorporated in the Join Action Plan.

The table below shows the staff exchange programme and a short description of each presentation.



Figure 1. Jan Jantzen during his presentation.



Figure 2. Audience during the presentations.



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Time	Agenda	Hosts	Description
DAY 1			
10:00 – 10:05	Welcome and Introduction	Ernesto Pereda (ULL) and Julián Monedero (Dobontech),	Dr. Ernesto Pereda, Director of the High Technical School of Civil and Industrial Engineering of the University of La Laguna carried out the opening session of the event and introduced Julián Monedero as the chairman.
10:05 – 10:15	Sustainable Innovation Project	Agustín Gonzalez (RICAM)	Agustín Gonzalez, Managing Director of Ricam Cluster acting also on behalf of Turisfera Tourism Cluster and Insignia Cluster presented an interesting project that is being carried out in collaboration of the three Clusters for Energy Efficiency in Hotels at Tenerife.
10:15 – 10:30	Smart Technology Control - Implementation in the local municipality and for the local industrial players	Bernd Garbers (SE)	Bernd Garbers, Technical Advisor at Samsø Energiakademi, introduced this quite interesting project about smart technology control in Samsø.
10:30-10:45	BREAK		A presentation of Energy efficiency in Commercial Buildings by Dr. Ricardo Guerrero, Director of Renewable Energy Master at the University of La Laguna was scheduled but it could not take place since he was sick. The time was used for a break.
10:45-11:00	Home Energy Efficiency, a Case Study	Jan Jantzen (SE Agency)	Dr. Jan Jantzen, Engineer and Manager at Samsø Energy Agency presented a real case study of home Energy Efficiency at Samsø.
11:00-11:15	Wireless Sensor Network for Real Time Energy Audits	Julián Monedero (Dobontech)	Julián Monedero, Managing Director of Dobon's Technology, S.L. did a presentation about the present Energy Audits that the company is developing.
11:15-11:30	RES Technologies: Cases from Crete, Greece	Artemis Saitakis (Forth)	Artemis Saitakis, Director of Science & Technology Park of Crete did an interesting introduction about RES in Crete.
11:30-11:45	Possibilities in geothermal plants of low enthalpy in the Canary Islands	Juan Carlos Santamarta Cerezal (ULL)	Dr. Juan Carlos Santamarta Cerezal, INGENIA Research Group Coordinator at the University of La Laguna presented some possibilities of low enthalpy geothermal plants in Canary Islands.
11:45-12:00	"Desalination and renewable Energy" group status	Isabel Martín Mateos (ULL)	Dr. Isabel Martín Mateos, researcher at the Desalination and Renewable Energy Group at the University of La Laguna presented the projects where his group has been involved.
12:00-13:00	Round table: Research Cooperation Projects between European Insular Regions	All participants and audience	Possible collaboration projects in Training, Innovation and Research were discussed between the three insular regions.
13:45	Lunch at La Cuadra de San Diego restaurant located on a XVI century rural Canarian house in the north side of the island.		



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ANNEX IX
**Insular regions cooperation for maximizing the economic benefits from research
in Renewable Energy Sources (INRES)**

STAFF EXCHANGE REPORT

Lucía Dobarro (ITC), Penélopez Ramírez (ITC) Antje Klaesener (INNOVA), Gonzalo Piernavieja (ITC) Evangelos Atzoletakis (CANDIA), Artemis Saitakis (FORTH), George Papamichail (FORTH), Nikolas Zografakis (REAC), Julián Monedero (DobonTech), Francisco Dobon (Dobontech), Agustín González (RICAM), Marcel Meijer (BS), Bernd Garbers (SE), Jan Jantzen (SEA)
External: Michael Sarris, Odysseas Sgouros, Evangelos Charkoutsakis, Malte Claussen, Stathis Koutoulakos

Hosts:
Christof Gundert, Company Microsol

Date: 24th of May 2011

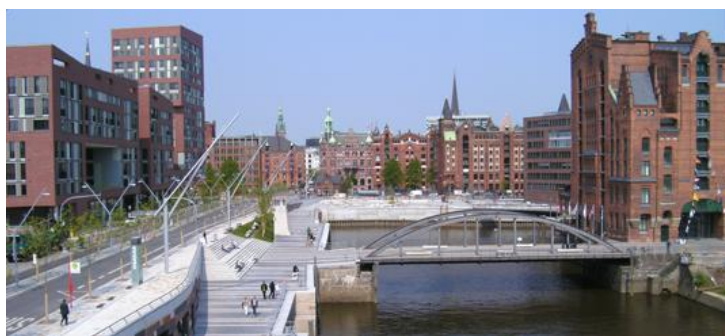
Summary: 24th of May 2011

After the interregional workshop the INRES group were guiding through the Hafen City.

HafenCity Hamburg is a project of city-planning where the old harbour quarters of Hamburg are built on with offices, hotels, shops, official buildings and residential areas. The project is one of the largest rebuilding projects in Europe in the 21st century.

The owner of the Company Microsol, Christof Gundert showed the installation of the solar plants.

A solar collector area of 1.800 qm is installed. The measure is to cover 40% of the hot water by solar energy



<http://www.hafencity.com/en/home.html>



Figure 1.
on the roof of a building
“Hafen City Hamburg”
The Canary Island delegation enjoy the view from the roof of the buildings (from left)
Julián Monedero (Dobontech)
Agustín González (RICAM)
Francisco Dobón (Dobontech)
Penélopez Ramírez (ITC)
Gonzalo Piernavieja (ITC)
Lucía Dobarro (ITC)

Time	Agenda	Hosts	Description
16:00 – 17:30	Technical Visit Hafen City Hamburg	Christof Gundert Company Microsol	After the inter-regional works the group was guiding through the technical installations of the Hafencity



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ANNEX X

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

Lucía Dobarro (ITC), Penélopez Ramírez (ITC) Antje Klaesener (INNOVA), Evangelos Atzoletakis (CANDIA), Artemis Saitakis (FORTH), George Papamichail (FORTH), Julián Monedero (DobonTech), Francisco Dobón (Dobontech), Augustín González (RICAM), Marcel Meijer (BS), Bernd Garbers (SE), Jan Jantzen (SEA)
External: Michael Sarris, Odysseas Sgouros, Evangelos Charkoutsakis, Stathis Koutoulakos

Hosts:

Danfoss Solar
Soren Sorensen, Thomas Jansen

Siemens Wind Power
Jakob Jensen, Troels K. Moller

Date: 25th of May 2011

Summary:

On the way to Denmark the group was invited by **Danfoss Solar – Power Electronics**.

