Renewable energy, opportunities for rural development in the province of Castellón

Results and experiences of the IN2RURAL project

Thursday, June 15, 2017
Llotja del Cànem (Castellón)

IN2RURAL

Innovative Practices
in Renewable Energies
to improve rural
employability

UNIVERSITAT JAUME·I

Co-funded by the
Erasmus+ Programme
of the European Union

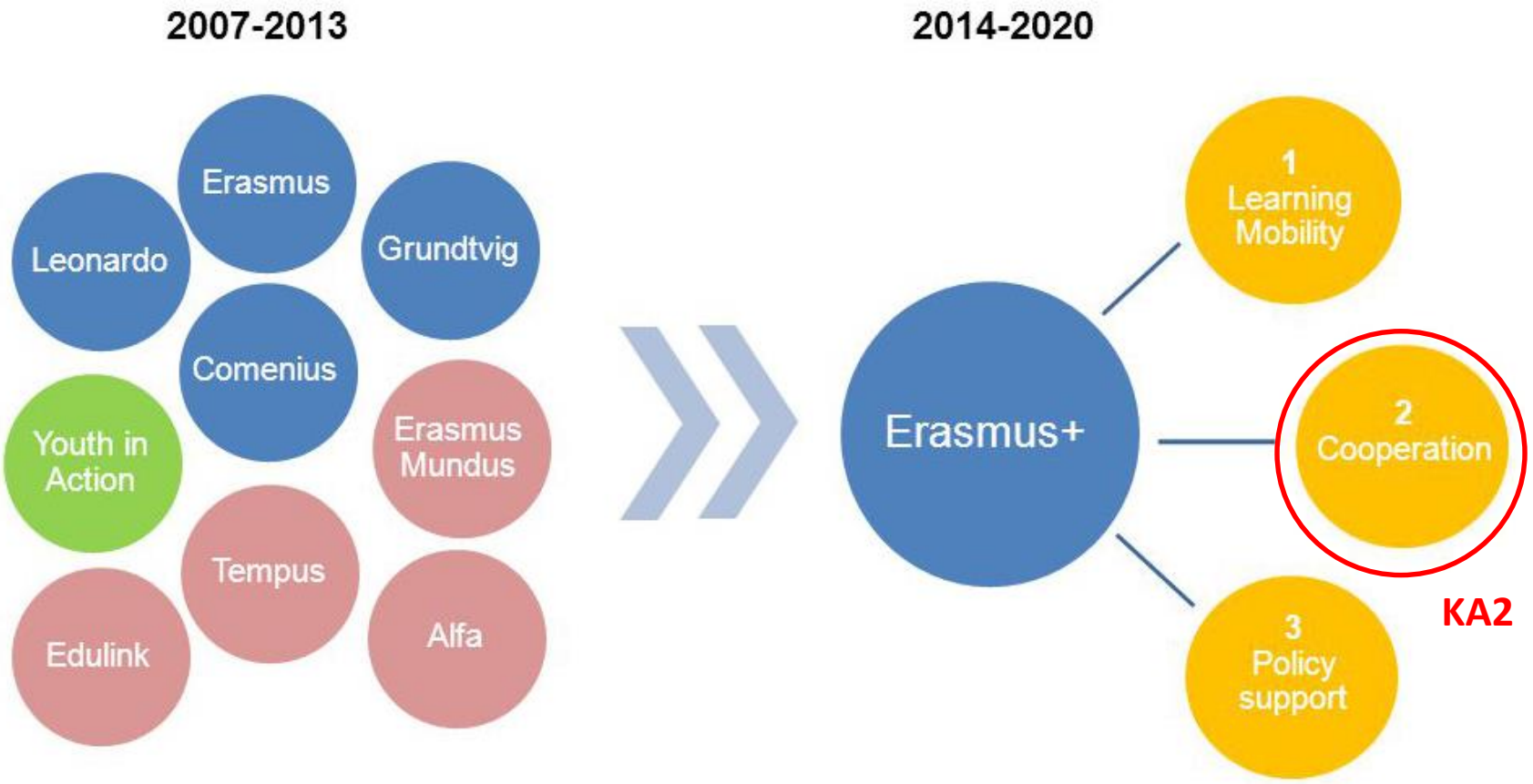
ERASMUS+ (Strategic Associations, Higher Education)

IN2RURAL Innovative Practices in Renewable Energies to Improve Rural Employability

