Training needs in renewable energies for local development

Study of prospective and training needs of renewable energies market for local development

Coordinated by:

Leonor Hernández, Joan Raül Burriel, Zoltán Bujdosó and Liliana Topliceanu

IN2RURAL

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Universitat Jaume I

Károly Róbert Főiskola

Universitatea "Vasile Alecsandri" din Bacau

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GEOLIN

GENERAL ELECTRIC

Publisher

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Joan Raül Burriel **Zoltán Bujdosó** **Liliana Topliceanu**

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Parque Natural Sierra de Espadán
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Unió de Llauradors
Universitat Jaume I de Castellón

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ACRONYMS

ADL Bacău	Agentia de Dezvoltare Locala Bacău (Bacău Local Development Agency)
ADR N-E	Agentia de Dezvoltare Rurala N-E (N-E Rural Development Agency)
AJOFM	Agentia Judeteana pentru Ocuparea Fortei de Munca (Bacău County Agency for Workforce Recruitment)
ALD	Agents of Local Development
AMUFOR	Association of Forest Municipalities of the Valencian Region
ANOFM	Agentia Nationala pentru Ocuparea fortei de Munca (National Agency for Employment)
ANRE	Agentia Nationala de Reglementare in domeniul Energiei (National Agency for Energy Regulation)
ASAJA	Provincial Federation of Farmers and Stockbreeders of Castellon
AVEBIOM	Spanish Association for Biomass Energy Valuation
AVEN	Valencian Energy Agency
CEDES	Center for Economic and Social Revitalization (Spain)
CEEI	European Centres of Innovative Companies
CEPADE	Centre of Postgraduate Studies in Business Administration
CEPER	Provincial Center for Renewable Energy (Spain)
CIEMAT	Research Centre for Energy, Environment and Technology (Spain)
CTE	Spanish Technical Building Code
EIT	European Institute of Innovation and Technology
ERDF	European Regional Development Fund
ESA	Wind Power Business Association
EU	European Union
EUCO	European Council
Eurostat	Statistical Office of the European Communities
FEPAC	Provincial Federation of Farmers and Stockbreeders of Castellon
FiT	Feed-in tariff system
GD	Government Directive
GDP	Gross Domestic Product
GEO	Government Emergency Ordinance (Romania)
GHG	Greenhouse Gases
HCCCI	Heves County Chamber of Commerce and Industry
HCSDP	Heves County Spatial Development Program 2014-2020
HCSO	Hungarian Central Statistic Office
HEI	Higher Education Institution
HEPURA	Hungarian Energy and Public Utility Regulatory Authority
HMKIK	Heves County Chamber of Commerce and Industry
HMTP	Heves County Spatial Development Program 2014-2020
HNREAP	Hungarian National Renewable Energy Action Plan 2014-2020
HUF	Hungarian Forint
IBTE	Low Voltage Installation
ICH	International Centre for Hydropower
ICT	Infocommunication and Communications Technology
IDAE	Spanish Institute for Diversification and Energy Saving
INE	Spanish Statistical Institute
ISCED	International Standard Classification of Education
IVACE	Valencian Institute of Business Competitiveness
IVE	Valencian Institute of Building
KIC	Knowledge and Innovation Communities
KSH	Hungarian Central Statistic Office

LAG	Local Action Groups
LED	Light-Emitting Diode
MECD	Spanish Ministry of Education, Culture and Sport.
MEKH	Hungarian Energy and Public Utility Regulatory Authority
MNMET	Hungarian National Renewable Energy Action Plan 2014-2020
NAPRES	National Action Plan for Renewable Energy Sources
N-E RDA	North-East Regional Development Agency (Romanian)
N-E Region	North East Development Region
N-E	North – East
NGO	Non Governmental Organisation
NIS	National Institute of Statistic (Romanian)
NREAP	National Renewable Energy Action Plan
OCT	Spanish Competent Territorial Agency
OECD	Organisation for Economic Co-operation and Development
OPROTEH	Optimization of constructive and technological design in machine building field
PDRS	Sustainable Rural Development Programme
PER	Spanish National Renewable Energy Action Plan
PFER	Spanish Plan of Renewable Energies
R&D	Research and development
RES	Renewable Energy Sources
RITE	Spanish Regulation of Thermal Installations in Buildings
Ro NIS	Romanian National Institute of Statistic
Ro NREAP	Romanian National Renewable Energy Action Plan
SEAP	Sustainable Energy Action Plan
SEPE	Spanish Public Service of Employment
SITC	Sustainable Innovation Technologies Centre
SME	Small and Medium Enterprise
TSO	Transmission System Operator
UJI	Universitat Jaume I
UNED	Spanish Distance University
VAERSA	Valencian Energy Use from Waste

MEASUREMENT UNITS

€	Euro
GW	Gigawatt
Km²	Square kilometer
KTOE	Kilo Tonnes of Oil Equivalent
MTOE	Mega Tonne of Oil Equivalent
MW	Megawatt

INTRODUCTION

Renewable Energies (RES) are recognized as one of the sectors of the future. In fact, one of the 2020 targets for European Union consists of obtaining 20% of energy from renewables. Jobs related to this sector cover a wide range of occupations and it is foreseen that new possibilities will be created in rural areas, where there are fewer industrial possibilities. Nowadays, there is a growing interest among decision makers, professionals and researchers to promote the synergies between RES, socio-economic development and youth employability.

The **problem addressed** by the study is based on the fact that, although the interrelation between RES, rural development and employment is widely accepted, its effective integration is scarcely achieved. In fact, the potential synergies of this interrelation contrasts with the current limitations observed in the implementation of RES at small scale. Moreover, although the local level has showed to be very effective to spread among the population the positive effects of an appropriate energy model, it is necessary to reinforce the capacities of the local actors to act from an integrated approach.

In this context and in line with the Agenda for the Modernisation of Europe's Higher Education Systems (EU, 2011), the **general goal** of the research is to advance in the study of the training needs in the field of RES for rural development, in order to reduce the existing scarcities and to contribute to the development of relevant training actions that improve the effectiveness of the teaching-learning processes. All of these in the framework of the European project IN2RURAL[1], which aims to promote innovative practices in the RES sector improving the employability of university students in the rural areas of Bacău (Romania), Castellón (Spain) and Heves (Hungary).

The **methodology** followed by the research team consisted of three interrelated and complementary phases: the theoretical review, the development of the case studies and the comparison of these case studies. It is highlighted that, as a part of the case studies, an empirical study has been carried out in order to know and analyse the perception of the main actors about the training needs in RES for rural development. The character of the study has determined the use of qualitative methodology, through the techniques of semi-structured interview and focus group.

The **structure of the study** is organised in four distinctive parts: the introductory contents (context, objectives and work methodology), described in the first three chapters; the study cases (Castellón, Bacău and Heves) and their comparison, from the fourth to seventh chapters; the references and the annexes with complementary information.

With a general approach, the **first chapter** offers an overview of the status of RES in Europe, with a description of the current energy situation and an analysis of the employment in the RES sector. This is followed by an exploration of the training in RES for rural development through the identification of the educational frame in the EU and the existing alternatives at different levels (vocational educational training, higher education, professional certificates and other options).

In the **second chapter** can be found the general objective of the study and the specific goals that have been defined to be achieved. It is remarked that these objectives are aligned with key policies in the European context (Europe 2020 strategy) and the national RES plans of Hungary, Romania and Spain. At the same time, they concur with the educational priorities named in the above mentioned Agenda for the Modernisation.

The **third chapter** explains in detail the work methodology used in this study. It describes the procedure that has been followed to obtain the primary data, the techniques and tools used by the

1. IN2RURAL project (Innovative Practices in Renewable Energies to Improve Rural Employability), was selected in the 2014 call for proposals of Erasmus+ Key Action 2. More information available at http://in2rural.ub.ro/

researchers and the sample in the three participant countries. This chapter reflects the complexity of linking RES with rural development and includes the involvement of a varied typology of stakeholders, representing local governments, educational centres, Small and Medium Enterprises (SME) and civil society organisations.

With the same structure, the **fourth, fifth and sixth chapters** include the case studies of Castellón, Bacău and Heves Counties. Each chapter contains information about the specific socio-economic context, the situation of RES in the territory, the map of local actors and the status of the training alternatives. Following these contents, there is an empirical study about the perception of representatives of the main actors about the training needs on RES for rural development with a detailed analysis of the interviews and focus groups outputs.

Once the existing situation in the three locations is described, the **seventh chapter** offers a comparison of the case studies in Bacău County, Castellón province and Heves County. This comparison includes the socio-economic context, the current energy situation, the map of actors, the training and the findings of the empirical study about the perception of the actors of the training needs on RES for rural development.

About the **references**, it is remarked that although there are publications at national and European level, the available scientific information on the local situation of RES in the areas of the study is limited. Nevertheless, in the last years there has been an effort to generate knowledge linking rural areas and RES all over the world, reflecting the relevance of the development and implementation of these energies for the socio-economic and technological improvement in the disfavoured areas.

As a final part of the study, four **annexes** can be found with the list of the participants in the study and the tools used during the field work described in the chapter three. Looking for the accuracy in the research methodology, the annexes collect the open questionnaire on training needs, the closed questionnaire about competences and the guide for the focus group.

1. CONTEXT

1.1. STATUS OF RENEWABLE ENERGIES IN EUROPE

In this section a set of statistical data that enables the analysis of the European energy structure and the current status of renewable energy is presented, as well as its future targets.

Regarding the spatial coverage, data from the 28 States which are nowadays members of the EU (European Union) has been included and, whenever it was available, data from the 28th State, Croatia, was added.

Regarding the temporal coverage, data from the last decade (starting with the year 2005) has been included to show its evolution. In most cases, the available and consolidated data showing the current situation was from 2013. For the future target, and due to its relevance at the European level, 2020 has been selected.

Eurostat web (http://ec.europa.eu/eurostat) has been the source of data used in all cases.

CURRENT ENERGY SITUATION

The European Union is the world's largest economy and has a population of over 500 million people, therefore, the primary energy consumption has been situated above 1.666 MTOE (Mega Tonne of Oil Equivalent) in 2013 (Figure 1-1. Primary energy gross inland consumption in 2013 at European level.). Of all the energy consumed, about half is produced in the EU member states (including nuclear, regardless of the uranium needed for nuclear power plants which is imported almost entirely), so the energy dependence is one of the challenges that must be addressed in the coming decades.