The company is one of the leaders for Photovoltaic (PV) Systems. The factory produce components to convert DC power to AC power to deliver electricity to the grid system.

The group got an instruction by Soren Sorensen who was explaining the history of the company. After lunch Thomas Jansen should the production line of the solar inverters.

The company is specialized only in the inverter technology. They just got a big order of 5.000 inverters for the world biggest PV solar system south of Schleswig in Germany.



Figure 1.

Danfoss factory for solar inverter in Gråsten - Denmark



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Summary: 25th of May 2011

Siemens Wind Power

After the visit at Danfoss the group continued to Siemens Wind Power. The group got a guide by Jakob Jensen and Troels K. Moller. Both are engineers and could explain the growth of a very small company to the leader in the wind business. For few years ago the Danish company “Bonus” Wind Turbines was taking over from Siemens Wind Power. After this there were a lot of changes. Today the company has around 3.000 employees in this factory and has departments in the whole world.

During the guide the group could see how to build a wind turbine from the first step to the finishing including the test station. It was quite impressive to see the size of the turbines 2,3 MW even they didn't showed the biggest type of their machines.

For security reasons it wasn't allowed to take pictures!



Figure 2.
Troels K. Moller was explaining about the securities in the factory of Siemens Wind Power

Time	Agenda	Hosts	Description
09:00 – 11:30	Bus trip from Hamburg to Denmark		
11:30-14:00	Technical Visit	Danfoss	Danfoss Solar Host: Soren Sorensen, Thomas Jansen
13:30-15:30	Bus trip to Brande Siemens Wind Power		
15:30-17:30	Technical Visit	Siemens	Siemens Wind Power Host: Jakob Jensen, Troels K. Moller
17:45-19:15	Bus trip to the ferry port Hou		



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ANNEX XI

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

Olivier Brunet, European Commission (INRES project officer), Lucía Dobarro (ITC), Penélopez Ramírez (ITC) Antje Klaesener (INNOVA), Evangelos Atzoletakis (CANDIA), Artemis Saitakis (FORTH), George Papamichail (FORTH), Julián Monedero (DobonTech), Francisco Dobon (Dobontech), Augustín González (RICAM), Ole Hemmingsen (BS), Marcel Meijer (BS), Bernd Garbers (SE), Jan Jantzen (SEA)
External: Michael Sarris, Odysseas Sgouros, Evangelos Charkoutsakis, Stathis Koutoulakos

Hosts:

Jørgen Tranbjerg, Farmer and owner of a wind turbine
Brian Kjær, Samsø Elektro and service mechanic for wind turbines
Ole Hemmingsen Brdr. Stjerne BS
Jan Jantzen Engineer SEA
Bernd Garbers, Technical Consultant SE

Date: 26th, 27th of May 2011

Summary: 26th of May 2011

Technical Visit: on-shore-wind turbine

According the request of the INRES partner Samsø Energy Academy organized a visit to a windturbine.

Brian Kjær, Company Samsø Elektro, was answering a lot of questions from the partners. He is doing a part of the service for the on-shore turbines and has good experiences in the off-shore technology.

After a fruit full discussion the owner of the turbine Jørgen Tranbjerg could give an overview about the different forms of ownerships, production and technical staff of the 11 turbines - 1 MW each.

He explained how to claim up to the turbine. Everybody was surprised about the nice view and had a lot of questions about the technology While all of the partners were claiming down the farmer started the turbine and people could feel by normal wind condition the force of the wind!

The 11 on-shore turbines producing 100 % of the whole electricity consumption of the island



Figure 1.

on top of 1 MW wind turbine
in front Augustín González (RICAM),
Bernd Garbers (SE Academy),
Olivier Brunet (European Commission)



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Summary: 26th of May 2011

Technical visit: Company Brdr. Stjerne (BS)

After the group got fresh air on the top of a wind turbine Ole Hemmingsen from the Company. Brdr. Stjerne (Partner of the INRES project) invited for technical visit to see their exhibition in the field of renewable energy.

The company is doing a lot of installation work like heat pumps, pellet boilers, solar system, thermal and photovoltaic. Furthermore is there more and more need for ventilation systems for low energy houses.

Ole showed a good example for installations of heat recovering systems.

The INRES project gave the company the idea of more dissemination possibilities.

The local press *Samsø Posten* interviewed a part of the INRES partner.

Summary: 27th of May 2011

Technical visit: home PV panels and ground source heating

The group visited a home with newly installed photovoltaic (PV) panels. The house is also equipped with a ground source heat pump and about 2/3 of the energy for heating comes from the ground. The PV panels produce electricity, and that matches well with ground source heating, which consumes electricity. The electricity consumption, including the heat pump, is about 11 MWh per year, and the panels produce maybe half that amount. When the PV panels are active the electricity is sent to the grid through the meter (net metering); if the production is momentarily higher than the consumption in the house, the meter runs backwards. The payback period of the investment is perhaps 18 years, which is rather long for a private investor, but the owner views it as an alternative to a pension plan. The visit showed that the renewable energy island project consists not only of large projects, but certainly also of private house owners' projects on a smaller scale.



Figure 1.
Ole Hemmingsen, company Brdr. Stjerne, explains a new type of a low energy circulation pump for heating systems



Figure 2.
The PV panels cover 39 square meters of the roof.



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Summary: 27th of May 2011

Technical visit: off-shore wind park south from Samsø

On the way from Samsø to the mainland SE Academy arranged an extra appointment with the ferry company to sail close the off-shore wind park 23 MW. The captain invited the group to have nice view from the bridge so they could see the dimension of the turbines.

On the public web side - off-shore park they could see the current production of the 10 machines.

Lucía Dobarro presented the INRES project to the crew.

At the end the local captain Bo Agerskov explained his part in the Samsø energy project!



Figure 4.
Captain Bo Agerskov explain the position of the off-shore wind park



Figure 3.
View of the off-shore wind park



Figure 5.
Lucía Dobarro present the INRES project



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Time	Agenda	Hosts	Description
26 th of May 2011			
16:00 – 17:30	Technical Visit Staff exchange	J. Tranbjerg B. Kjær	Climb on a on-shore wind turbine 1 MW Experience with off-shore technology Different ownerships
17:30-18:30	Technical Visit	Ole Hemmingsen Brdr. Stjerne	Exhibition - Renewable Energy
27 th of May 2011			
15:00-16:00	Technical Visit	Jan Jantzen SEA	Private house installation: PV panels and ground source heating
16:45-17:35	Technical Visit	Bernd G. SE Academy	Ferry tour close the off-shore wind park Explanation off-shore technology

ANNEX XII
**Insular regions cooperation for maximizing the economic benefits from research
in Renewable Energy Sources (INRES)**

STAFF EXCHANGE REPORT

George Papamichail, Artemis Saitakis, (FORTH) Nikos Zografakis (REAC), Evangelos Atzoletakis (TEAB SA)

Externals:

Jan Jantzen (SEA), Athanasios Coutsolelos (UoC)

Hosts:

Crete: Foundation for Research and Technology, Regional Energy Agency of Crete, TEAB SA

In the context of INRES Project, a regional workshop with the title “*Renewable Energy Sources: Industry - Academia collaboration*” was held in Chania, Crete (PORTO PLATANIAS Hotel) in September 2011, 16th. The workshop was organised in the framework of the *1st International Conference on BioInspired Materials for Solar Energy Utilization (BIOSOL2011)*¹ by the Cretan project partners and the University of Crete (UoC).