1. Erasmus + KA2 Introduction
2. IN2RURAL proyect
   - Project Summary
   - Results and experiences

Co-funded by the Erasmus+ Programme of the European Union

1. INTRODUCTION: Erasmus +

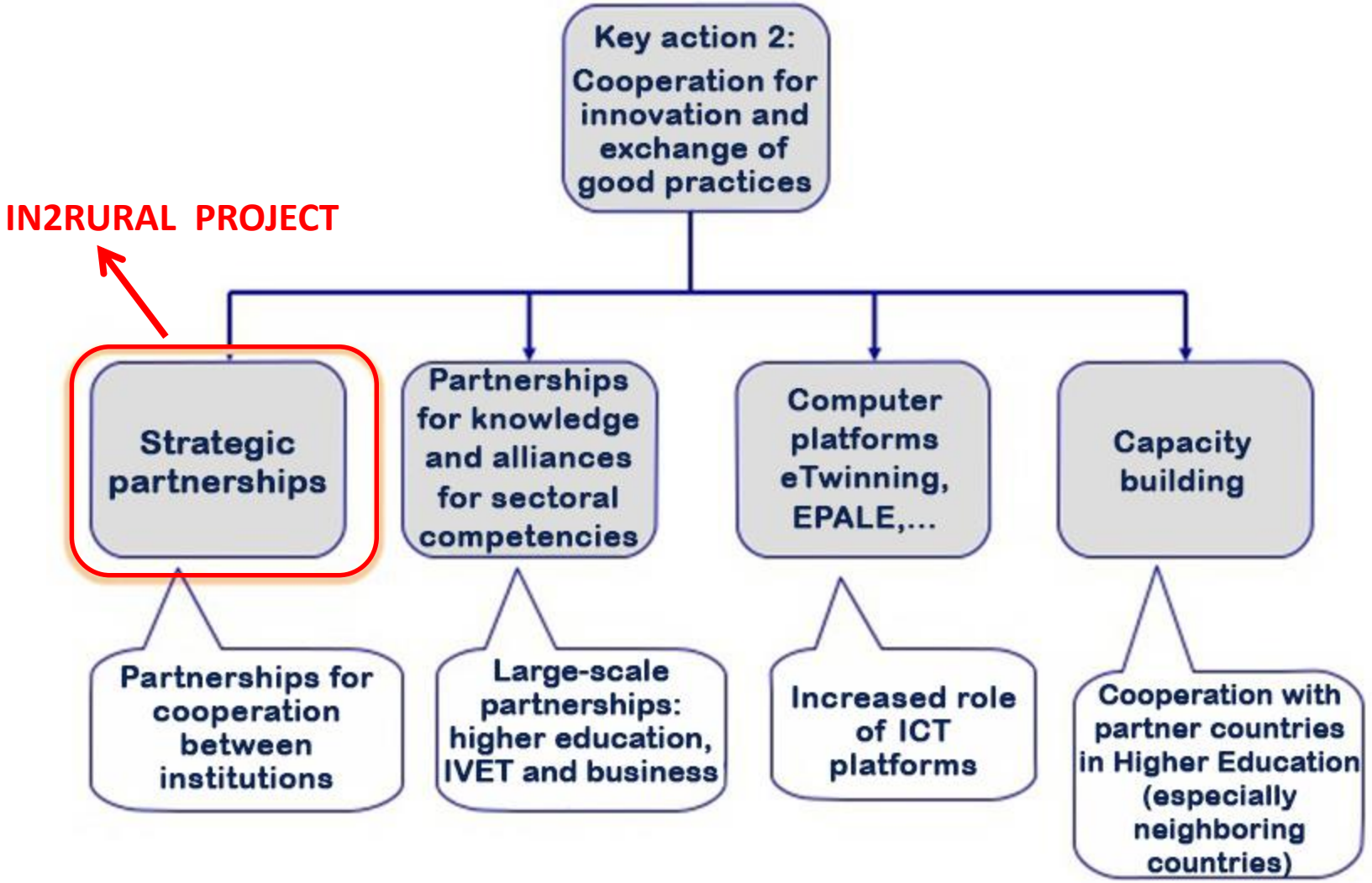


- **European program of education, training, youth and sport 2014-2020**
- **Objective: to improve skills and employability and modernize education, training and youth work**

Co-funded by the Erasmus+ Programme of the European Union

1. INTRODUCTION: Erasmus +

Key action 2. Cooperation for innovation



Co-funded by the Erasmus+ Programme of the European Union

2. IN2RURAL: Proyect summary

“Innovative Practices in Renewable Energies to Improve Rural Employability”

IN2RURAL

• In the 2014 call, in Spain 124 projects were presented and 13 were awarded. IN2RURAL was the 4th highest rated

•Participate: **3 universities and 3 enterprises** from RREE of Spain, Romania and Hungary (coordinates UJI)

• Duration of the project: **3 years** (1/09/2014 – 30/08/2017)

http://www.in2rural.ub.ro/

UNIVERSITAT JAUME·I

umans Urbanisme i Medi Ambient

Universitatea "Vasile Alecsandri" din Bacau

GENERAL ELECTRIC SOLUȚII DE CALITATE 0,4 - 400 KV

KÁROLY RÓBERT FŐISKOLA

GEOLIN

Co-funded by the Erasmus+ Programme of the European Union

2. IN2RURAL: Proyect summary

OBJECTIVES

- To promote the **training and employment of university students** in the field of renewable energies aimed at rural socio-economic development
- Applying training to the **development of initiatives** in this field
- **Dissemination** of good practices linking renewable energies and rural development

Co-funded by the Erasmus+ Programme of the European Union

2. IN2RURAL: Project summary

Some project results:

OPEN ACCESS

- Guide for training needs for rural development
- Online courses:
  - Technical English for renewable energies
  - Renewable energies for rural development
  - Search for employment and entrepreneurship in renewable energies for rural development
- Internships in Enterprise: case study development where the use of renewable energies for rural development is proposed (students tutored by University + company)
- Guide on renewable energies for small towns

Besides…..