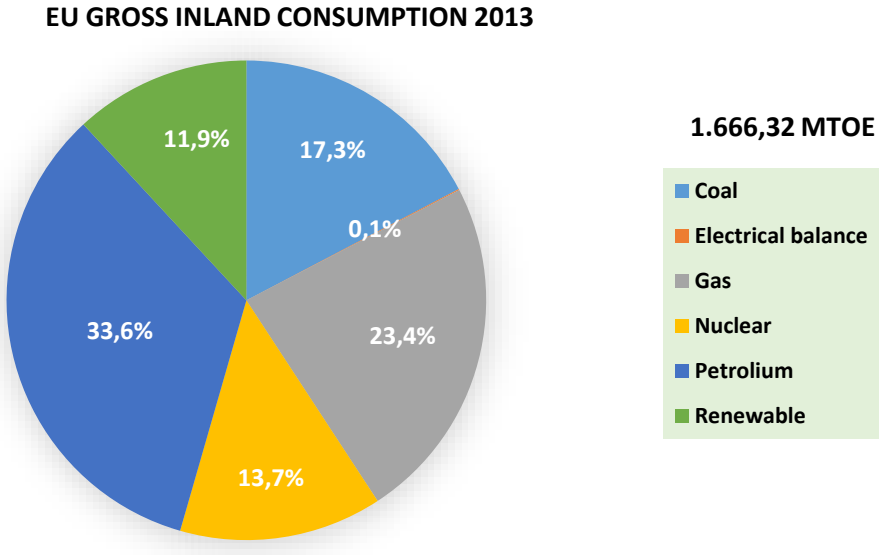


Figure 1-1. Primary energy gross inland consumption in 2013 at European level. Source: Own compilation based on Eurostat (2015).

The primary energy consumption structure reveals the relevance of fossil fuels (petroleum, gas and coal) which represents about 74,3 % of the total, and the share of renewable energies: 11,9%. In 2013, the final energy consumption in the European Union was 1.103,81 MTOE (Figure 1-2. Final energy consumption in 2013 in the European Union.).

It can be seen that the most energy demanding sectors are transport (around 32% of the total), residential (27%) and industry (25%). Agriculture and fisheries is the economic sector with the lowest energy consumption.

DEVELOPMENT OF RENEWABLE ENERGIES

The contribution of renewable energies to the energy system in the European Union has been increasing since 2005. In 2013, renewable energies accounted for 15% of the final energy share and a positive trend can also be seen to the 2020 objective (20% in final energy share) in the EU (Figure 1-3).

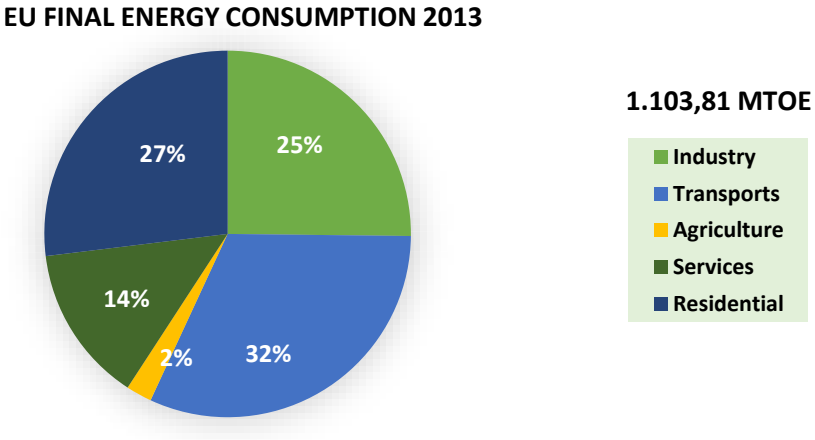


Figure 1-2. Final energy consumption in 2013 in the European Union. Source: Own compilation based on Eurostat (2015).

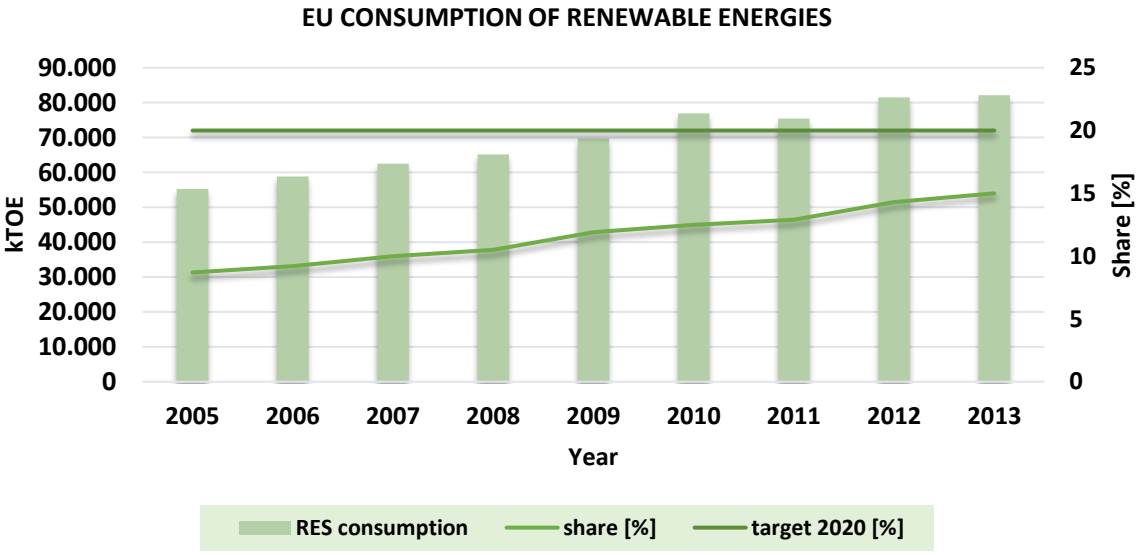


Figure 1-3. Evolution of final renewable energy share in the EU. Source: Own compilation based on Eurostat (2015).

The evolution of the renewable energy distribution from 2005 until 2013 can be observed in Figure 1-4. It is important to notice that the renewable energy consumption almost doubles from 2005 to 2013. Back in 2005, the main renewable energy was the solid biomass with 60% of the total, followed by the hydro power (23%). Relevant changes, when comparing 2013 to 2005, are the increase in wind power energy (from 5% to 10%), the incorporation of solar photovoltaic energy (up to 4%) and also the increase in biogas share or liquid biofuel. The hydro power and the solid biomass lose 7 and 9 points of share, respectively.

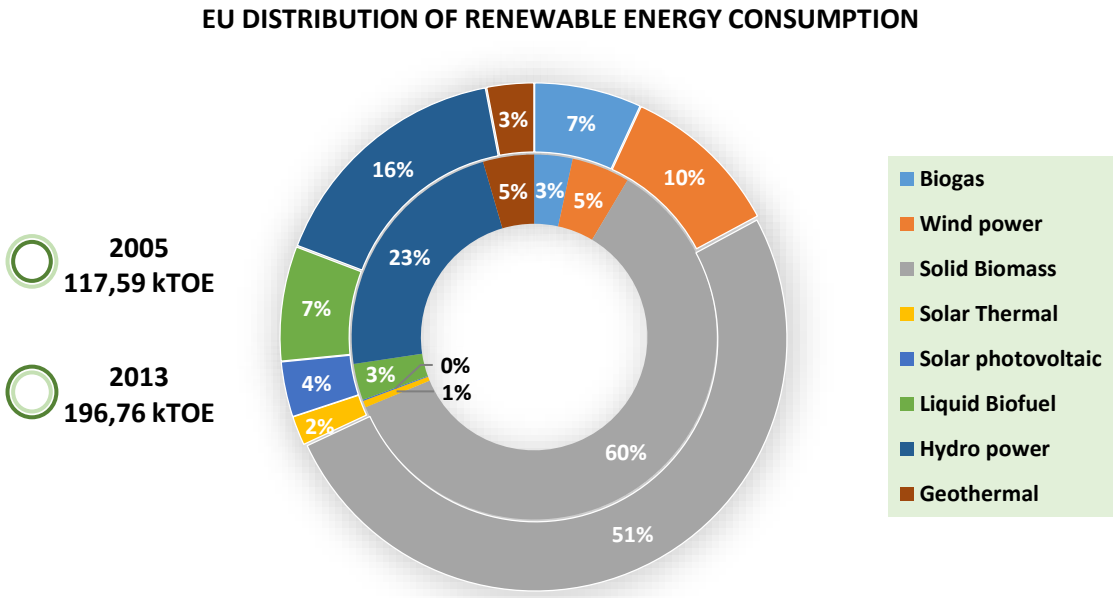


Figure 1-4. Evolution of distribution of renewable energy consumption.
Source: Own compilation based on Eurostat (2015).

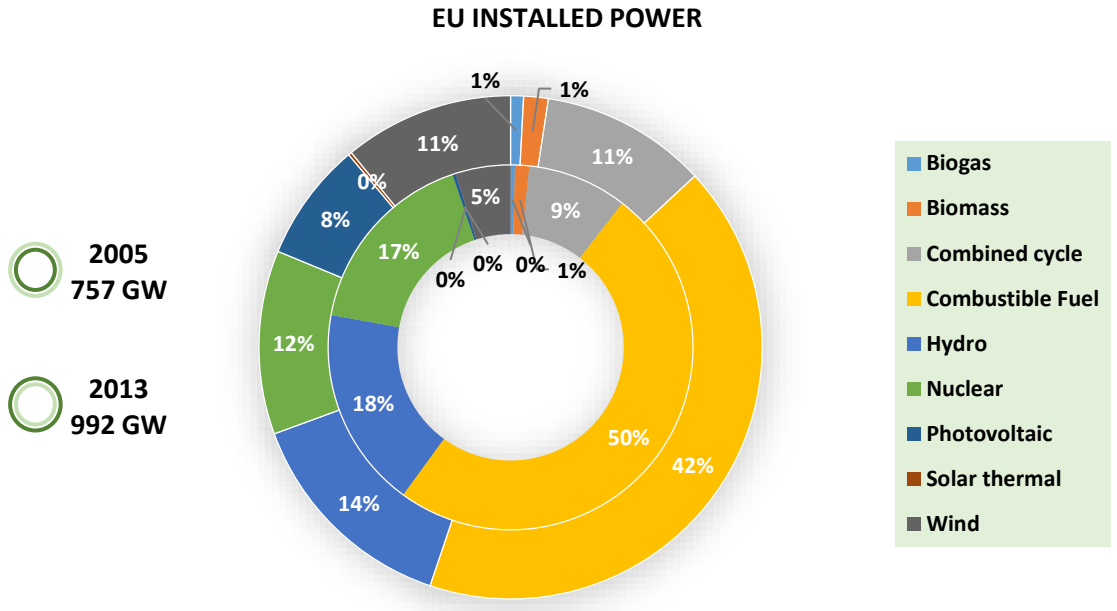


Figure 1-5. Installed power distribution in 2006 and 2013 at national level (left) and regional level (right).
Source: Own compilation based on Eurostat (2015).

Figure 1-5. shows the comparison between the installed power of the year 2005 and year 2013. The current installed power reaches 992 GW, being around 25% higher than eight years ago. Currently, the main renewable energy installations in the EU are hydro power (14%), wind (11%) and solar photovoltaic (8%), yet far from fossil fuels (more than 50%).