Figure 1. During the event

The aim of the workshop was to raise awareness and bring together regional policy makers, academic community, local businesses and key stakeholders to discuss and exchange RES experiences, as well as identify opportunities for potential co-operations. It convened experienced scholars and researchers from Cretan academic and research organisations and different-level RES experts from the policy and industrial sectors. Additionally, the participated companies exhibited RES products and services during the workshop.



Figure 2. Local exhibitors: renewable energy products

¹ BIOSOL2011 was organised in September 12 -17, 2011 by the University of Crete,

Info: <http://www.biosol2011.gr>

- Over 100 experts from Academia, local industry and local and regional authorities participated in the workshop and visited the RES exhibition area.
- The target group consisted of academics, SMEs and entrepreneurs, technology experts from the RES sector, public and private authorities, development organisations, media etc.
- INRES partner Samsø Energy Agency (SEA) participated with an invited presentation. The presentation introduced the so-called 'investment balance diagrams' of various renewable energy installations: a PV panel, a wind turbine, and ground heat. All are relevant for the common house owner. The presentation emphasised the INRES collaboration and an additional one with the University of the Aegean, Greece.
- High interest of different-area participants to the topics of the workshop, and interactive participation and collaboration among them. Experts and researchers had the opportunity to exchange experiences, identify collaboration opportunities and discuss recent and future industry needs, trends and forecasts.
- Two local companies expressed interest in establishing research collaboration with universities and research institutions in order to cover technological needs and develop R&D projects. A follow up initiative to facilitate any potential collaboration will be made by the Cretan partners, exploring any future progress.
- Additional collaboration interests were expressed between the Samsø Energy Agency, Technical University of Crete and University of the Aegean. A



Figure 3 Dr. Nikos Zografakis highlights Region's RES policies.



Figure 4. Participants registration

follow up meeting took place after the completion of the workshop by representatives of all institutions.

- Regional and local media (newspapers, TV channels etc) expressed great interest for the policy promoting joint actions between Regional RES programming academia / research, and local SMEs and entrepreneurs. Interviews by Dr. Jan Jantzen, Dr. Nikos Zografakis Mr. Artemis Saitakis and Prof. Thanassis Koutsolelos were given at local TV news and newspapers.



Figure 5. Mr. Artemis Saitakis explains project objectives.

Speakers' Presentations Links

Please click on presentation titles

16.30-17.00	Registration	
17.00-17.15	Introduction	
17.15-18.15	Presentation of RTD projects	
	<i>Regional Energy Agency of Crete (REAC)</i>	RES in Crete - Opportunities for regional Innovation Dr. Nikos Zografakis, Director
	<i>University of Crete, Dept. of Chemistry</i>	BIOSOLENUTI Project Prof. Thanassis Coutsolelos
	<i>Technical University of Crete</i>	Solar application in the island of Crete. Examples of the Renewable and Sustainable Energy Lab, Technical University of Crete Zacharias Gkouskos, MSc & Associate Professor Theocharis Tsoutsos
	<i>Foundation for Research & Technology Hellas (FORTH)</i>	INRES Project Artemis Saitakis, Director, Science Technol. Park of Crete Networking opportunities for SMEs in RES sector Panagiotis Ignatiadis, FORTH, HELP-FORWARD Network ECO technologies with the use of innovative photocatalytic materials Dr. Vassilios Binas, Institute of Electronic Structure & Laser,
	<i>Technological Educational Institute of Crete</i>	Applications of Solar Energies in W. Crete Prof. John Vourdoubas, Dept. Of Natural Resources and Environment Wind Energy laboratory activities Prof. Manolis Karapidakis
	<i>Regional Innovation Council of Crete, WG "Energy"</i>	Activities and proposal for RES strategy in Crete Dr. Nikos Zografakis, WE Energy, Regional Innovation Council of Crete
18.15-19.00	International Experience	
	<i>Samsø Energy Agency, Denmark</i>	Samsøe, A Renewable Energy Island in Denmark Dr. Jan Jansen, Director
	<i>NSF center for chemical innovation solar fuels Caltech, USA</i>	Industry-Academia research cooperation Siddharth Dasgupta, Director
19.00-19.15	Coffee Break	
19.15-20.30	Presentation of Industries	

	Crete Photovoltaics SA	<u>Building quality PV systems in Crete</u> Mr. Sven Behnsen
	Megatron SA	Presentation of the activities of MEGATRON SA
	NEON ENERGY, Energy Systems AE	<u>Energy Systems</u> Mr. K. Boutos, Arch.Eng, D.P.L.G. Paris, Director
	Hyrdoclima Ltd	<u>Geothermy and BMS applications</u> Mr. N. Paranychianakis
	EcoWatt Hellas Ltd	<u>Presentation of company activities</u> Mr. John Fanourakis
	Energyworks OE	<u>Investment opportunities from small wind turbines</u> Mr. Zacharias Malliarakis,, Technical Director Mr. John Koutrakis, general Director
	Olympic Sun OE	<u>Market analysis and applications of solar thermal systems in Greece (1970-2011)</u> Mr. Alaxandros Perrakis
	Energomichaniki Kritis	<u>Presentation of company activities</u> Mr. Manolis Tsikandylakis
	Cretan Energy SA	<u>Presentation of company activities</u> Mr. Thanassis Chiras, Technical Director,
20.30-21.00	Discussion	



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ANNEX XIII

Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

Lucía Dobarro, Penélope Ramírez, Salvador Suárez, Carlos Pindao (ITC), Julián Monedero, Francisco Dobón (DobonTech), Bernd Garbers (SE), Ole Klejs Hemmingsen (BS)

Externals:

Agustín González (RICAM cluster), Guacimara Chocho (Energy Agency Las Palmas), Malte Claussen (VEH), Erik Koch Andersen, Morten Øster Kristensen and Jørgen Tranberg (Samsø farmers), Birgit Holmboe and Bengt Olof Grahn (Isle-Pact members)

Hosts:

Gran Canaria: Instituto Tecnológico de Canarias

Technical visit to the Canary Islands

This technical visit was organized on the basis request of the Samsø partners (SE and BS) with a double aim: the great interest of the farmers from Samsø to learn about the organic cultivation in the Canary Islands and the mutual interest on the Li-batterie storage system, presented during the III Inter-regional INRES workshop in Hamburg.