- Dissemination activities open to the general public
- Active dissemination (press, video, web, facebook, youtube ...)
- Network of collaborators with different profiles in the project

El Mundo - Castellón al Día - 06/02/2015

La UJI promoverá prácticas sobre energías renovables

El proyecto tiene una duración de tres años e integra a universidades y pymes de Rumanía y Hungría

Co-funded by the Erasmus+ Programme of the European Union

2. IN2RURAL: Project results

Study of training needs of renewable energies for rural development

I. Introduction

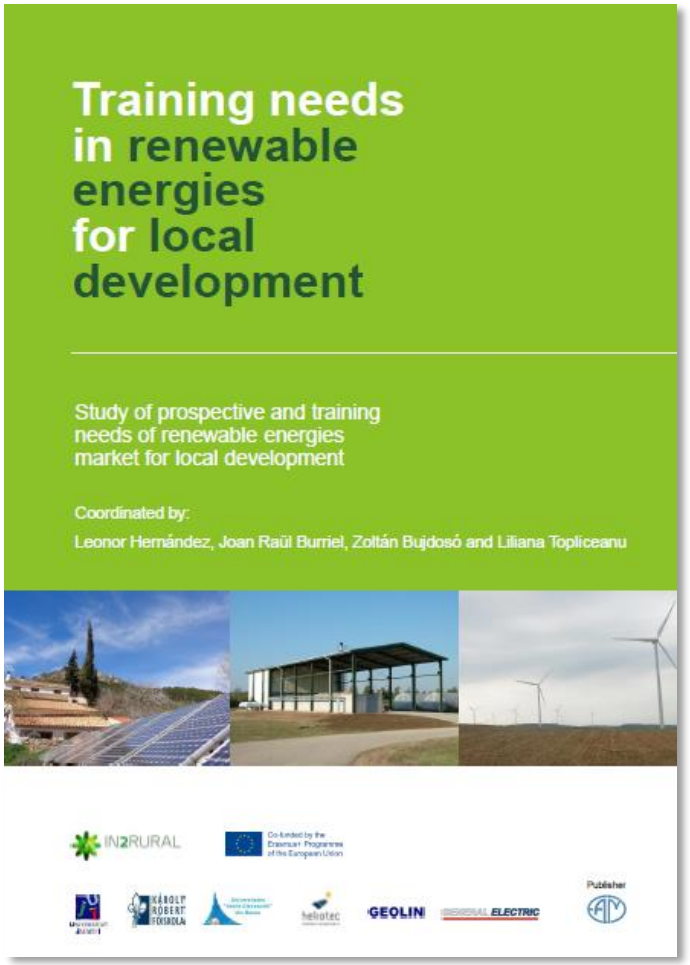
II. Metodology

III. Castellón (Spain)

IV. Bacau (Romania)

V. Gyöngyös (Hunggary)

VI. Comparison of the 3 cases



http://www.in2rural.ub.ro/index.php/proj-products
http://repositori.uji.es/xmlui/handle/10234/154485

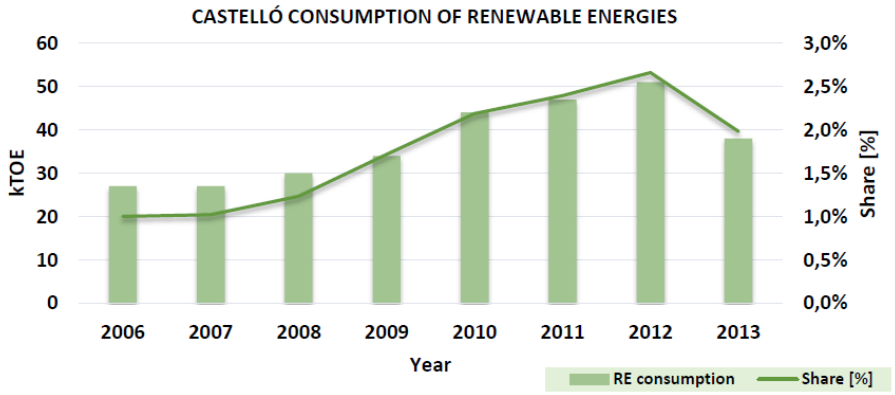
Co-funded by the Erasmus+ Programme of the European Union

2. IN2RURAL: project results

Study of training needs of renewable energies for rural development: CASTELLÓN

PART 1. CONTEXT

- Definition of study territory
- Socioeconomic diagnosis



PARTE 2. RREE AND DEVELOPMENT

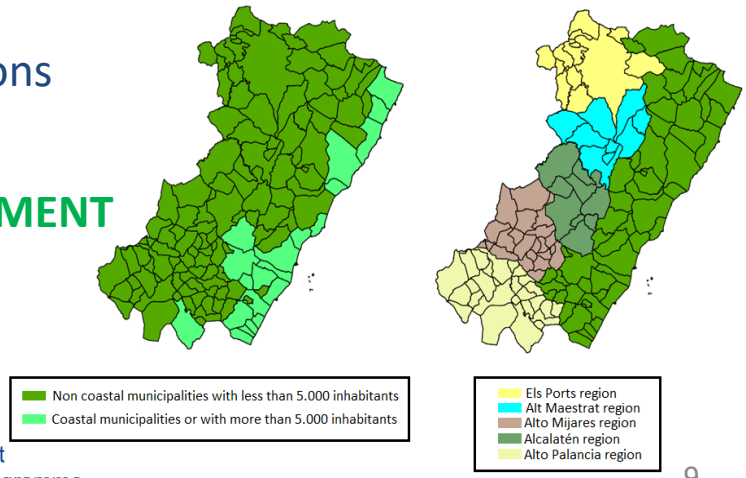
- Energy situation
- Development of RREE
- Employment and RREE
- Legislation RREE