RENEWABLE ENERGY TARGETS AND TRAJECTORIES

The current goal in the implementation of RES was stated in the Directive 2009/28 / EC and is part of the 2020 Growth Strategy, which stipulates a GHG mitigation by 20% (compared to 1990 levels), savings of 20% by improving energy efficiency and an impact of RES in gross final energy consumption which reaches 20%. In addition, it sets the objective that RES account at least 10% of gross final consumption in the transport sector.

Figure 1-6 shows the importance of Renewable Energy Sources (RES) for electricity production in the EU (more than 25% of the total in 2013), while the situation of the RES in the transport section is lower (5% of the total transport energy waste in 2013) and it is far from the goal of 10% in 2020, despite of the increasing trend between 2005 and 2010.

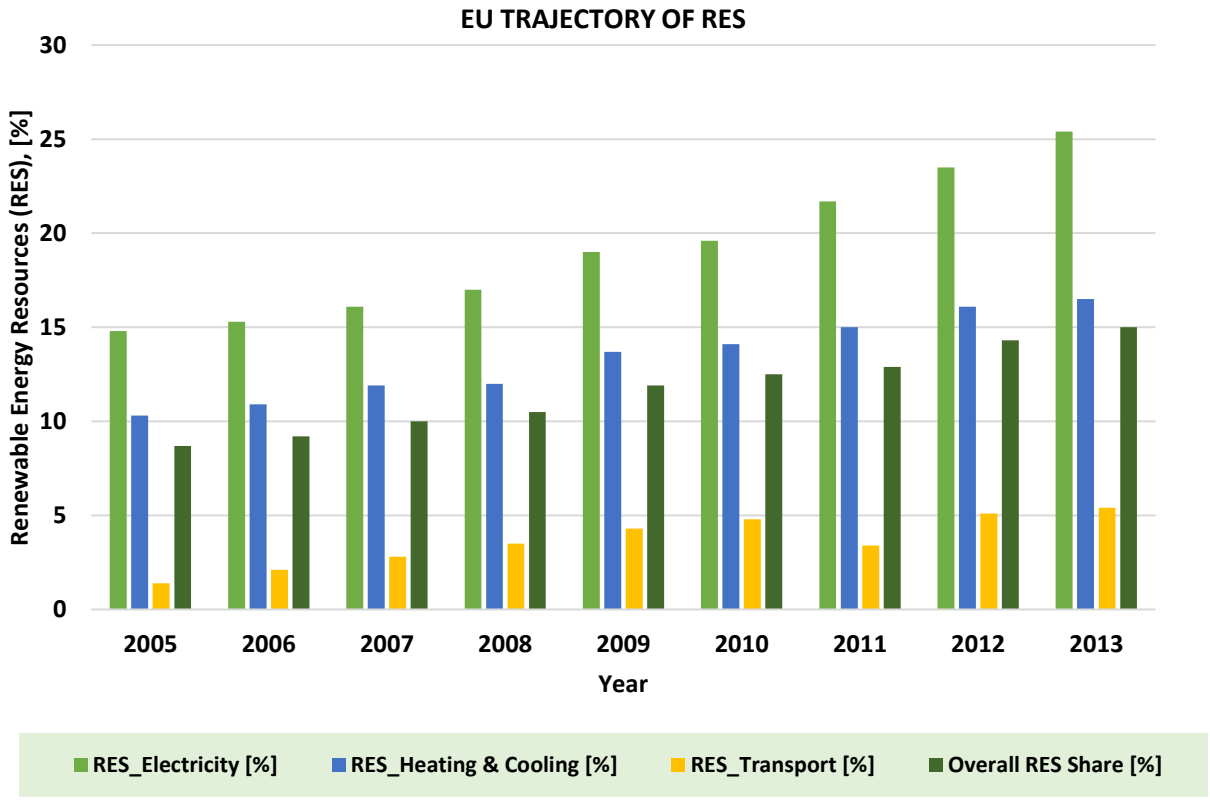


Figure 1-6. EU trajectory of energy from renewable sources (RES) in heating and cooling, electricity and transport from 2005 to 2013. Source: Own compilation based on Eurostat (2015).

However, the development and implementation of the RES in different countries of the EU-28 are quantitatively different. Figure 1-7 gives an idea of this imbalance, in which the proportion of RES, expressed in percentage, on the final gross energy consumption in 2013 can be seen.

In the medium term, the target for the whole EU is an overall RES share in the final energy consumption of, at least, 27% for 2030. The agreement of the European Council in 2014 (EUCO 169/14) provides

that Member States may set more ambitious national targets, but always in accordance with the existing guidelines on state aids. The Energy Roadmap 2050 of the European Commission aims to increase between 55% and 75% the proportion of RES in gross final consumption of energy, and that, along with energy efficiency, is considered critical in any model that could be adopted.

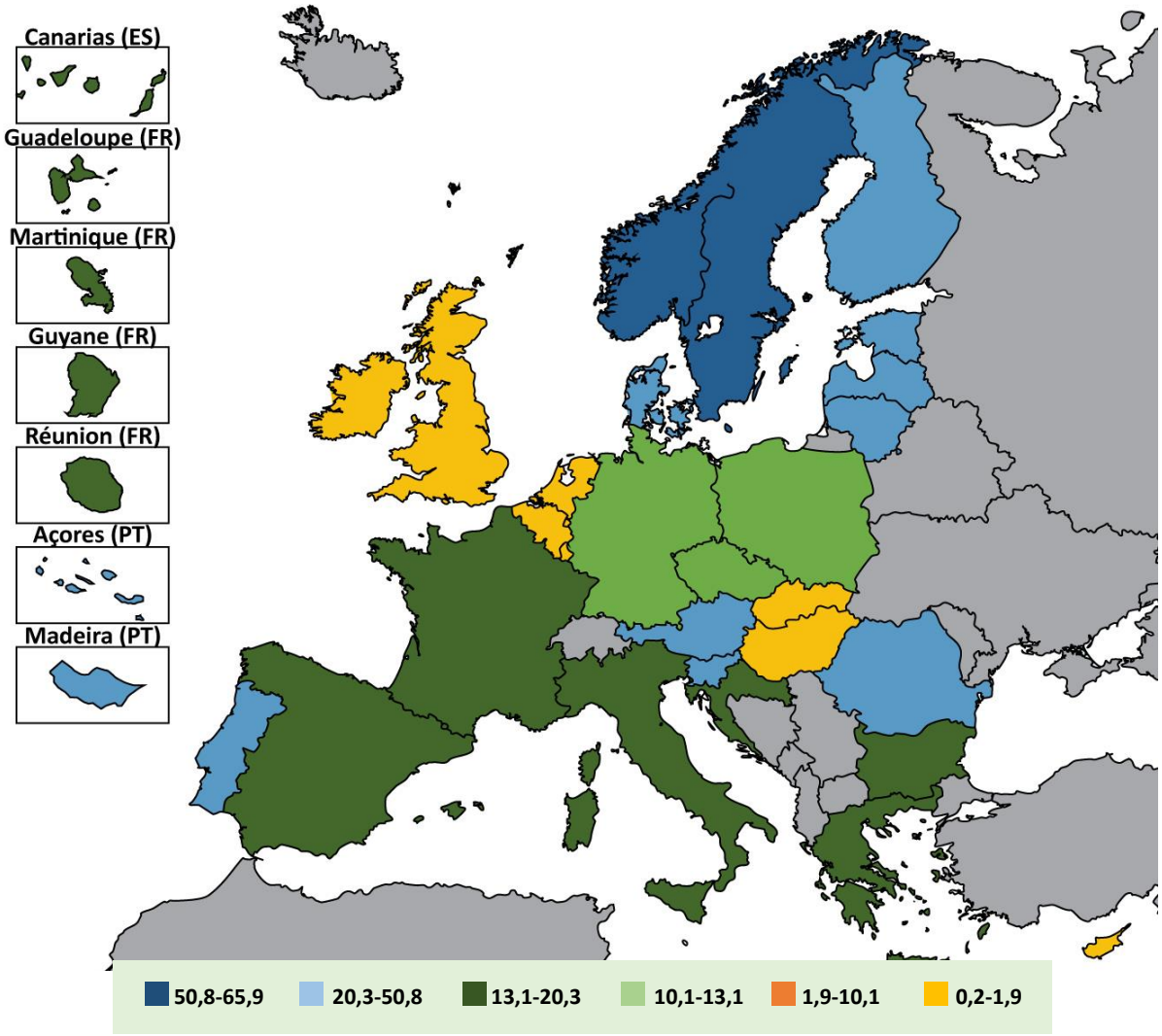


Figure 1-7. Share of energy from renewable sources (RES) in the final gross energy consumption in each EU-28 State. Source: Eurostat (2015).

EMPLOYMENT AND RENEWABLE ENERGY

The percentage of direct and indirect jobs generated by the RES, in all links of the value chain, is reflected in Figure 1-6. Out of a total of 1.148.050 RES-related direct and indirect jobs in the EU-28 EurObserv'ER (2014), the production of electricity by photovoltaic and wind technologies absorbs more than 40% of the total workforce, followed by the occupation in the solid biomass sector (26%).

A quantitative effect can differentiate the characteristics of the two main subsectors. It can be noticed:

a) Industrial production and installation of components, R&D, design, development, installation and commissioning of all types and sizes of generating capacity and consumption facilities.

b) Operation and maintenance of power plants and all types of equipment.

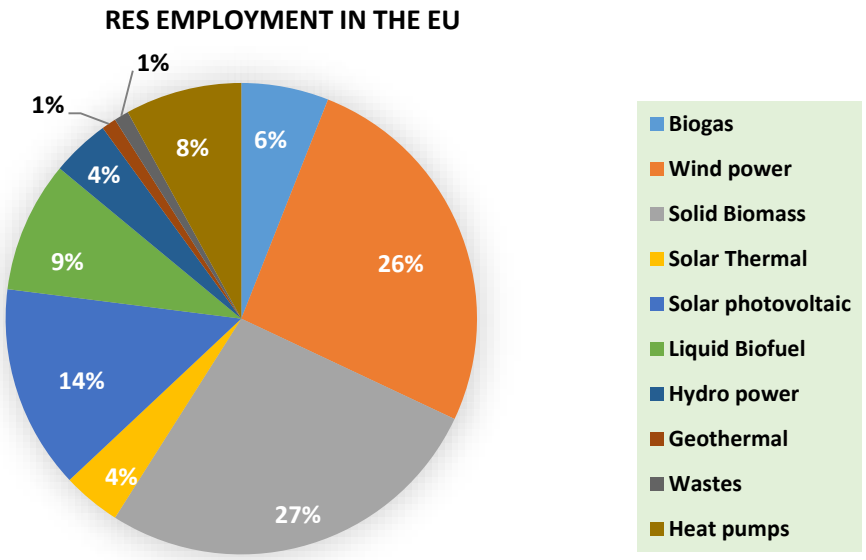


Figure 1-8. RES direct and indirect employment in the EU in the year 2013.
Source: Own compilation based on EurObserv'ER (2014).