Date: 1st February 2012

Technical visit to R&D facilities in Pozo Izquierdo

The ITC R&D facilities are located next to the coast, in the southeast of Gran Canaria. With a surface of 109.000 sqm, it is a site with excellent renewable energy conditions.

The group visited the different labs and prototypes, presented by Penélope Ramirez from ITC, with special attention to renewable energies and biotechnology. The ITC R&D facilities were visited by INRES partners during the kick-off meeting in 2009 (see annex I). This time, the visit was oriented to the stakeholders invited by SE and BS partners: the farmers and the company VEH.

The **renewable energies** department is the biggest one of the centre. The technology developed by this department



Figure 1. INRES consortium and Samsø stakeholders in ITC, Pozo Izquierdo.



Figure 2. INRES consortium and Samsø stakeholders in Pozo Izquierdo.



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is oriented to the local sector and developing countries (solar installations, desalination systems, etc). The **biotechnology** department concentrating on algae (labs, production plants and biomass processing installations)

The projects and services presented are:

SOLAR COLLECTORS TESTING LABORATORY (LABSOL): This is a laboratory for the certification of solar collector systems. It follows the Spanish quality control systems certified by ENAC (UNE-EN ISO/IEC 17025:2005 and UNE-EN 12975-2:2006). The test performed here are:

- Exposure tests
- Internal Thermal Shock
- External Thermal Shock
- High-Temperature withstand
- Internal pressure
- Rain penetration
- Mechanical load
- Steady-state and external output
- Effective thermal capability and time constant
- Angle of incidence modifier
- Materials Corrosion

HYDROGEN facilities (RES – H2): projects developed in ITC for hydrogen production from RES. The RES2H2 project was an initiative in the framework of the 5th European Framework for the production, storage and use of hydrogen produced through water electrolysation using the energy generated by a windturbine. The system includes an electrolyser, a storage tank, 6 fuel cells, 6 inverters and dumping loads for the simulation of a village consumption. A desalination plant provides the necessary water for electrolysation as well as for supplying water for the simulated village.

The other project dealing with hydrogen production includes the use of PV system as electricity source for an electrolyser. The hydrogen got from this electrolyser is used as fuel for an electric car using fuel cells.



Figure 3. R&D facilities of ITC in Pozo Izquierdo, Gran Canaria.



Figure 4. LABSOL: Solar collector test facility.



Figure 5. Desalination plant in Tunisia working with PV system



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In the facilities there are some small wind turbines associated to different off-grid systems with energy stockage in batteries and PV systems. All different RES systems are used in the DISTRIBUTED GENERATION LABORATORY in ITC facilities. The objectives of the laboratory are:

- To study load and storage management
- Communication protocol interfaces aimed at improving management and control strategies (ITC's)
- Microgrid testing
- Distributed Generation interconnection elements testing
- Strategies for the integration of distributed generation sources (solar, wind ...) in the insular electric networks

The model of the DESALINATION system working with PV system in Tunisia was also shown to the group. The project supplies fresh water to the village Ksar Ghilène with a PV-Reverse Osmoses desalination system

Along the walk through the facilities, the group could see the wind farms and PV systems in ITC facilities for electric generation connected to the insular grid.

In the field of **biotechnology** the ITC is exploring areas that could offer new development possibilities for the agroindustrial sector of the Canary Islands. The main R&D field studies potential applications of microalgae developing processes, products and services in the biotechnology field, with direct application to industry, agriculture and the environment. There is a microalgae production facility with a raceway cultivation plant for processing of harvested biomass. This is a support to acuiculture development in the Canaries (sustainable and self- sufficient acuiculture). They are working on:

- Identification of ambient quality bioindicators and design of ecotoxicity biotests.
- Identification, selection and characterization of new organisms with potential medical, food and agroindustrial applications.



Fig 6. Stakeholders at biotech lab



Fig 7. Microalgae



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Date: 2nd February 2012

Morning session: the visit was separated in two groups:

GROUP 1:

Penélope Ramirez and Carlos Pindao (ITC), Ole Klejs Hemmingsen (BS)

Externals: Guacimara Chocho (Energy Agency Las Palmas), Erik Koch Andersen, Morten Øster Kristensen and Jørgen Tranberg (Samsø farmers)

Hosts:

Ricardo Díaz, Instituto Tecnológico de Canarias, Environmental Analysis Department

Eva García and Josefa Caballero, Mancomunidad del Sudoeste de Gran Canaria.

**Technical visit to ITC Environmental Analysis Department
in Polígono de Arinaga**

The Pesticide Residue Laboratory of the Department of environmental analysis of the ITC, which is the official laboratory of the Department of Agriculture of the Canary Government for pesticide residues, performs analysis of plant protection products residues (pesticides) in fresh vegetable products, offering an analytical service which is available, both from the Producers of fruit and vegetables in the Islands and for the Canary Public Administration (Plant Health Service of the General Directorate for Agriculture, Canary Institute of Agro-Food Quality and for the Food Safety Service of the General Directorate of Public Health) with responsibility for residues of plant protection products. The residue analysis carried out by the laboratory of the Department of Environmental Analysis, are accredited by ENAC (National Accreditation, Spain's Entity) for these commodities: banana, tomato, pepper, carrot, leek, orange, grape and tangerine. The laboratory is currently working on enlargement of the scope of their accredited analysis, on the one hand with new plant commodities: papaya, cucumber, lettuce and potato; on the other, with a greater number of analyzed pesticides.



Figure 1. ITC environmental analysis laboratory



Figure 2. Natural depuration at Santa Lucía.



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The Department not only offers its analytical service of pesticide residues to the Canary Society, moreover, applied R&D activities in their area of expertise: pesticide residues. This R&D activities are developed through trials of field and laboratory carried out in response to the demands and needs that receives the laboratory from the producers, both public and private. Trials are designed to give quick answers to the problems of the producers and the problems of the departments of the Administration in its inspection work and its efforts to support and support for agricultural production in the Islands.