PARTE 3. ACTORS MAP OF RREE- CS

- Local government, business sector, associations
- Schools

PART 4. TRAINING, RREE AND RURAL DEVELOPMENT

- General classification of the training offer
- Available training sheets available



OPEN ACCESS
Co-funded by t
Erasmus+ Programme
of the European Union

2. IN2RURAL: Project results

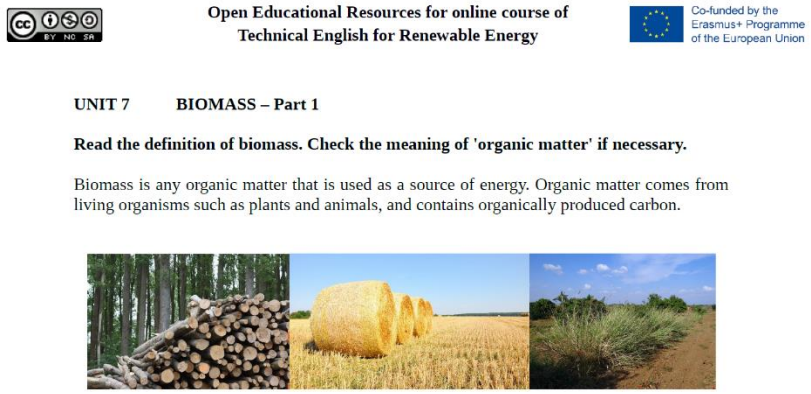
Online course 1: Technical English for RREE

Date:
- February 2016

Nº participants:
- 30 enrolled

Academic value:
- 0,5 ECTS

Course content (12 units)
- RREE and rural development
- Photovoltaic power
- Biomass
- Wind power

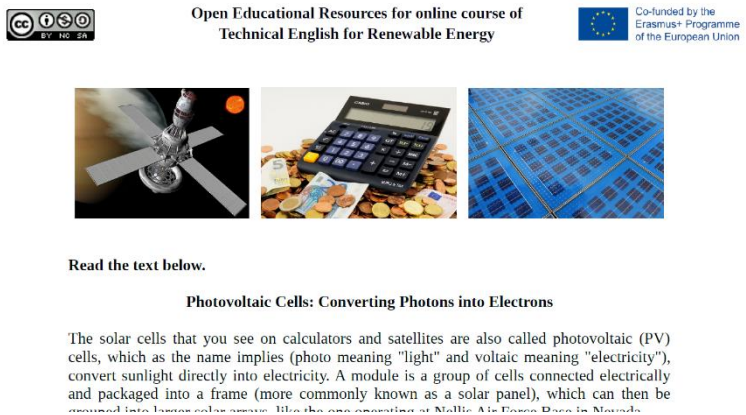

Open Educational Resources for online course of Technical English for Renewable Energy

Co-funded by the Erasmus+ Programme of the European Union

UNIT 7 BIOMASS – Part 1

Read the definition of biomass. Check the meaning of 'organic matter' if necessary.

Biomass is any organic matter that is used as a source of energy. Organic matter comes from living organisms such as plants and animals, and contains organically produced carbon.


Open Educational Resources for online course of Technical English for Renewable Energy

Co-funded by the Erasmus+ Programme of the European Union

Read the text below.

Photovoltaic Cells: Converting Photons into Electrons

The solar cells that you see on calculators and satellites are also called photovoltaic (PV) cells, which as the name implies (photo meaning "light" and voltaic meaning "electricity"), convert sunlight directly into electricity. A module is a group of cells connected electrically and packaged into a frame (more commonly known as a solar panel), which can then be

http://in2rural.karolyrobert.hu/?lang=en

2. IN2RURAL: Project results

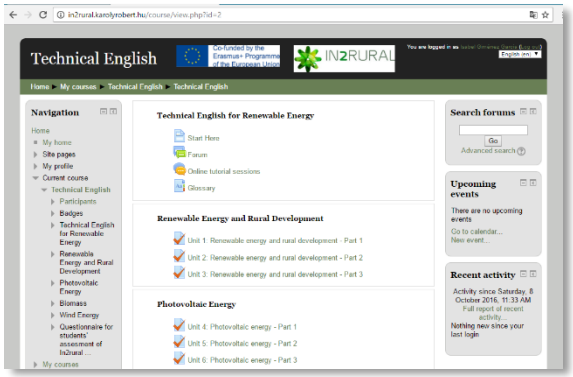
Online course 1: Technical English for RREE

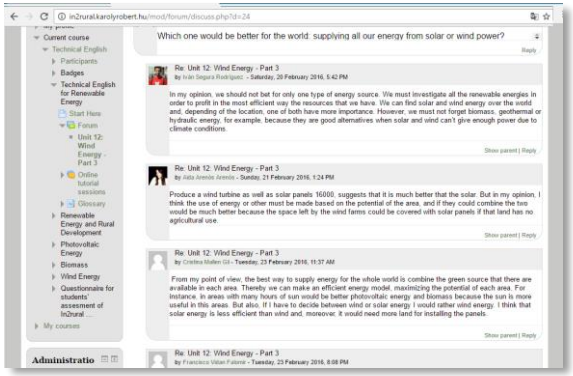
Srudent support:

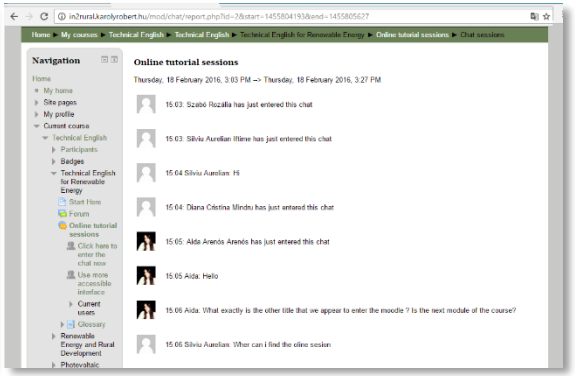
- Start here
- Forum
- Online tutorial sessions
- Glossary

Evaluation criteria:

- Tests
- Participation in forums







2. IN2RURAL: Project results

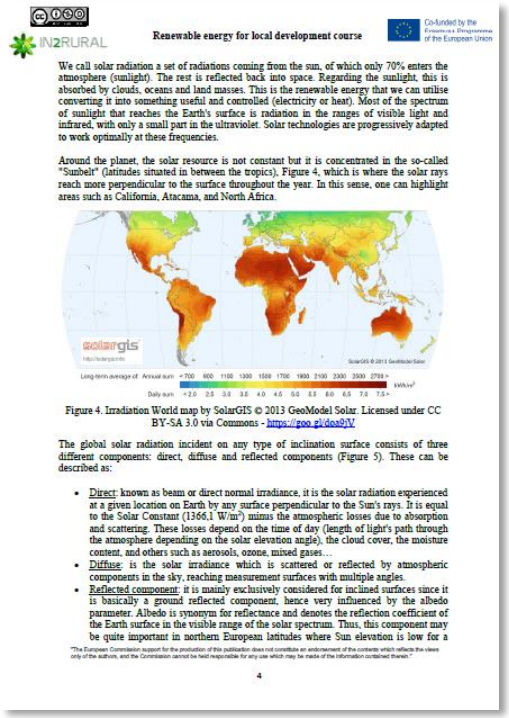
Online course 2: RREE for rural development

Dates:
- From March to June 2016

Nº participants:
- 30 enrolled students

Academic value:
- 5,5 ECTS

Course content (4 units):
- RREE for local development
- Photovoltaic power
- Biomass
- Wind power



IN2RURAL — Renewable energy for local development course

We call solar radiation a set of radiations coming from the sun, of which only 70% enters the atmosphere (sunlight). The rest is reflected back into space. Regarding the sunlight, this is absorbed by clouds, oceans and land masses. This is the renewable energy that we can utilise converting it into something useful and controlled (electricity or heat). Most of the spectrum of sunlight that reaches the Earth's surface is radiation in the ranges of visible light and infrared, with only a small part in the ultraviolet. Solar technologies are progressively adapted to work optimally at these frequencies.

Around the planet, the solar resource is not constant but it is concentrated in the so-called "Sunbelt" (latitudes situated in between the tropics), Figure 4, which is where the solar rays reach more perpendicular to the surface throughout the year. In this sense, one can highlight areas such as California, Atacama, and North Africa.

Figure 4. Irradiation World map by SolarGIS © 2013 GeoModel Solar. Licensed under CC BY-SA 3.0 via Commons - https://goo.gl/doa9jV

The global solar radiation incident on any type of inclination surface consists of three different components: direct, diffuse and reflected components (Figure 5). These can be described as:

- Direct: known as beam or direct normal irradiance, it is the solar radiation experienced at a given location on Earth by any surface perpendicular to the Sun's rays. It is equal to the Solar Constant (1366,1 W/m²) minus the atmospheric losses due to absorption and scattering. These losses depend on the time of day (length of light's path through the atmosphere depending on the solar elevation angle), the cloud cover, the moisture content, and others such as aerosols, ozone, mixed gases…
- Diffuse: is the solar irradiance which is scattered or reflected by atmospheric components in the sky, reaching measurement surfaces with multiple angles.
- Reflected component: it is mainly exclusively considered for inclined surfaces since it is basically a ground reflected component, hence very influenced by the albedo parameter. Albedo is synonym for reflectance and denotes the reflection coefficient of the Earth surface in the visible range of the solar spectrum. Thus, this component may be quite important in northern European latitudes where Sun elevation is low for a

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

4

IN2RURAL — Renewable energy for local development course

Figure 8. Different types of biomass, by MarcusKauffman CC-BY-SA-3.0, via Flicker.

In the second sense, biomass also means plants or animal matter that can be converted into biofuels (ethanol, biodiesel, and biogas). Numerous types of plants can be grown for industrial biomass production including: switchgrass, hemp, corn, poplar, willow, sorghum, sugarcane, bamboo, and a variety of tree species, ranging from eucalyptus to oil palm. There are also crops that are specifically grown for use as fuel that offer high biomass output per hectare with low input energy. Some examples of these plants are: wheat, which typically yield 7.5–8 tonnes of grain per hectare, and straw, which typically yield 3.5–5 tonnes per hectare in the UK. The grain can be used for liquid transportation fuels while the straw can be burned to produce heat or electricity. Other crops such as corn and sugarcane can be fermented to produce the transportation fuel, ethanol. On the contrary, biodiesel, another transportation fuel, can be produced from left-over food products like vegetable oils and animal fats. Still in this second group, one can highlight rotting garbage, and agricultural and human waste. All of these release methane gas (also called landfill gas or biogas) by fermentation. Finally, it is to note that there is a great deal of research involving algal fuel or algae-derived biomass due to the fact that it's a non-food resource (one of the main handicaps of the use of crops as biomass instead of nourishment for humans and animals) and can be produced at rates 5 to 10 times those of other types of land-based agriculture, such as corn.