1.2. TRAINING IN RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

1.2.1. EDUCATIONAL FRAME IN THE EUROPEAN UNION

Down below a brief description of the various alternatives within the EU educational framework is presented, in order to provide an overview of the training resources that are accessible to any person interested in acquiring or improving skills related to RES and rural development.

Considering the **educational level**, the following levels are planned:

a) **Higher education,** which can lead to recognized degrees (Bachelor's degree, Master's degree and Doctorate) or their own degrees (as their own masters, specialization courses and expert courses).

b) **Vocational training titles**, which give a double labour and academic accreditation and allow the access to higher levels. It covers Intermediate and Advanced Vocational Training and Educational Cycles.

c) **Professional certificate** framed in the system of training for employment (occupational for the unemployed and continuing for working professionals) and constituted by the monographic units group included in a modular course catalogue.

d) **Other training activities** such as seminars, courses, conferences, etc., that are delivered on short-term and are mostly organised by schools, public administrations and/or associations or foundations of various kinds.

According to its **form**, the alternatives can be classified into:

1. **Face-to-face classes,** following the traditional format in which students come to school physically to participate in the theoretical and practical training process.

2. **Distance learning,** using electronic means (particularly, the Internet) that rely on training platforms to support the teaching-learning processes.

3. **Blended learning,** including physical and virtual activities to complement the modality with the use of network technologies to enrich learning.

TRAINING IN RES

Climate change, growing world populations and limited fossil fuel resources mean that the demand for renewable energy will continue at an ever increasing rate for the foreseeable future. Renewable energy is now at the heart of every informed discussion concerning energy sustainability, security and affordability. As it can be seen, the member states of the EU have signed up to legally binding targets of 20% energy from renewable sources by 2020. In order to meet these targets, a significant number of highly trained engineers or skilled technicians are required worldwide, so the educational offer involving RES is in a continuous growth nowadays.

VOCATIONAL TRAINING TITLES

In the European Union, there are plenty of options to rather acquire a practical training in something related to renewable energies in a general way or specific technical training about some clean technologies or energy efficiency.

In such a way, some multi-discipline certificates can be found for those who wish to provide a general advice to householders on RES Technologies and evaluate resources, analyse project feasibility and manage the implementation of renewable energy projects. For example:

Renewable Energy Training

Subject: Multiple | Region: Europe | Country: United Kingdom | City: Knowl Hill | Course duration 640 hours | Language: English | Course Type: Vocational Training | Course Delivery: Face to Face | Access: Paid | Institution: National Energy Foundation

Renewable Energy Systems Technician

Subject: Multiple | Region: Europe | Country: Spain | City: Tarazona | Course Language: Spanish | Course Duration: 1 year | Course Type: Vocational Training | Course Delivery: Face to Face | Access: Paid | Institution: ADES Centro Tecnológico

And as an example of a more specific training:

Offshore Windmill Safety Training (BOWIST)

Subject: Windpower | Region: Europe | Country: France | City: Lorient | Language: French | Course Duration: 1 year | Course Type: Vocational Training | Course Delivery: Face to Face | Access: Paid | Institution: Centre d'Etude et de Pratique de la Survie

UNIVERSITY EDUCATION

The higher education in the European Union offers the most advanced theoretical training of the existing educational systems, and it is divided into two levels: undergraduate and graduate programmes.

In the figure below, the thematic focus of European Undergraduate and Graduate Programmes can be seen (data for the chart is based on multiple mentions per programme):

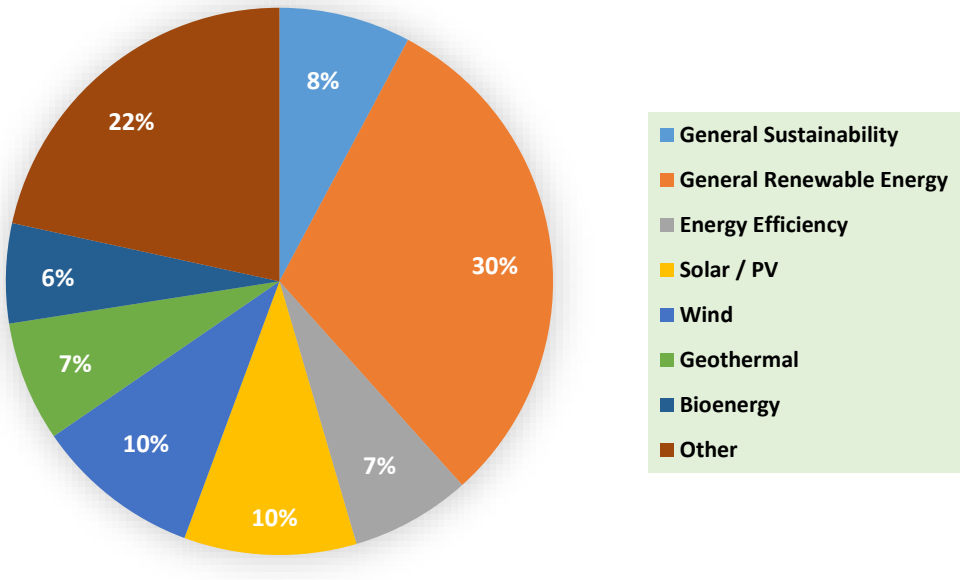


Figure 1-9. Thematic Focus of European Undergraduate and Graduate Programmes. Source: PostProg.

In the undergraduate programmes, we speak, for example, about degrees in engineering (electrical, mechanical, energy) or architecture which include more or less specific subjects related to RES and its technology in all the countries. An example could be:

Engineering in Energy Systems

Subject: Multiple | Region: Europe | Country: Germany | City: Ulm | Course Language: German | Course Duration: 7 Semesters | Course Type: Undergraduate Programme | Course Delivery: Face to Face | Qualification Awarded: Bachelors | Access: Paid | Institution: Ulm University and Biebarach University of Applied Sciences

However, in some countries, certain degrees more related to renewable energy can be found and the university degrees listed below illustrate this aspect:

Electrical Engineering and Renewable Energy Systems BEng

Subject: Multiple | Region: Europe | Country: United Kingdom | City: Nottingham | Course Language: English | Course Duration: 3 Years | Course Type: Undergraduate Programme | Course Delivery: Face to Face | Qualification Awarded: Bachelor | Access: Paid | Institution: University of Nottingham

BEng Renewable Energy

Subject: Engineering and RES | Region: Europe | Country: United Kingdom | City: Penryn | Course Language: English | Course Duration: 4 Years | Course Type: Undergraduate Programme | Course Delivery: Face to Face | Qualification Awarded: Bachelor | Access: Paid | Institution: University of Exeter

In the case of graduate studies, the European offer related to RES could be considered considerably wider in comparison with other regions in the world. In terms of contents, some programmes have a more general curriculum, for example renewable energy in general, while others are more narrowly focused on technology such as wind, solar, biofuels, etc. Courses in areas such as energy efficiency, industrial ecology, energy management and general sustainability are often slightly more academic and multi-disciplinary in nature. Here, the curriculum is focused on providing a broader conceptual and interdisciplinary approach to energy management and sustainability.

Programmes on general renewable energy typically provide an option for specialization on a specific technology (example: solar, wind or geothermal) during the second part of the program. This specialization is, however, not as deep as a dedicated Master's programme that is centered on a particular technology. Three examples have been selected, going from the most general, to the most specific one:

Renewable Energy Engineering MSc

Subject: Engineering | Region: Europe | Country: United Kingdom | City: Cranfield | Course Language: English | Course Duration: Full Time: 1 Year, Part Time: 2-3 Years | Course Type: Master's Programme | Course Delivery: Face to Face | Qualification Awarded: Postgraduate/Master | Access: Paid | Institution: Cranfield University

Electrical Technology for Sustainable and Renewable Energy Systems Masters (MSc)

Subject: Energy | Region: Europe | Country: United Kingdom | City: Nottingham | Course Language: English | Course Duration: Full Time 1 Year | Course Type: Master's Programme | Course Delivery: Face to Face | Qualification Awarded: Postgraduate/Master | Access: Paid | Institution: University of Nottingham

Master's in Solar Energy

Subject: Solar energy | Region: Europe | Country: France | City: Perpignan | Course Language: French | Course Duration: 2 Years | Course Type: Master's Programme | Course Delivery: Face to Face | Qualification Awarded: Postgraduate/Master | Access: Paid | Institution: University of Perpignan

PROFESSIONAL CERTIFICATES AND OTHER TRAINING ACTIVITIES

In this section both professional certificates and professional development courses are included. The first ones are usually more complete and long lasting (from 6 to 24 months), while a development course usually has a duration that goes from one day to several weeks and its content is specifically designed for a definite type of professional in order to complete or develop new skills and useful knowledge to their jobs or their work field.

In order to illustrate the differences described above, different examples are shown. The first two are classified as professional certificates and the other ones as professional development:

Professional License Speciality Renewable Energy and Energy Efficiency

Subject: Multiple | Region: Europe | Country: France | City: Amiens | Course Language: French | Course Duration: 1 Year | Course Type: Professional Certificate | Course Delivery: Face to Face | Qualification Awarded: Certificate | Access: Paid | Institution: University of Picardie Jules Verne

Efficient Energy Use and Planning

Subject: Multiple | Region: Europe | Country: Sweden | City: Karlstad | Course Language: English | Course Duration: 16 Months | Course Type: Professional Certificate | Course Delivery: Face to Face | Qualification Awarded: Certificate | Access: Paid | Institution: LIFE Academy | Course Link

Hydropower Financing and Project Economy

Subject: Hydropower | Region: Europe | Country: Norway | City: Trondheim | Course Language: English | Course Duration: 5 Days | Course Type: Professional Development | Course Delivery: Face to Face | Qualification Awarded: Certificate | Access: Paid | Institution: International Centre for Hydropower (ICH)

Offshore Wind Energy

Subject: Wind Power | Region: Europe | Country: Germany | City: Hamburg | Course Language: English | Course Duration: 2 weeks | Course Type: Professional Development | Course Delivery: Face to Face | Qualification Awarded: Certificate | Access: Paid | Institution: DNV GL Energy Academy

2. OBJECTIVES

The general and specific objectives of the present study are aligned with the strategic policies and development plans at European and national level. Specifically, their concordance is highlighted with the **Directive 2009/28/EC on the promotion of the use of energy from renewable sources** and the **Europe 2020 growth strategy**. At the same time, the origin of the study are the existing needs and priorities in Hungary, Romania and Spain, as reflected in their respective **National Renewable Energy Action Plans (NREAP)**.