Technical visit to natural depuration site in Santa Lucía

The Santa Lucía's Wastewater Natural Reclamation Systems (WWNRS) collects the wastewater from various rural hamlets and villages inside the erosion crater of the Caldera de Tirajana. The resident population is around 1,000 inhabitants and the Villa de Santa Lucía represents the most significant focus of local population. This system was designed to deal the wastewater load associated to 100 inhabitants equivalent and a daily average flow of 12.5 m³. Therefore, the system only must receive a part of the wastewater that the general pipeline habitually transports from the population to the conventional wastewater treatment plant located on the coastline, 20 km away. However, the burst in that pipeline have forced the derivation to Santa Lucia's system of all the wastewater generated in Santa Lucía. These extreme working conditions are of interest in the evaluation of the efficiency of this WWNRS, submitted to overflow and operational problems, and the benefits of mild temperatures, typical of the Canary Islands. This system has a flow-span, manually-cleaned bar screen, an old septic tank and a prefabricated Imhoff tank with 15 m³ of capacity, two parallel vertical-flow constructed wetlands (VFCW) of 150 m² each one, followed by a horizontal flow constructed wetland (HFCW) planted with *Typha latifolia* and a surface of 300 m². The whole area is complemented by a storage lagoon of treated wastewater, which may be re-used or discharged. Generally, the VFCWs has operated in alternate mode, one VFCW was set on constant mode for at least one month, to then divert the flow towards the VFCWs in repose. At the present, the VFCWs have no macrophytes and the effective treated surface is from 50 to 80 m² by the incomplete distribution of the wastewater onto wetlands surface.

Since the WWNRS was implemented, in 29th July 2008, sampling has been carried out at various points along the system.

In general, the WWNRS performances were optimum at all levels in spite of the overload. Specifically during the second year, the implication of local authorities and local agents, like farmers and artisans, has improved de performance of the system and the exploitation of the reclaimed water and the macrophytes. It is estimated that the mild temperatures have contributed favourably to optimum reduction of contaminants.

The case of the Santa Lucía WWNRS shows that it is possible to treat waste waters properly and harness resources in small towns away from central wastewater treatment plants located in mountainous areas with great variation in their flow and pollutant indicators, with low energy, maintenance and operating costs. This system offers the opportunity of re-using treated wastewater, nutrients and vegetable biomass to generate profits and promote local economic development.



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GROUP 2:

Daniel Henriquez, Fco. Javier Rocha, Carlos Pindao, Francisco Julián Domínguez (ITC), Bernd Garbers (SE) Externals: Ana Rodríguez (University of Las Palmas de GC), Guacimara Chocho (Energy Agency Las Palmas), Malte Claussen (VEH)

Hosts: Instituto Tecnológico de Canarias (ITC)

The invitation of the ITC is based on the presentation from Malte Claussen on 24.05.2011 on the III interregional workshop of the INRES group in Hamburg. The issue presented for the storage of energy (electricity) in battery storage systems from Li-Ion batteries and the scope for self-consumption optimization has been received with great interest at the workshop. The topics presented are based on current technical developments for battery storage technology.

Topic 1: Energy Storage.

- Report on the development of a new energy storage device based on Li-ion batteries
- Design and technology of the lithium-ion batteries, new generation of Li-based titanium oxide
- Design of energy storage, housing design, one slot for Plug + Play Technology
- Estimated market

Topic 2: Solutions for the optimization of own consumption of electricity from renewables.

- Introduction and system requirements.
- Basic Technology.
- Power supply, custom and equity reasons for the optimization of own consumption
- Hardware and system components
- Suggested solutions based on commercially available system components

Topic 3 Presentation of a new solar inverter concept with optimized power consumption and battery manager.

- Principle and technology of the Power Router
- Presentation of the backbone technology
- Presentation of the "self use" contacts for automatic switchover to emergency power consumption or
- Function of the battery manager
- Monitoring, smart metering and remote monitoring of its own power grid using the Power Router



Figure 1. Li-batterie. Storage design



Figure 2. Malte Claussen (VEH)



Figure 3. Technical group (ITC)



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STUDY VISIT AGENDA Canary Islands

Date: 1-2 February 2012

INSTITUTO TECNOLÓGICO DE CANARIAS, S.A. Playa de Pozo Izquierdo, Gran Canaria

Date: 2-3 February 2012

Gorona del Viento and Farmers, El Hierro

Date	Time	Participants	Description
01/02/2012	09:00 – 09:30	ITC, SEA, Brdr, Dobontech	Arrival and ITC presentation
	09:30 – 10:30	Inres stakeholders	Visit to R&D facilities Pozo Izquierdo
	10:30 – 12:00	Isle-pact partners	Coffee-break
	12:00 – 13:00	Inres partners	INRES meeting
	13:00 – 14:00		Lunch
	14:00 – 17:00	Inres partners IslePact partners	INRES meeting
	17:00 – 18:00	Inres partners	INRES – Isle Pact meeting
	20:00	ITC, SEA, Brdr, Dobontech Inres stakeholders Isle-pact partners	Dinner in Las Palmas de Gran Canaria
02/02/2012	09:30 – 10:00	ITC, SEA, Brdr, o.m.t Inres stakeholders	Visit to ITC environmental analysis department Arinaga
	10:00 – 13:00 (parallel sessions)	Inres stakeholders (farmers)	Visit to depuradora Sta Lucía
	10:00 – 13:00 (parallel sessions)	ITC, SEA, Brdr, VEH	Technical meeting
	13:00 - 14:00	ITC, SEA, Brdr, o.m.t, ULPGC, RICAM Inres stakeholders	Lunch
	14:00		Trip to El Hierro
	17:00 – 19:00	ITC, Dobontech, SEA, Brdr Inres stakeholders	Technical visits RES: El Hierro 100% RES Project construction sites: lower reservoir, pumped storage power plant and wind farm.
03/02/2012	9:00 – 10:30		Technical visits agriculture and farming: Cabildo de El Hierro experimental crops.
	10:30 – 12:00		Ecological crops with local farmers
	12:00 – 13:00		El Hierro 100% recyclable workshop
	13:00 – 14:00		Lunch
	15:00		Trip to Gran Canaria



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STUDY VISIT, participants' CVs