The biomass used for electricity and heat generation varies by region as a function of the potential availability of a given type of resource. To give some examples, forest by-products such as wood residues are common in the USA. Agricultural waste is common in Mauritius (sugarcane residue) and Southeast Asia (rice husks). Bioethanol is very common in Brazil (sugarcane production). And animal husbandry residues, such as poultry litter, are common in the United Kingdom and The Netherlands.

For any specific project to be developed in a rural European environment, promoters and engineers will have to analyse the biomass supply possibilities available in the region.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

8

http://in2rural.karolyrobert.hu/?lang=en

2. IN2RURAL: Resultados del proyecto

Online course 2: RREE for rural development

UNIT 1: RREE INTRODUCTION + RURAL DEVELOPMENT

Chapter 1: First steps into renewable energies
Chapter 2: The renewable energies panorama
Chapter 3: The renewable energies technology
Chapter 4: Development in rural areas
Chapter 5: How initiatives can promote social sustainability of rural areas

UNITS 2, 3 y 4: PHOTOVOLTAIC POWER / BIOMASS / WIND POWER

CHAPTER 1: TECHNICAL ASPECTS
CHAPTER 2: ECONOMICAL ASPECTS
CHAPTER 3: SOCIAL AND ENVIROMENTAL ASPECTS FOR RURAL DEVELOPMENT
CHAPTER 4: FULLY DEVELOPED CASE STUDY OF EERR APPLICATION to RURAL DEVELOPMENT
CHAPTER 5: PROPOSED CASE STUDIES (to be developed by students)
CHAPTER 6: EXTRA MATERIAL

Co-funded by the Erasmus+ Programme of the European Union

http://in2rural.karolyrobert.hu/?lang=en

2. IN2RURAL: Resultados del proyecto

Online course 2: RREE for rural development

Case studies

- A case study of RREE applied to RRDD to be developed in English by the student tutored by 3 specialists (enterprise/ university):
  - Technical
  - Rural development
  - English

- They include:
  - Previous good practices
  - Technical Alternatives
  - Calculations and design
  - Economic aspects
  - Impact on rural development (environmental, social and economic)

http://in2rural.karolyrobert.hu/?lang=en

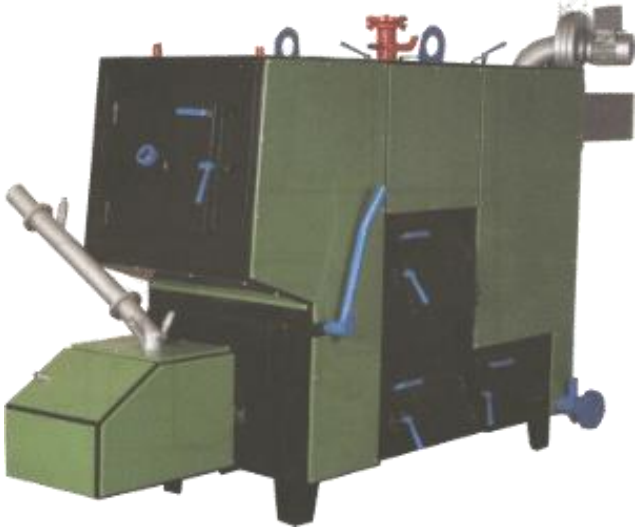
Co-funded by the Erasmus+ Programme of the European Union

2. IN2RURAL: Resultados del proyecto

Online course 2: RREE for rural development

CASE STUDIES EXAMPLES:

A water purification company requires the installation of a sewage plant in Benafigos (Spain). The installation is far from the conventional electricity grid and therefore the client decides to study the possibility of installing an isolated photovoltaic system to supply the power required by the installation.



The heating system of a municipal building in Tiszaföldvár (Hungary) wants to switch from diesel to pellets. The building is 1970 and without modern insulation. The city is in the middle of a region with agricultural and forestry activity.