Another relevant aspect in the definition of the objectives is the **interdisciplinary approach** of the study, which integrates different areas of knowledge linked with the themes addressed in the document. Thus, the research includes specialists in RES, electrical engineering, local development, education, sociology and international cooperation. This approach allows to deal with the relationships between RES, training needs and rural development from a holistic and innovative perspective.

The following table reflects some explicit parts of the above mentioned strategies to which the general and specific objectives of the study contribute to:

Table 2-1. Strategic plans to which the study contributes. Source: Own elaboration based on data from European Commission (2009, 2013), National renewable energy action plans of Hungary, Romania and Spain (2010).

STRATEGY	SPECIFIC PARTS TO WHICH THE STUDY CONTRIBUTES
Directive 2009/28/EC on the promotion of the use of energy from renewable sources	Considerations: - (The control of European energy consumption and the increased use of energy from renewable sources) have an important part to play in promoting the security of energy supply, promoting technological development and innovation and providing **opportunities for employment** and **regional development**, especially in **rural and isolated areas**. - Production of energy from renewable sources often depends on local or regional **small and medium-sized enterprises** (SMEs). The **opportunities for growth and employment** that investment in regional and **local production** of energy from renewable sources bring about in the Member States and their regions are important. - (12) Biogas installations can, as a result of their decentralised nature and the regional investment structure, contribute significantly to **sustainable development** in **rural areas** and offer farmers **new income opportunities**. - (49) **Information and training gaps**, especially in the **heating and cooling sector**, should be removed in order to encourage the deployment of energy from renewable sources. Annex IV: - The **training** leading to installer certification or qualification shall include both **theoretical and practical parts**. At the end of the training, the installer must have the skills required to install the relevant equipment and systems to meet the **performance and reliability needs** of the customer, incorporate quality craftsmanship, and comply with all applicable codes and standards, including energy and eco-labelling. - The theoretical part of the **biomass stove and boiler installer training** should give an overview of the market situation of biomass and cover ecological aspects, biomass fuels, logistics, fire protection, related subsidies, combustion techniques, firing systems, optimal hydraulic solutions (…) - The theoretical part of the **heat pump installer training** should give an overview of the market situation for heat pumps and cover geothermal resources and ground source temperatures of different regions, soil and rock identification for thermal conductivity, regulations on using geothermal resources, feasibility of using heat pumps in buildings (…) - The theoretical part of the **solar photovoltaic and solar thermal installer** training should give an overview of the market situation of solar products and cost and profitability comparisons, and cover ecological aspects, components, characteristics and dimensioning of solar systems, selection of accurate systems and dimensioning of components (…).

Europe 2020:Europe's growth strategy	**Objective 3**: limiting greenhouse gas emissions by 20 % or even 30 % compared to 1990 levels, **creating 20 % of our energy needs from renewables** and increasing our energy efficiency by 20 %. **Flagship initiatives**: - **'Youth on the move'**: aims to enhance the **performance of education systems** and to facilitate the **entry of young people into the labour market**. - **'Resource-efficient Europe'**: aims to help decouple economic growth from the use of resources. It supports the shift towards a **low-carbon economy**, an **increased use of renewable energy sources**, the development of green technologies and a modernised transport sector, and promotes energy efficiency.
Hungary's National Renewable Energy Action Plan 2011-2020	**Agriculture and rural development** is one of the key areas of Hungarian renewable energy policy. The use of biomass for energy purposes based on the favourable agro-ecological conditions of the country and taking into account sustainability criteria (especially the protection of biodiversity and soil quality), can contribute to the **retention of agricultural jobs and to the creation of new ones**. **Specific measures for the promotion of the use of energy from biomass:** (...) Energy recovery from biomass is more than simply a question of energy production: biomass can be instrumental to the multifunctional development of and **a breakthrough field of development for rural areas** (...) Rather than large power plant capacities, we wish to support biomass use for the **local generation of thermal energy**; with respect to electricity, **low to medium capacity plants with a local regional development** impact should be supported (...) All this is intended to serve the central policy objective of making the agricultural and forestry sectors, as well as **rural players**, the **unambiguous beneficiaries of biomass use for energy generation** and to ensure that a larger proportion of the commercial benefits (profits) from energy generation makes it to their income.(...) Taking into account the importance of green economy development for the national economy and its effects on employment, the creation of at least 150–200 thousand jobs, including **70–80 thousand in the renewable energy industry**, could be a realistic target over the next ten years, and will be based on domestic value creation and the **increase of employment primarily in rural areas**.
Romania's National Renewable Energy Action Plan 2011 -2020	**Forms of RES in rural areas:** - **Biomass** is the main rural fuel which is particularly used for heating spaces and water as well as for cooking; - **Geothermal energy** may be used for heating spaces and water; due to placement, the main potential of use is located in rural areas – dwellings, greenhouses, aquaculture, milk pasteurization - **Solar energy** may be particularly used for preparing domestic hot water resulting in the reduction of fossil fuel consumption for water heating; - **Micro hydro power plants** may represent a basic option for the supply of rural areas which are not connected to the electricity grid; - **Wind generators** may also cover the necessary quantity of electricity within non-electrified rural areas that are difficult to access. **Measures to achieve the objectives:** - Guarantee of an **appropriate training** level of the personnel in accordance with current **technical-economic requirements**. - **Exploration of new uses for the energy** surplus in the rural area especially if **new places of work** are created.
Spain's National Renewable Energy Action Plan 2011 -2020	**Strategies to tackle challenges identified:** Lastly, the development of renewable energies is **a priority for Spanish energy policy**. Renewable energies have a number of **positive effects on society** at large including the sustainability of their sources, reduction in polluting emissions, technological change, the opportunity to advance towards more distributed forms of energy, reduction of energy dependence and the trade balance deficit and **increase in rural employment and development**. **Impact on other sectors:** The Ministry of the Environment and Rural and Marine Affairs is also developing a series of specific measures linked to Law 45/2007 of 13 December 2007 on the **sustainable development of rural areas** through the 2010-2014 Sustainable Rural Development Programme (Sp. acronym PDRS), devised to promote the development of rural areas. Noteworthy measures of this Programme include those designed to promote renewable energies, with **special emphasis on biomass**. **Employment and renewable energies:** On the basis of the evolution forecast by the 2011-2020 Renewable Energy Plan and the socio-economic forecasts, **direct employment** associated with renewable energy sources in 2015 and 2020 is expected to reach 82,589 and 128,373 jobs respectively.

Considering the above mentioned aspects, the general goal of the research is to advance in the study of the training needs in the field of RES for rural development, in order to reduce existing scarcities and contribute to the development of relevant training actions that improve the effectiveness of the teaching-learning processes.

To reach this general goal, the following specific objectives have been defined:

- To know the state of the art through the theoretical review of the key documents related to the links between RES, rural development and training at European level.
- To analyse the specific situation of RES and its relationship with the employment opportunities in the three study cases (rural areas of Bacău county, Castellón province and Heves county).
- To generate a map of the essential actors related to the field of study, including governments, managerial sector, education and training centres and other stakeholders with influcence at local level.
- To identify the current education and training possibilities in RES for rural development in the three study cases.
- To explore which is the perception of the main local actors about the training needs on RES for rural development.
- To compare the similarities, complementarities and differences among the three case studies in order to facilitate the collaboration in the field of study.

3. WORK METHODOLOGY

The theoretical overview and the analysis of the main published documents were the starting points of this research about the training related to RES for rural development. Taking into account the aims of the empirical study and the context in which it has been carried out, it has been considered that the qualitative design is the most appropriated, as its techniques are very efficient to obtain relevant information. These techniques, as the semi-structured interviews and the focus groups, allow collecting exhaustively the experience of specialists that have been selected because of their high implication and knowledge of the field of study (Bautista, 2011).

The research has been organised in three different phases, according to the following sequence:

- First phase, with a theoretical overview on the European context.
- Second phase, the case studies of Castellón province, Bacău county and Heves county. Each study case contains the empirical study with the perception of the actors about the training needs in RES for rural development.
- Third phase, consisting of a comparison of the three case studies.

To address the empirical study of the second phase, it has been necessary to prepare these specific tools, which can be found in the Annexes II, III and IV:

- Open questionnaire on training needs in the field of renewable energies for rural development.
- Closed questionnaire about competences in the field of renewable energy for rural development.
- Guide for the focus group.

In the next sections, the procedure, techniques and sample of the empirical study are described.

3.1. PROCEDURE

The process to carry out this study has been organised in three complementary and interrelated phases, integrated by the theoretical research, the empirical study and the comparison of the study cases. Although the phases follow a linear approach, they are interrelated and the findings and conclusions of a particular phase have contributed to improve the previous phase and to guide the work to be done in the next phase.

a) Theoretical research phase

During this phase, the research team has collected information from different written sources and publications. This stage has been focused on the analysis of the situation of RES for rural development and the training offer in this field at European, national and local levels. The major part of the information has been provided by public organisations and agencies (such as European Commission agencies, national statistics institutes, energy agencies) and research and educational centres. It can be noticed the data shortage on the local situation of RES and the difficulty to find systematic documents about the training offer in RES for rural development. This fact confirms the relevance of the current study which aims to contribute to fulfil the existing needs.

b) Empirical phase

The work developed in this stage has started with the design and detailed planning of the semi-structured interviews and the focus group that complement the information obtained through the interviews. In this sense, the research team has designed the specific tools described in the previous section and collected in the Annexes II, III and IV. In each country, between thirteen and eighteen

representatives of key organisations have been identified and contacted to present the study and requested to participate in the process. The positive response is remarked among the contacted persons that have collaborated altruistically in the research. The detailed description of the sample can be found in the case studies (sections 4.5, 5.5 and 6.5) and a joint list is compiled in Annex I.

Once the sample has been contacted, a pilot interview has been conducted in order to obtain the final version of the questionnaire. In total, the research team has conducted forty interviews (ten in Hungary, fourteen in Spain and sixteen in Romania), that have been recorded to facilitate the data analysis. The interviews have been transcribed and a synthesis document with the main aspects has been elaborated.

This preliminary document has been sent via e-mail to the eighteen persons selected for the three focus groups (one in each country: Hungary, Spain and Romania). During the focus group, the moderator has facilitated a guided and in-depth discussion about the different parts of the preliminary document. These meetings have provided qualitative information to obtain the final information that is shown in the case studies (sections 4.5, 5.5 and 6.5).

c) Comparison of the study cases phase

After each national research team has carried out the local case study, a comparative study has been developed in order to identify the common aspects and the complementary capacities. In this sense, all the sections included in the independent case studies have been analysed (section 7), such as the context, the RES and development, the map of actors, the training in RES for rural development and the empirical study with the perception of the actors. The findings of this phase are essential to detect potential actions and future research lines not only in the three participant countries, but also are scalable to other countries (mainly at European level).