Region:	Samsø (Denmark)
Sector:	Renewable energy technical consultant and installers (INRES partners)
Brief CV:	Bernd Garbers , Samsø Energy Academy. Technician for the heating and air conditioning. 3 years study energy supply and energy savings. 1995 starting a Solar Company in Germany, development of middle size thermal solar systems. 2001 working in Denmark, energy consultants, since 2009 development and consultant for the renewable energy project on Samsø
Brief CV:	Ole Hemmingsen , the owner and director of Brdr. Stjerne K.S., is educated as plumber, and has later advanced his knowledge with authorization inside plumbing and draining. Ole Hemmingsen is also certified installer of solar thermal plants, and certified as controller of oil and wood furnace installations. Ole Hemmingsen is approved as installer of heat pump systems.
Sector:	Farmers (INRES stakeholders)
Brief CV:	My name is Jørgen Tranberg , 57 years, married with 3 children. I have lived on the island for 28 years. Exploit an ordinary dairy-farm with 140 cows, on 140ha of which 40ha is being leased. Additional 60ha natural hills grazed by Highland Cattle. Apart from agriculture I have invested in one Siemens 1MW wind-turbine behind the farm, one half 2.3MW Siemens offshore wind-turbine and 140kW PV-installations in Germany. I'm Chairman of Samsø Havvind which was in charge of the construction of 10 2.3MW off-shore wind turbine south of the island. Member of the board of HÅB, a project which is developing a 20 wind turbines strong wind park in the Bay of Aarhus north of Samsø. I'm chairman of the Samsø Energy and Environment Office: the association of locals, who is interested in and takes part in the Samsø Renewable Energy-project.
Brief CV:	Morten Øster Kristensen age: 43 Organic Farmer. 200 ha plant production with grain and grass-seed. Storeing, drying, and cleaning of the crops are done at the farm. Heating system in the main-house and other buildings is provided by waiste from the crop-cleaning process. Also own windmill 1 Mw.
Brief CV:	Erik Koch Andersen : organic farmer, age 66. 11 hectar land, 14 red cows (old types), production of rapset, own production of rapset oil for his own car and traktor! Sustainable energy production with a solarsystem thermal and photovoltaic.
Region:	Hamburg (Germany)
Sector:	Solutions for self-consumption optimization
Brief CV:	Malte Claussen , German Company: VEH Physicist and general manager of the company VEH, specialized in renewable energies (solar pv, solar thermal and bioenergy like pellets)
Region:	Canary Islands (Spain)
RES sector:	Renewable energy cluster, managing director (External INRES expert)
Brief CV:	Agustín González , AEI-Cluster RICAM has managed projects with public funding for more than 7 years in business related areas such as R&D, innovation, quality management, environment, business intelligence, etc. Has acted as advisor on public policy R&D, information society, internal market, globalization, taxation, industrial regulation, and others. He has also participated in working groups in awareness campaigns, surveys and promoting entrepreneurship.
RES sector:	Renewable energy expert (INRES partner)



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Brief CV:	Julián Monedero , Dobon's Technology, has a degree in Physics at the University of La Laguna (Canary Islands, Spain) and is co-founder of DOBONTECH where he has been working as Managing Director and Quality Assurance Director during six years. Since 2008 he is the President of AEMER (Association of environmental management and renewable energy companies of Santa Cruz de Tenerife) He has been one of the promoters of RICAM cluster.
RES sector:	Renewable energy expert (INRES partner)
Brief CV:	Francisco Dobón is founder of DOBONTECH and principal researcher in the Company. He has more than twenty years of experience in the field of power electronics and communication (power transmitters for TV and Radio) at RTVE (Spanish National Radio Television Company). He has a degree in Technical Mechanics from the Industrial School of Teruel (Spain) and has high skill in mechanical design and development, collaborating in the manufacturing of high precision parts for renewable energy projects and electro-medical projects. He has been the research leader of the main research projects of DOBONTECH since its foundation.
RES sector:	Renewable energy expert (INRES partner)
Brief CV:	Penélope Ramírez , Instituto Tecnológico de Canarias, S.A. has a PhD in Mechanical Engineering. At the ITC, she has been involved in several European projects dealing with, stand-alone renewable energy systems for electricity generation and hydrogen production in FP5, CIP and Interreg programs. She participates in projects to assess the technical and economic feasibility of the introduction of RES in islands as well as in training and dissemination activities concerning renewable energy technologies. She has experience in dealing with Institutions and enterprises in North African countries: planning and programming for a desalination station driven through PV energy in Tunisia, elaboration of a plan for the promotion of RES in Morocco, participation in the elaboration of the Wind Map of Mauritania and participation as speaker in several seminars related to renewable energies. She collaborates currently in the INRES, an EU Project for Islands in Renewable Energies" FP7-Regions of Knowledge programme.
RES sector:	Technology transfer, project management (INRES partner)
Brief CV:	Lucía Dobarro Delgado , Instituto Tecnológico de Canarias, S.A. has Electronic Engineering and MBA degrees. At the ITC, she has been involved in over twenty European projects dealing with ICT, innovation networks, energy and entrepreneurship in FP5, FP6, FP7, CIP and Interreg programs since 1999. She is currently Head of Section at the innovation networks and international project department leading, INRES Project. She is responsible of the Erasmus for the Young Entrepreneurs Programme in remote regions of Europe and member of the Enterprise Europe Network and also train business people and students in innovation management. She is preparing a Ph.D. in international entrepreneurship.



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ANNEX XIV Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

Lucía Dobarro (GOBCAN-ITC), Francisco Dobón (DobonTech), Bernd Garbers (SE) and Ole Klejs Hemmingsen (BS)

Externals:

Malte Claussen (VEH), Erik Koch Andersen, Morten Øster Kristensen and Jørgen Tranberg (Samsø farmers), Birgit Holmboe and Bengt Olof Grahn (Isle-Pact members)

Hosts:

Cristina Morales, Gorona del Viento and Cabildo Insular El Hierro

Date: 2nd February (afternoon) and 3rd February 2012

Technical visit to El Hierro island

The visit has been organised, upon request of Samsø partners, to exchange experiences among Samsø farmers, involved in RES activities and El Hierro stakeholders involved in the 100% RES project and organic farming. Isle-Pact members from Samsø and Gotland also joined the visits.

El Hierro 100% RES project

The ambitious objective of making the island of El Hierro 100% RES includes the installation of a mixed system of electricity production, combining a wind farm with a hydroelectric power station. The Government of the Island El Hierro (Cabildo de El Hierro), Endesa (the local utility) and ITC are collaborating in the project to meet the island's electricity demand entirely from RES.

The supply will be ensured by a mixed system comprising a 11,5 MW wind farm composed by five wind turbines, placed in the North East of the island and a hydroelectric pump-storage power station with a system of artificial lakes. This water runs downhill through a pipeline to sea level, where it drives a turbine. Output can be varied to match demand, thus guaranteeing sufficient electricity supply.

The status of development of the project can be followed



Figure 1. El Hierro 100% RES project, upper reservoir.



Figure 2. El Hierro 100% RES project, phases of development.