Co-funded by the Erasmus+ Programme of the European Union

http://in2rural.karolyrobert.hu/?lang=en

2. IN2RURAL: Project results

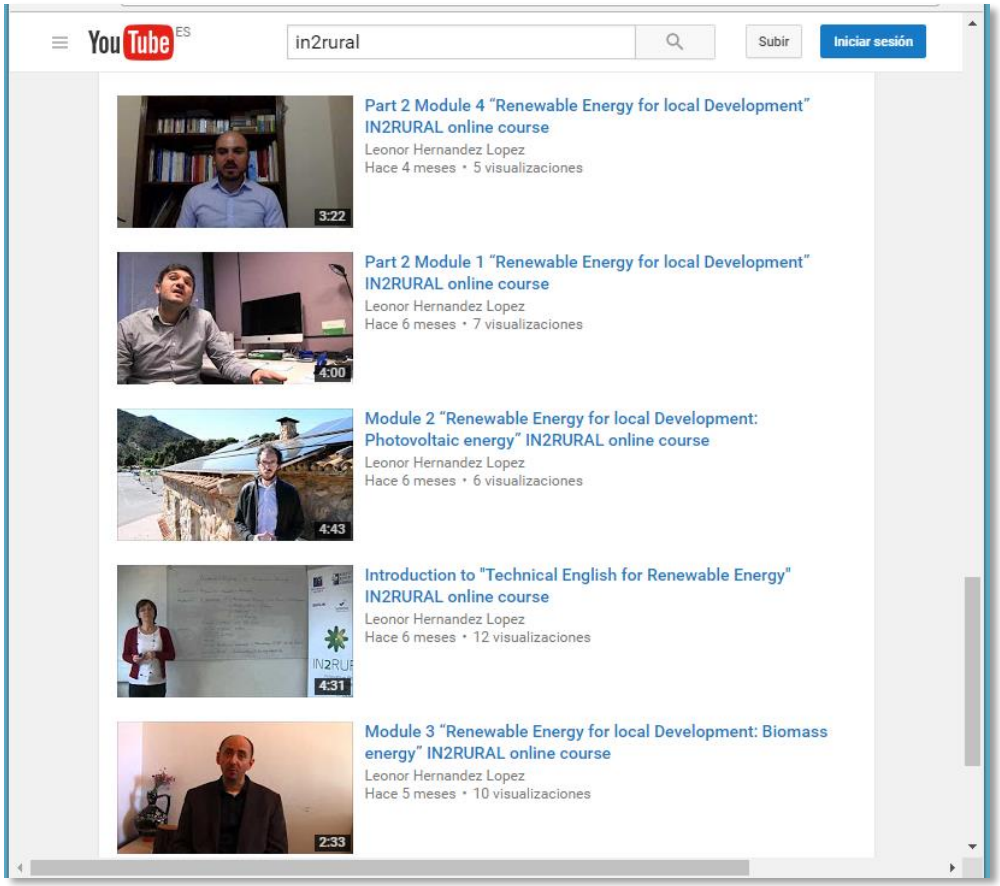
Online course 2: RREE for rural development

Student support

- Video presentation
- Forum
- Online Tutoring Sessions
- Tutoring by mail / Skype / face-to-face
- Glossary

Evaluation criteria:

- Tests
- Participation in forums
- Case study



Co-funded by the Erasmus+ Programme of the European Union

http://in2rural.karolyrobert.hu/?lang=en

2. IN2RURAL: Project results

Online course 3: RREE Employment and entrepreneurship for rural development

Dates:
- Juny 2017

Nº participants:
- 30 enrolled students

Academic value:
- 1 ECTS

Course content (2 units):
- Active job search
- Entrepreneurship

Module 2: Active Job Searching

Chapter 1: Job-seeking and placements abroad
Chapter 2: Europass CV and cover letter
Chapter 3: Personalized coaching in occupational skills

Module 2: Entrepreneurship

Chapter 1: Entrepreneurship competences
Chapter 2: The initial steps to create a business plan
Chapter 3: Resources for entrepreneurs

http://in2rural.karolyrobert.hu/?lang=en

OPEN ACCESS

Co-funded by the Erasmus+ Programme of the European Union

2. IN2RURAL: Project results

Internships (2 months + Final Degree Project)

Development of case studies where the use of RREE for rural development is proposed (students tutored by University + enterprise)

Dates:

- November 2016 to May 2017

Nº participants:

- 12 students (4 students from each country, 50% national enterprises, 50% International enterprises)

- Study and design of renewable energy facilities in the Mas Torre Martínez
- Comparative study between the use of urban heating and individual heating systems, based on biomass, in a rural municipality in the interior of the province of Castellón
- Photovoltaic-wind energy hybrid system for the supply of energy to an isolated consumer
- The role of biomass in the GAIA ecovillage and its use in the establishment of new eco-houses