3.2. EMPIRICAL TECHNIQUES

The techniques used to carry out the field work have been the semi-structured interview and the focus group. To this end, the research team has designed three common tools that have been used in the three participant countries.

The initial semi-structured interview has allowed knowing the experience of representatives from a wide range of actors linked to the training needs of RES for rural development. The potential of this kind of interviews is emphasised in order to obtain deep qualitative information and facilitate the understanding of the different approaches of the interviewed persons (Taylor and Bogdan, 2000). The tools used for the interview are the Open questionnaire on training needs in the field of renewable energies for rural development (Annex II) and the Closed questionnaire about competences in the field of renewable energy for rural development (Annex III).

The second technique used for data collection is the focus group, consisting of a semi structured group interview moderated by a facilitator. It is highlighted that focus group has been selected for being very appropriated to get a concentrated group of observations in a short time and to clarify research findings from a complementary method (Morgan, 1997). Thus, this technique has allowed obtaining information about the first version of the systematized document obtained after the semi structured interviews described in the previous paragraph. In this part of the field work, the facilitators have used the Guide for the focus group (Annex IV).

In the next table, the main contents covered by the described tools can be seen.

Table 3-1. Details of the tools used in the semi structured interviews and the focus group. Source: Own elaboration based.

TOOL	PART	Nº OF ITEMS	CONTENTS
Open questionnaire on training needs in the field of renewable energies for rural development	Rural context	2	- Current situation and evolution of the rural areas - Initiatives to reverse the current situation
	RES and rural development	10	- Role of RES for rural development - Factors or initiatives to boost RES in rural areas - Current demand for RES in rural areas - RES facilities in rural areas - Success stories of RES for rural development - Stakeholders related to RES in rural areas - Employment and business related to RES in rural areas
	RES training for rural development	5	- Training / educational situation of RES - Specific training on RES and rural development - Unmet training needs and improvements to be made
	Other	3	- Other key informants - Possible participation in focus group - Other comments
Closed questionnaire about competences in the field of renewable energy for rural development	Basic competences	18	- Capacity for analysis and synthesis - Troubleshooting - Information management skills - Interpersonal skills - Planning and time management - Oral and written communication - Use of ICT - Knowledge of languages - Teamwork and networking - Ability to work in an international context - Abilities to learn, to apply knowledge and to adapt to new situations - Priority for quality - Ability to generate new ideas - Other basic competences
	Specific competences	21	- Know the scientific-technical language and the theoretical foundation of the technologies for the application of renewable energy - Ability to research and develop technologies in the field of renewable energies - Be able to evaluate the advantages and disadvantages of the various primary and / or final sources of renewable energy, including hybrid systems - Know how to calculate, measure and evaluate small installations (eg electric power plants up to 100 KW) for export and / or self-consumption of renewable energy - Perform environmental impact studies of the various renewable energy technologies - Analyze the environmental problems related to energy and relate them to global warming - Analyze the role of energy as a production factor in the economic system - Apply legal and tax issues affecting the renewable energy sector - Understand the fundamentals of transport and distribution of electricity through the public nets of low and high voltage - Know the interconnection systems between public networks and small production and / or consumption plants of electricity from renewable energy sources and current charging systems in the EU

			- Identify the technical characteristics of the reception facilities of electricity in low voltage, consumer devices and its protection systems - Analyse the potential for exploitation of energy crops and local processing plants for biofuels - To be permanently informed about innovations in the field of bioclimatic architecture - How to apply the Technical Building Code as far as energy efficiency is concerned - Provide ongoing information about innovations in the field of renewable energy for rural development - Provide ongoing information about innovations in the field of energy efficiency and savings - Know the basics of accounting and financial analysis applied to the renewable energy sector and energy efficiency and savings - Promote the automation and monitoring of production processes and / or final energy consumption from renewable energies - Understand and relate renewable energy to rural development from a social, economic and environmental perspective - Have abilities and specific skills for installation and maintenance of small installations using renewable energy - Other specific competences
Guide for the focus group	Rural context	3	- Current situation and evolution of the rural areas - Initiatives to reverse the current situation
	RES and rural development	9	- Role of RES for rural development - Factors or initiatives to boost RES in rural areas - Current demand for RES in rural areas - RES facilities in rural areas - Success stories of RES for rural development - Stakeholders related to RES in rural areas - Employment and business related to RES in rural areas
	RES training for rural development	4	- Training / educational situation of RES - Specific training on RES and rural development - Unmet training needs and improvements to be made

3.3. EMPIRICAL SAMPLE

The sample of the study is composed of forty-nine specialists in RES for rural development, which represent different actors with strong influence in the field of study at local level (Annex I). Although the detailed description of the sample can be found in the study cases of Castellón province, Bacău county and Heves county, it has been considered relevant to offer a summary with their main characteristics.

Regarding the origin, eighteen persons are from Spain, eighteen from Romania and thirteen from Hungary. From these specialists, there are representatives from different organisations active in the field of RES for local development:

- Local governments, as Municipality of Gyöngyös (Hungary), Municipality of Benlloch (Spain) and Bacău County Council (Romania).
- SMEs, as KPMG Counselling (Hungary), Forestal del Maestrazgo (Spain) and Electrotehno (Romania).
- Training and research centres, as the Sustainable Innovation Centre (Hungary), Secondary School Alto Palancia (Spain), "Gheorghe Asachi" Technical University (Romania).
- Associations, as Assocatios Ugar (Hungary), Som Energia (Spain) and Itesti Fruit-Growing Association (Romania).
- Other relevant institutions, as the Natural Park Sierra Espadán (Spain) and the National Agency for Environmental Protection (Romania).

From these organisations, the biggest groups are composed of educational and research centres (39%) and SMEs (31%), due to their direct link with the general objective of the research. Considering the relevant role of policy makers in rural development, the third group is represented by local government representatives (14%), including mayors, local development agents and energy officers. To analyse the situation of training needs from a holistic approach, there have been taking into account the perspective of professional and users associations (8%) and other organisations (8%).

Relating to the age of the participants, the lowest percentage corresponds to the persons under 35 years old (11%) and the highest represented group is composed of persons between 36 and 45 years old (53%). The rest of the persons (36%) are over 45 years old. Among these persons, 89% have university degree at undergraduate, Master or PhD Level. These data may be originated by the fact that the persons selected to be part of the sample are experienced and specialized in RES and the knowledge about rural development and training needs.

Concerning the gender, the low percentage of women (18%) that have participated in the empirical study is highlighted. This is a common characteristic in the three countries, being a reflection of the lack of gender balance in the knowledge areas related to the energy field, which can be seen in the gender distribution among the university and vocational training students.

4. CASE STUDY: CASTELLÓN (SPAIN)

4.1. CONTEXT

4.1.1. DELIMITATION OF THE TERRITORY

The delimitation of the municipalities included in this analysis has been based on the Spanish Law 45/2007, whose article 3 defines rural municipalities as those with resident population lower than 5.000 inhabitants and integrated into the rural environment. According to this, the criterion took into account has been to reject coastal municipalities and restrict the scope to those with less than 5.000 inhabitants (114 rural municipalites in Castellón). Some statistical data representative for the rural area in this report are presented as "Castellón hinterlands" and include five regions (Els Ports, Alt Maestrat, Alcalatén, Alto Mijares and Alto Palancia) that cover most of the rural municipalities in Castellón, as shown in Figure 5-1.

The following section includes the contextualization of the socio-economic reality of Castellón in respect to the Valencian Region, Spain and the international environment.

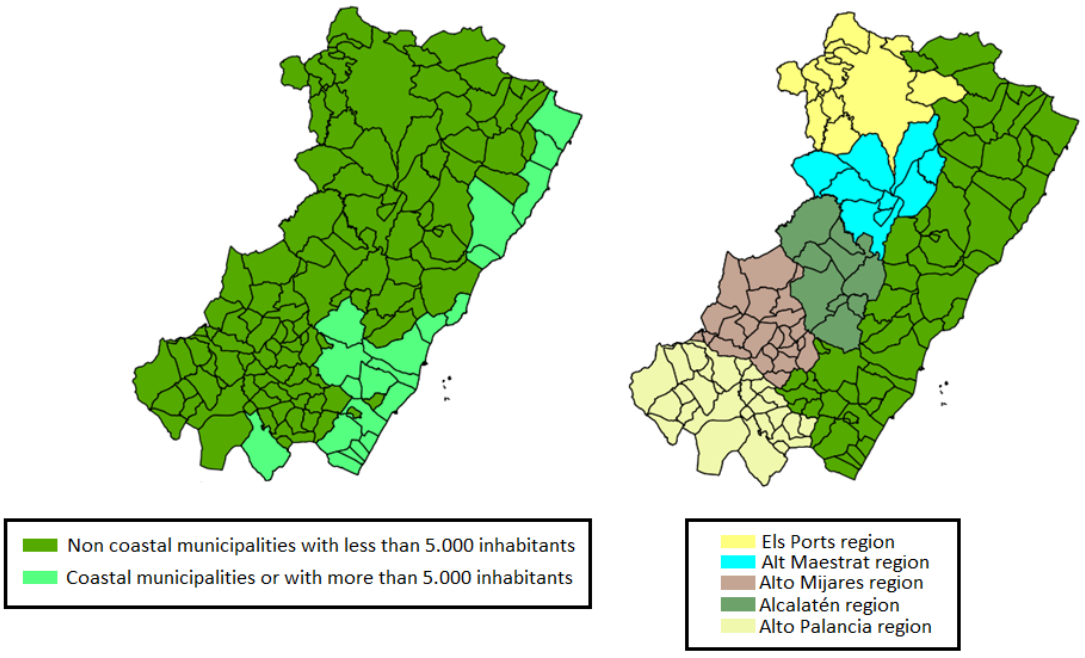


Figure 4-1. Rural municipalities and regions in the province of Castellón. Source: Own elaboration

4.1.2. ECONOMIC CONTEXT

The **global economic context** is marked by the end of the financial crisis that began in 2008 and the first signs of economic recovery.

In terms of the economic contribution that each territory has to the upper administrative structure in 2014, the province of Castellón represents 13,11% of the Valencian Region GDP, Valencian GDP is the 9,39% of Spanish GDP and this last one represents the 7,60% of the European Union GDP, according to the Spanish Statistical Institute.

The reports of the Chamber of Commerce of Castellón (2012) show that the main sectors of the economy in **the province of Castellón** are the ceramics industry, the citrus fruits and the service sector (especially tourism). It is also necessary to emphasise the important petrochemical sector located near the port.

4.1.3. GEOGRAPHICAL AND DEMOGRAPHIC CONTEXT

The province of Castellón is located in the east of the Iberian Peninsula, in the so-called Mediterranean corridor, representing an important communication axis that connects the south of the peninsula with the center of the European continent. More precisely, the province of Castellón serves as a link between the Valencian Region and Catalonia. Although it is a peripheral location, it is well located in the communication routes to the European continent.