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at <http://www.goronadelviento.es> Gorona del Viento a company owned by Cabildo de El Hierro, Endesa and ITC, for the development and promotion of El Hierro 100% RES project.

El Hierro organic farming

The group visited the *Finca Experimental Cabildo El Hierro*, an Experimental Farm located in Frontera, for testing organic farming methods, such as the biological pest control. As an example, the farm developed a project to control mealybug, which mainly affects the banana, by reproducing population of *Cryptolaemus*, an insect that feeds exclusively on this mealybug and its natural enemy. The project includes the breeding of this insect for later release.

Visit to local farmers It was of special interest to the stakeholders the visit to local farmers using organic farming techniques such as crop rotation, green manure, compost and biological pest control. In figure 4 we can see a case of crop rotation with the incorporation of goats (mixed farming). This interaction between the animal, the land and the crops are done on a small scale. Crop residues provide animal feed, while the animals provide manure for replenishing crop nutrients and draft power. As an additional benefit, the goats provide milk and act as a cash crop in the times of economic hardship.

El Hierro 100% recyclable

On the 3rd of February, the Cabildo de El Hierro organized the First Workshop El Hierro 100% recyclable, to discuss the new strategy of waste management towards Zero Waste. The objective of El Hierro island is to become a World reference in waste management, increasing levels of recycling and working for the minimization of waste production. During the workshop, the INRES stakeholders and partners had the opportunity to exchange ideas and experiences with the local authorities. The group had also a meeting with the responsible of environment policies in the island, Mr. Juan Rafael Zamora Padrón, who showed great interest on the Samsø 100% RES achievements.



Figure 3. Wind farm, construction site.



Figure 4. Ecological agriculture. El Hierro experimental farm.



Figure 5. Ecological agriculture with local farmers.



Figure 6. El Hierro 100% recyclable workshop



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STUDY VISIT AGENDA Canary Islands

Date: 1-2 February 2012

INSTITUTO TECNOLÓGICO DE CANARIAS, S.A. Playa de Pozo Izquierdo, Gran Canaria

Date: 2-3 February 2012

Gorona del Viento and Farmers, El Hierro

Date	Time	Participants	Description
01/02/2012	09:00 – 09:30	ITC, SEA, Brdr, Dobontech	Arrival and ITC presentation
	09:30 – 10:30	Inres stakeholders	Visit to R&D facilities Pozo Izquierdo
	10:30 – 12:00	Isle-pact partners	Coffee-break
	12:00 – 13:00	Inres partners	INRES meeting
	13:00 – 14:00		Lunch
	14:00 – 17:00	Inres partners IslePact partners	INRES meeting
	17:00 – 18:00	Inres partners	INRES – Isle Pact meeting
02/02/2012	20:00	ITC, SEA, Brdr, Dobontech Inres stakeholders Isle-pact partners	Dinner in Las Palmas de Gran Canaria
	09:30 – 10:00	ITC, SEA, Brdr, o.m.t Inres stakeholders	Visit to ITC environmental analysis department Arinaga
	10:00 – 13:00 (parallel sessions)	Inres stakeholders (farmers)	Visit to depuradora Sta Lucía
	10:00 – 13:00 (parallel sessions)	ITC, SEA, Brdr, VEH	Technical meeting
	13:00 - 14:00	ITC, SEA, Brdr, o.m.t, ULPGC, RICAM Inres stakeholders	Lunch
	14:00		Trip to El Hierro
	17:00 – 19:00	ITC, Dobontech, SEA, Brdr Inres stakeholders	Technical visits RES: El Hierro 100% RES Project construction sites: lower reservoir, pumped storage power plant and wind farm.
03/02/2012	9:00 – 10:30		Technical visits agriculture and farming: Cabildo de El Hierro experimental crops.
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	15:00		Trip to Gran Canaria



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STUDY VISIT, participants' CVs

Region:	Samsø (Denmark)
Sector:	Renewable energy technical consultant and installers (INRES partners)
Brief CV:	Bernd Garbers , Samsø Energy Academy. Technician for the heating and air conditioning. 3 years study energy supply and energy savings. 1995 starting a Solar Company in Germany, development of middle size thermal solar systems. 2001 working in Denmark, energy consultants, since 2009 development and consultant for the renewable energy project on Samsø
Brief CV:	Ole Hemmingsen , the owner and director of Brdr. Stjerne K.S., is educated as plumber, and has later advanced his knowledge with authorization inside plumbing and draining. Ole Hemmingsen is also certified installer of solar thermal plants, and certified as controller of oil and wood furnace installations. Ole Hemmingsen is approved as installer of heat pump systems.
Sector:	Farmers (INRES stakeholders)
Brief CV:	My name is Jørgen Tranberg , 57 years, married with 3 children. I have lived on the island for 28 years. Exploit an ordinary dairy-farm with 140 cows, on 140ha of which 40ha is being leased. Additional 60ha natural hills grazed by Highland Cattle. Apart from agriculture I have invested in one Siemens 1MW wind-turbine behind the farm, one half 2.3MW Siemens offshore wind-turbine and 140kW PV-installations in Germany. I'm Chairman of Samsø Havvind which was in charge of the construction of 10 2.3MW off-shore wind turbine south of the island. Member of the board of HÅB, a project which is developing a 20 wind turbines strong wind park in the Bay of Aarhus north of Samsø. I'm chairman of the Samsø Energy and Environment Office: the association of locals, who is interested in and takes part in the Samsø Renewable Energy-project.
Brief CV:	Morten Øster Kristensen age: 43 Organic Farmer. 200 ha plant production with grain and grass-seed. Storeing, drying, and cleaning of the crops are done at the farm. Heating system in the main-house and other buildings is provided by waiste from the crop-cleaning process. Also own windmill 1 Mw.
Brief CV:	Erik Koch Andersen : organic farmer, age 66. 11 hectar land, 14 red cows (old types), production of rapset, own production of rapset oil for his own car and traktor! Sustainable energy production with a solarsystem thermal and photovoltaic.
Region:	Hamburg (Germany)
Sector:	Solutions for self-consumption optimization
Brief CV:	Malte Claussen , German Company: VEH Physicist and general manager of the company VEH, specialized in renewable energies (solar pv, solar thermal and bioenergy like pellets)
Region:	Canary Islands (Spain)
RES sector:	Renewable energy cluster, managing director (External INRES expert)
Brief CV:	Agustín González , AEI-Cluster RICAM has managed projects with public funding for more than 7 years in business related areas such as R&D, innovation, quality management, environment, business intelligence, etc. Has acted as advisor on public policy R&D, information society, internal market, globalization, taxation, industrial regulation, and others. He has also participated in working groups in awareness campaigns, surveys and promoting entrepreneurship.
RES sector:	Renewable energy expert (INRES partner)