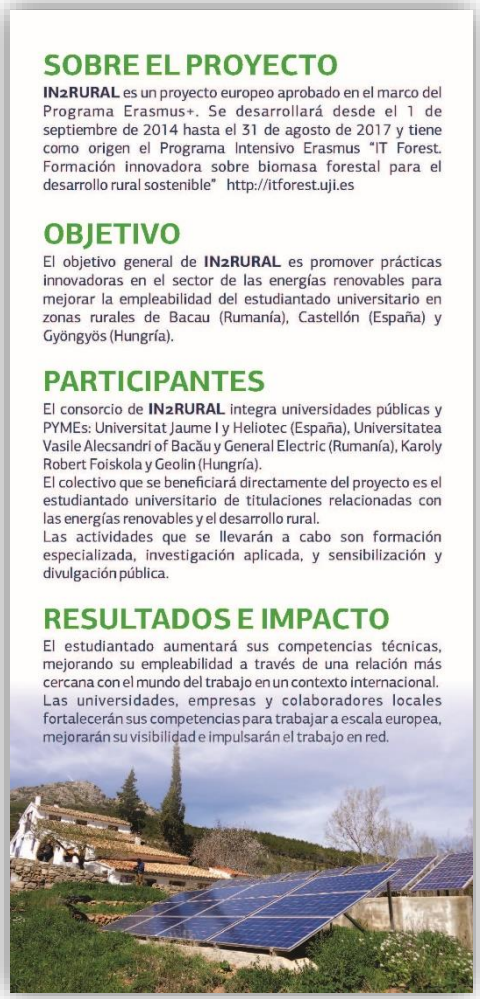
2. IN2RURAL: Project results

Guide on renewable energies for small towns

Co-funded by the
Erasmus+ Programme
of the European Union

2. IN2RURAL: Project results: DIFFUSION

Flyer



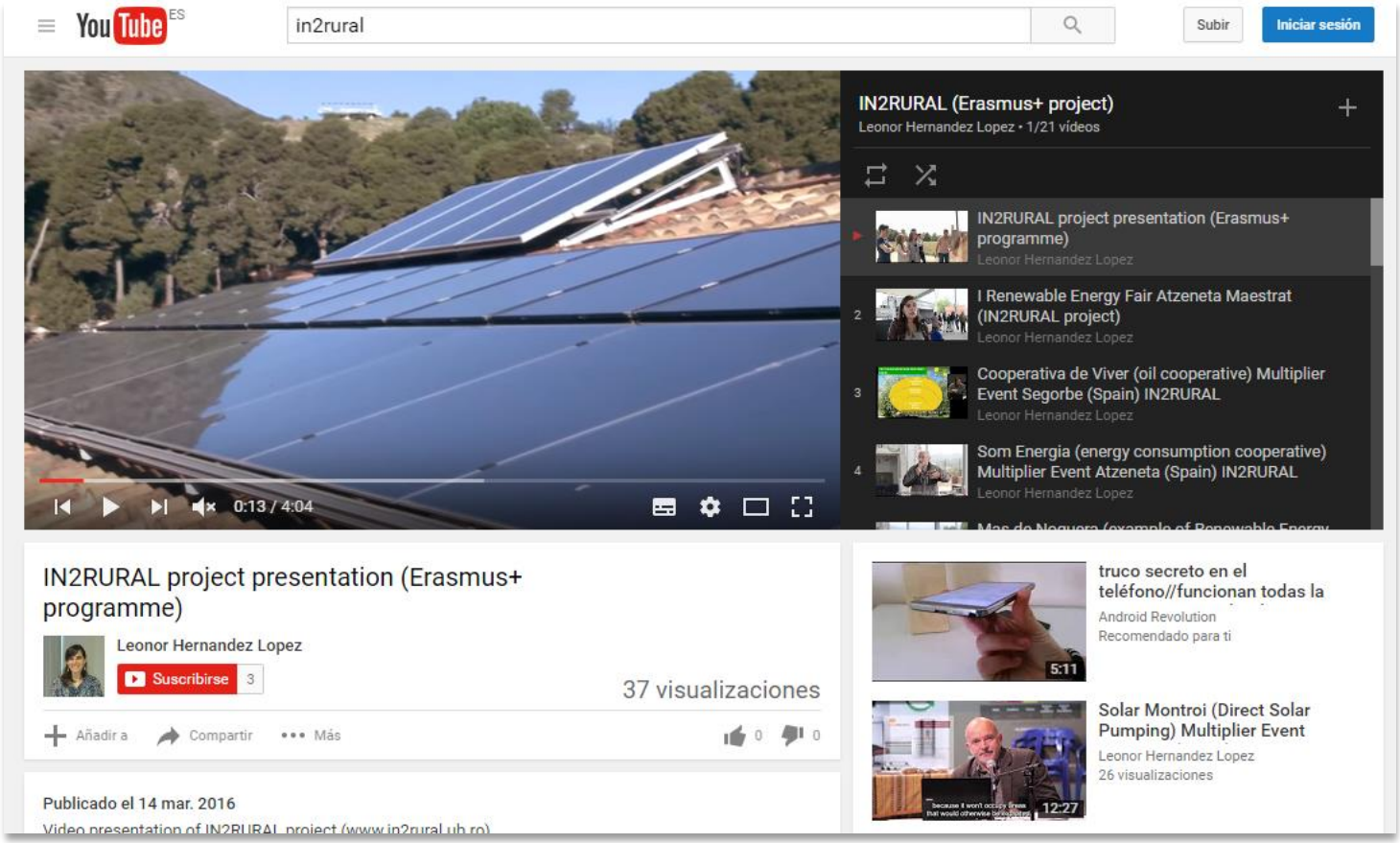
Newsletters

Co-funded by the Erasmus+ Programme of the European Union

2. IN2RURAL: Project results: DIFFUSION

Youtube channel: IN2RURAL

https://www.youtube.com/playlist?list=PLg4VBgL4sO8_XhDDm1ogsqfDNwqwZMnrk



Co-funded by the Erasmus+ Programme of the European Union

2. IN2RURAL: Project results: DIFFUSION

Diffusion seminars

http://repositori.uji.es >> IN2RURAL

www.in2rural.ub.ro

WEB/FACEBOOK/YOUTUBE www.facebook.com/in2rural

www.youtube.com **>> IN2RURAL**

Co-funded by the
Erasmus+ Programme
of the European Union

2. IN2RURAL: Network of collaborators

- **Network of collaborating entities:**
  - City councils and public administration

Ajuntament de Benlloch

Todolella

Ayuntamiento de Segorbe

Ajuntament d'Atzeneta del Maestrat

Ajuntament De Serra

parc natural de la serra d'espadà

  - SMEs in the renewable energy sector

forestal del maestrazgo

implica-T

net plc

  - Cooperatives and associations related to RREE

som energia

COOPERATIVA DE VIVER ALTO PALANCIA

LA UNIÓ DE LLAURADORS I RAMADERS

CO INCIDE Tecnología para el Desarrollo Local

  - educational centres

IES ALTO PALANCIA

ESPADÀ CENTRE D' ESTUDIS

  - Other entities (users and / or promoters of RREE)

Mas de Noguera

MAR DE FULLES NATURAL EXPERIENCE

Co-funded by the Erasmus+ Programme of the European Union

ERASMUS+ (Strategic Associations, Higher Education)

Gracias por vuestra atención

LEONOR HERNÁNDEZ lhernand@uji.es

http://www.in2rural.ub.ro/

Co-funded by the
Erasmus+ Programme
of the European Union