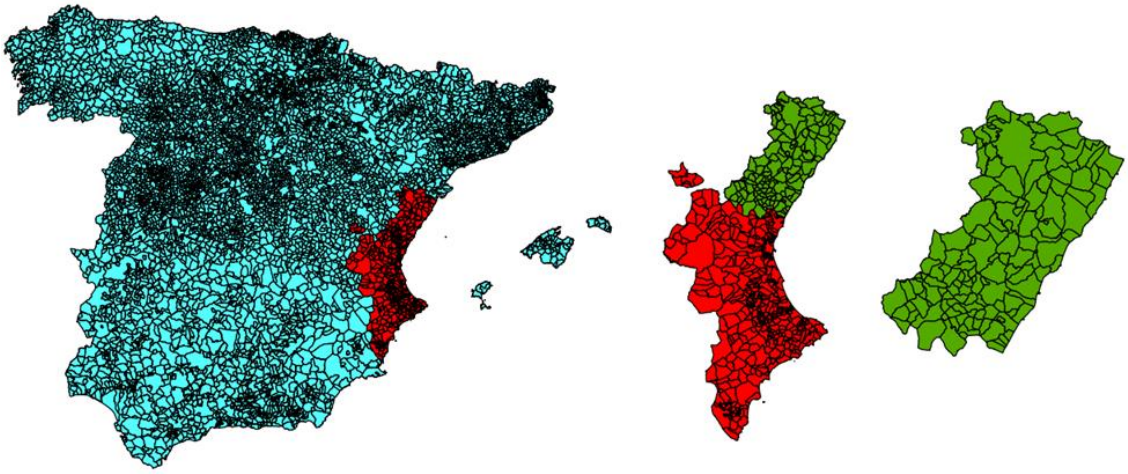


Figure 4-2. Municipalities of Spain, Valencian Region (red) and the province of Castellón (green). Source: Own elaboration

The province of Castellón has an area of 6.631,8 km^2 which is 1,3% of the Spanish total area, and 28,5% of the Valencian territory.

It is a coastal province with mountainous hinterlands, which influences the communication between the coast and the inland areas. On the other hand, by the coast and along the north-south axis, it extends important communication routes.

The province of Castellón has a population of 587.508 inhabitants, which represents 11,49% of the Valencian Region population, of which it forms part, and 1,26% of the total Spanish population. Historically, the population has registered a positive trend for the last 60 years, although this trend has ceased and even slightly declined during the recent years of economic crisis (2007 to present).

4.1.4. SOCIO-ECONOMIC DIAGNOSIS OF TERRITORY

In this section the socio-economic dimension of the territory is analysed, from the structure of the population and training, to the production structure (enterprises, economic activities and the labour market) and infrastructure and equipment.

STRUCTURE OF THE POPULATION

The following tables show the distribution by sex and age of the population of Spain, the province of Castellón and its hinterlands in year 2014.

The aging of the population causes a decrease in the lower age levels of the population pyramids. In Castellón hinterlands it can be appreciated an increase aging of the population, both by the fact of having fewer young people and because of having more old people. It is also clear that women represent the sex that achieves greater ages in the three cases.

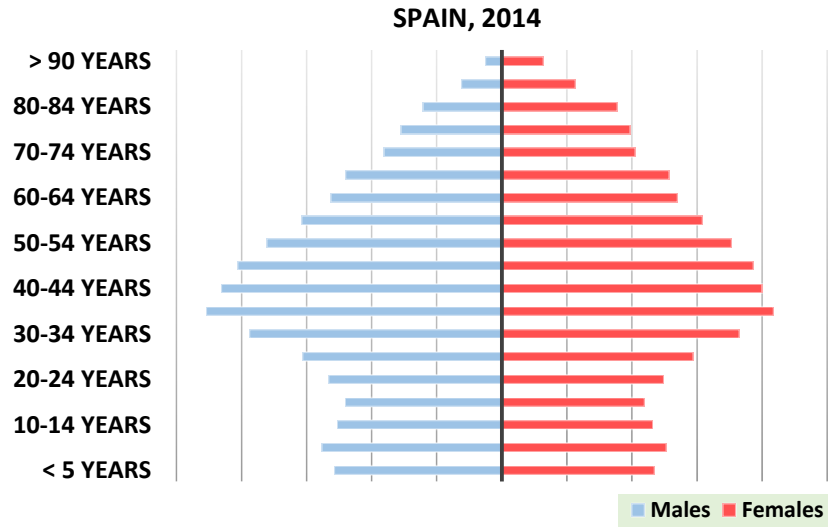


Figure 4-3. Population pyramid of Spain. Source: Own compilation based on INE (2015 a)

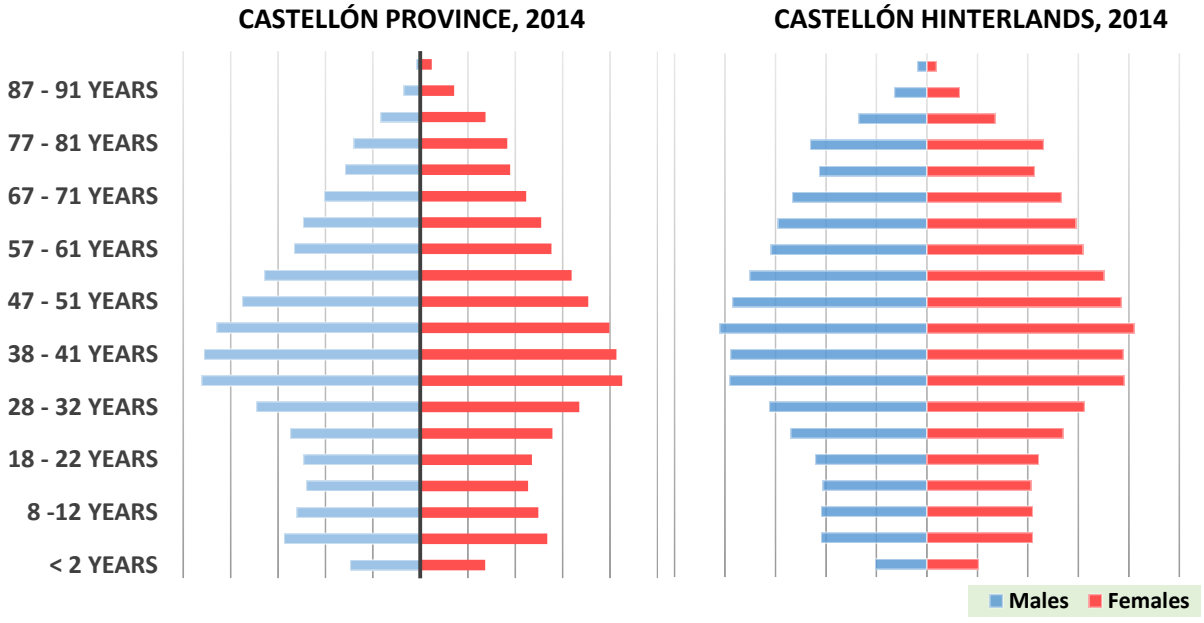


Figure 4-4. Population pyramid in 2014 of Castellón hinterlands and province. Source: Own compilation based on IVE (2015 a).

TRAINING OF THE POPULATION

The following tables show the level of education of the population in the different analysed territories. Population has been grouped by age due to the importance of this variable on the level of education.

Table 4-1. Training of the population between 25 and 64 years old, in Spain and the Valencian Region in 2014. Source: Own compilation based on IVE (2015 a)

AGE	SCOPE	LESS THAN SECONDARY EDUCATION (%)	SECONDARY EDUCATION (%)	HIGHER EDUCATION (%)
25 - 64 years	Spain	43,4	21,9	34,7
	Valencian Region	44,7	23,3	32,0
25 - 34 years	Spain	34,4	24,1	41,5
	Valencian Region	34,1	26,1	39,9
35 - 44 years	Spain	34,6	22,7	42,8
	Valencian Region	36,3	24,1	39,6
45 - 54 years	Spain	47,0	22,7	30,2
	Valencian Region	49,2	25,2	25,7
55 - 64 years	Spain	61,4	17,4	21,2
	Valencian Region	62,7	16,9	20,3

It is clearly observed that the younger population enjoys higher training levels. The training levels in the Valencian Region are slightly lower than the state average.

PRODUCTION STRUCTURE

In this section the production structure of the territories concerned is discussed. In particular, data on the number of businesses as well as size, number of workers or economic activities they develop are presented.

COMPANIES

The number of companies in a territory and its size show interesting information on the economic dynamics of the region.

Table 4-2. Number of companies and variation before the crisis. Source: Own compilation based on INE (2015 b)

	2007	2014	VARIATION (%)
Spain	3.336.657	3.119.310	-6,51
Valencian Region	368.586	330.855	-10,24
Castellón province	42.476	38.084	-10,34

The effect of the crisis is clearly visible in the disappearance of companies between 2007 and 2014. This destruction of companies is clearly superior in the Valencian Region and the province of Castellón than in the rest of Spain.

Table 4-3. Number and percentage of companies depending on the size in 2014 (2009). Source: Own compilation based on INE (2015 b)

	SPAIN	(%)	VALENCIAN REGION*	(%)	CASTELLÓN	(%)
Unpaid	1.672.483	53,62	182.705	50,35	18.868	49,54
1 - 9	1.316.431	42,20	159.768	44,03	17.623	46,27
10 - 49	108.383	3,47	17.541	4,83	1.266	3,32
50 - 199	16.976	0,54	2.381	0,66	243	0,64
> 200	5.037	0,16	449	0,12	84	0,22
Total	3.119.310	100,00	362.844	100,00	38.084	100,00

The business of Castellón is marked by the prominence of small businesses, as 80% of them involving between 1 and 5 workers, although this reality is shared with the whole of the Valencian Region and Spain.

ECONOMIC ACTIVITIES

The next section shows the importance of economic activities in the various territories considered in this study.

Table 4-4. Contribution of the economic sectors to GDP in 2011 (Spain, Valencian Region, Castellón). Source: Own compilation based on Observatorio de las ocupaciones (2014)

	SPAIN (%)	VALENCIAN REGION (%)	CASTELLÓN (%)
Agriculture	2,49	1,91	2,69
Industry	17,14	18,03	27,55
Constructions	9,50	10,72	10,09
Services	70,87	69,34	59,67

Industry and construction are the economic activities that contribute to the wealth of the territory in the Valencian Region more than in Spain. Instead, agriculture and services contribute more to the wealth in Spain than in the Valencian Region. Agriculture and industry are more important in Castellón than in the other two areas, while the contribution of services is lower.