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Brief CV:	Julián Monedero , Dobon's Technology, has a degree in Physics at the University of La Laguna (Canary Islands, Spain) and is co-founder of DOBONTECH where he has been working as Managing Director and Quality Assurance Director during six years. Since 2008 he is the President of AEMER (Association of environmental management and renewable energy companies of Santa Cruz de Tenerife) He has been one of the promoters of RICAM cluster.
RES sector:	Renewable energy expert (INRES partner)
Brief CV:	Francisco Dobón is founder of DOBONTECH and principal researcher in the Company. He has more than twenty years of experience in the field of power electronics and communication (power transmitters for TV and Radio) at RTVE (Spanish National Radio Television Company). He has a degree in Technical Mechanics from the Industrial School of Teruel (Spain) and has high skill in mechanical design and development, collaborating in the manufacturing of high precision parts for renewable energy projects and electro-medical projects. He has been the research leader of the main research projects of DOBONTECH since its foundation.
RES sector:	Renewable energy expert (INRES partner)
Brief CV:	Penélope Ramírez , Instituto Tecnológico de Canarias, S.A. has a PhD in Mechanical Engineering. At the ITC, she has been involved in several European projects dealing with, stand-alone renewable energy systems for electricity generation and hydrogen production in FP5, CIP and Interreg programs. She participates in projects to assess the technical and economic feasibility of the introduction of RES in islands as well as in training and dissemination activities concerning renewable energy technologies. She has experience in dealing with Institutions and enterprises in North African countries: planning and programming for a desalination station driven through PV energy in Tunisia, elaboration of a plan for the promotion of RES in Morocco, participation in the elaboration of the Wind Map of Mauritania and participation as speaker in several seminars related to renewable energies. She collaborates currently in the INRES, an EU Project for Islands in Renewable Energies" FP7-Regions of Knowledge programme.
RES sector:	Technology transfer, project management (INRES partner)
Brief CV:	Lucía Dobarro Delgado , Instituto Tecnológico de Canarias, S.A. has Electronic Engineering and MBA degrees. At the ITC, she has been involved in over twenty European projects dealing with ICT, innovation networks, energy and entrepreneurship in FP5, FP6, FP7, CIP and Interreg programs since 1999. She is currently Head of Section at the innovation networks and international project department leading, INRES Project. She is responsible of the Erasmus for the Young Entrepreneurs Programme in remote regions of Europe and member of the Enterprise Europe Network and also train business people and students in innovation management. She is preparing a Ph.D. in international entrepreneurship.



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ANNEX XV: Insular regions cooperation for maximizing the economic benefits from research in Renewable Energy Sources (INRES)

STAFF EXCHANGE REPORT

Jan Jantzen (SEA) visited *University of La Laguna, Tenerife.*

Hosts:

Professor Ricardo Guerrero, Director of the Energy and Climate Change Program at University of La Laguna, in collaboration with INRES partner Julian Monedero, Dobontech.

Date: 10 Feb 2012

Summary. A visit to Tenerife provided an opportunity to create a joint activity between INRES and another EU project named PROMISE. Jan Jantzen presented both projects at the University of La Laguna, ULL, to approximately 20 students and staff of the energy and climate change program. The one hour presentation had the title: Energy Efficient Behaviour in Homes of Tenerife. Before the presentation Jan Jantzen was interviewed for a video about the INRES project. After the presentation one student asked about possibilities for an internship with the Samsø Energy Agency, and this was investigated further by email after the return to home. The event was a positive outcome of the close contacts that the INRES project has established between the participants.



Figure 1. Ready to look for energy savings in an apartment in Santa Cruz.

Home energy savings

Most people have only a vague idea of how much energy they spend in their home, and it is unclear what difference it makes to change the daily behaviour or make a small investment in for instance weather strips that seal doors and windows against wind.

We enter households, if the owners wish, and advise them how to reduce their gas and electricity consumption (Fig. 1). Except for the mountains, Tenerife has a mild climate, compared to the other participating islands, so one would think there is not much to save on heating / cooling expenses. On the other hand, if it is possible for the household to change the indoor temperature by one degree, as much as one third of that energy can be saved, because the temperature difference to the outside is three degrees.

In a home energy check in Tenerife it pays to focus on electric water heaters, electric equipment, and gas cookers. Figure 2 illustrates that it is a good investment to switch to energy saving bulbs. The diagram is one tool we use to make the home owners aware of energy savings.

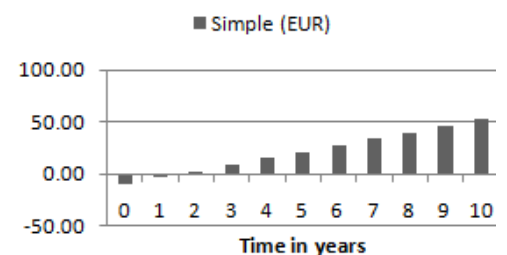


Figure 2. Investment account. Replacing an incandescent lamp by an energy saving lamp is paid back in two years with Tenerife prices.



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It was actually difficult to find large energy savings. The homes we visited were all very energy conscious. Hot water heaters seem to be the largest energy consumers.

Tenerife has 25 bioclimatic houses designed by architects from various countries (Fig. 3). These consume very little energy. A bioclimatic house attempts to keep a comfortable temperature indoor just by its construction. The house in the figure had an air duct hidden in the cement table outside, which provides natural cooling inside in the summer time. But notice that the average outdoor temperature varies relatively little, it is 21 degrees +/- 3 degrees over the whole year.



Figure 3. Bioclimatic house (La Tea) in ITER near the Sur airport.

Conclusions

Tenerife has only 3% renewable energy, so there is apparently a large potential. The homes we visited spent very little energy, but we found about 10% energy savings.

It was a good opportunity to present the two projects to an interested audience of students and staff. They constitute a potential multiplier for technology transfer.

It would make good sense to start an educational collaboration between the INRES islands. Students could receive courses, accredited by universities in Crete and Tenerife, and combine the theoretical knowledge with field trips to the other islands.

References

Jantzen J (2012): *Energy Efficient Behaviour in Homes of Tenerife*. Seminar at University of La Laguna, Tenerife, Feb 2012 (slides [www.inresproject.eu])

Time	Agenda	Hosts	Description
13:00 - 13:30	Camera interview	ITC	Two producers interviewed JJ for a video about the INRES project.
13:30 - 14:30	Presentation by Jan Jantzen	ULL	Energy Efficient Behaviour in Homes of Tenerife.