Table 4-5. Percentage of workers and enterprises by economic sector in 2013 (Castellón). Source: Own compilation based on Observatorio de las ocupaciones (2014).

	COMPANIES (%)
Agriculture	4,86
Industry	8,63
Constructions	6,68
Services	79,83

In the case of Castellón, the services sector covers up to almost 80% of enterprises and 65% of workers. The distribution of employment between Valencia and Spain partly reflects the already seen in terms of the contribution of different economic sectors to the richness of the territory.

More information about economic data and employment linked to renewable energies will be presented in section 4.2.

Table 4-6. Distribution of employment by economic activity (2013 and 2014). Source: Own compilation based on Observatorio de las ocupaciones and INE (2014)

	SPAIN (2014) (%)	VALENCIAN REGION (2014) (%)	CASTELLÓN (2013) (%)
Agriculture	4,10	3,32	9,30
Industry	12,49	14,73	19,30
Constructions	5,60	5,75	5,46
Services	77,82	76,20	65,94

LABOUR MARKET

The next section covers the main indicators of employment in the territories considered in this study, along with its evolution before and during the economic crisis.

Most of the tables below show the quarterly data of the Labour Force Survey, since this is the most important statistical source for the labour market data.

Table 4-7. Comparison of the rate of unemployment in Spain, Valencia and Castellón in the first quarters (1Q) of 2007 and 2015. Source: Own compilation based on IVE (2015 a) and INE (2015 a)

	2007 1Q (%)	2015 1Q (%)	INCREASING (%)
Spain	8,42	23,78	182,42
Valencian Region	8,54	24,28	184,31
Castellón	6,59	25,69	289,83

The economic crisis in the last few years has meant a deterioration of very large labour market in Spain and in the Valencian Region or Castellón, although in the province it has been still higher than in other territories. The unemployment is higher when the level of studies is lower.

Table 4-8. Unemployment rate by level of education, Valencia and Castellón, 1st Quarter 2015. Source: Own compilation based on IVE (2015 a)

	VALENCIAN REGION (%)	CASTELLÓN (%)
Total	24,30	25,70
Illiterate People	38,50	-
Primary School	42,80	45,70
First stage of secondary Level education	30,00	28,20
Second stage of secondary Level education	24,00	26,60
Higher Education	15,00	18,70

4.2. RENEWABLE ENERGIES AND DEVELOPMENT

This section presents a set of statistical data that enable the analysis of the energy structure of the current status of renewable energy, as well as its future targets.

Regarding the spatial coverage of the data, whenever it was possible, data for Spain, for the Valencian Region and for the province of Castellón, has been included.

Regarding the temporal coverage, data from the last decade (starting in year 2005) has been included to show the evolution of the data. In most cases, the available and consolidated data to show the

current situation was from 2013. For the future targets, and due to its relevance at European level, 2020 has been selected.

At national level, Eurostat web has been an important source of information. Most of the data at regional and provincial levels have been obtained from the reports from IVACE (2013). It has been very relevant, especially in terms of future prospects, the information provided by the Spain´s National Renewable Energy Action Plan 2011-2020 (SpNREAP) (Spanish Government, 2010).

4.2.1. CURRENT ENERGY SITUATION

Spanish geographical position limits the possibilities of interconnection with the rest of Europe, together with a low exchange capacity, makes the Iberian Peninsula an "electric island". The national energy consumption structure has been historically characterized by the dominant role of imported resources (as petroleum or natural gas), high consumption in the transport sector, high degree of energy dependence and therefore a low level of self-supply. The policies of energy efficiency and renewable energy started to change this situation in 2005. The economic crisis has affected the country energy data, as the reduction of industrial activity has limited the electricity demand and also the actions in energy saving and efficiency and in renewable energy promotions have suffered, from 2011, a significant slowdown.

Regarding the primary energy, in 2013, the gross inland consumption was 118,8 MTOE (Mega tonne of Oil Equivalent) in Spain and 9,9 MTOE in the Valencian Region (see below figure).

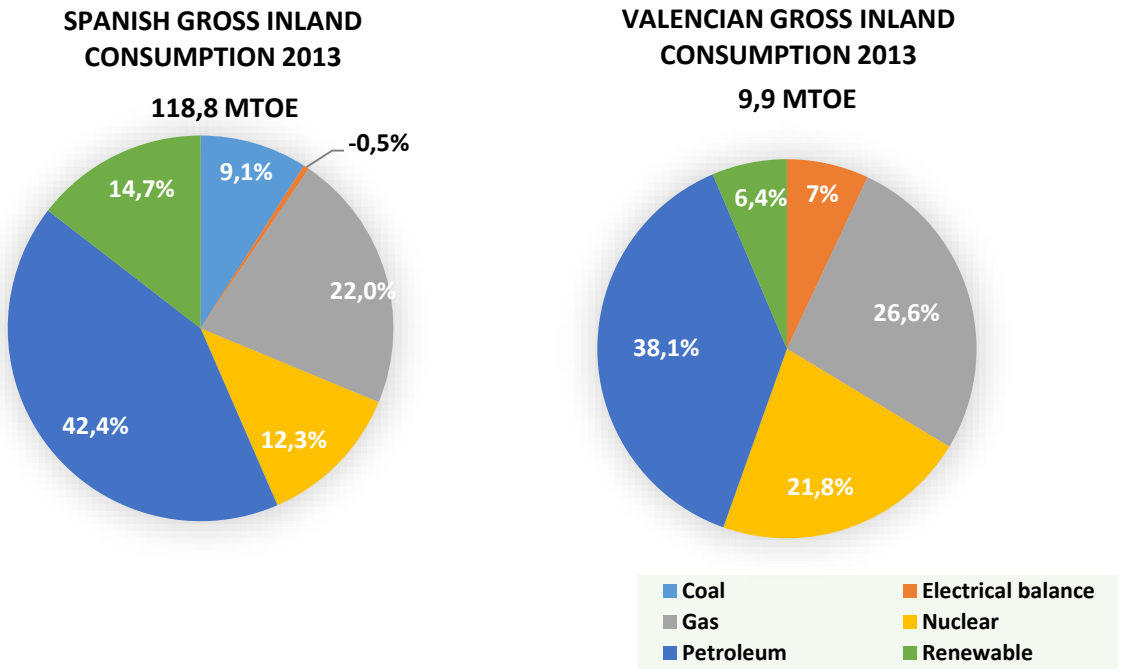


Figure 4-5. Primary energy gross inland consumption in 2013 at national level (left) and regional level (right). Source: Own compilation based on IVACE (2013)

The primary energy consumption structure reveals the relevance of fossil fuels (petroleum, gas, coal) at national level (73,5 %) and at regional level (64,7%) and the share of renewable energies: 14,7% and 6,4% respectively. In general, higher presence of natural gas, lower petroleum consumption, zero consumption of coal and lower share of renewable energies are observed at regional level when comparing to national data.

In 2013, the final energy was 80,8 MTOE in Spain, 7,5 MTOE in the Valencian Region and 1,9 MTOE in the province of Castellón (see below figure).

At national and regional level, the most energy demanding economic sectors are transport (around 40% in both cases) and industry (25,7% and 31% respectively). This scenario changes at provincial level, where the industry is the sector demanding more energy (68%). Agriculture and fisheries, in the three cases, is the economic sector with the lowest energy consumption.

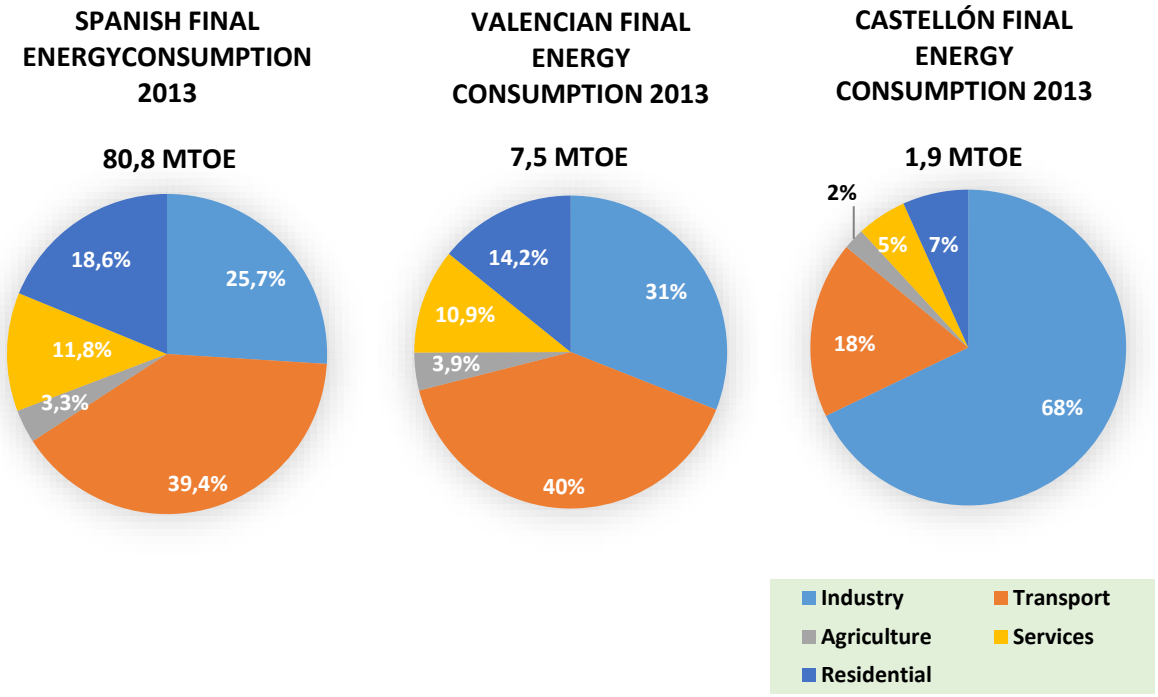


Figure 4-6. Final energy consumption in 2013 at national level (left), regional level (middle) and provincial level (right). Source: Own compilation based on IVACE (2013)

4.2.2. DEVELOPMENT OF RENEWABLE ENERGIES

The contribution of renewable energies to the energy system in Spain has been increasing since 2005. In 2013, renewable energies accounted for 15,4% of the final energy share at national level, and 4,1% and 2% at provincial and regional level. It can be also observed a decrease in the share of renewable energy at regional and provincial level in the last year mainly due to the effects in the economic crisis.

The evolution from 2005 till 2013 of the renewable energy distribution at national level can be observed in the next figures. It is important to notice that the renewable energy consumption in the country more than doubles from 2005 to 2013. Back in 2005, the main renewable energy was the solid biomass (59%) followed by the wind power (22%). Relevant changes, when comparing 2013 and 2005, are the increase in solar thermal energy (from 1% to 12%), the incorporation of solar photovoltaic energy (up to 4%) and the increase in wind energy share.

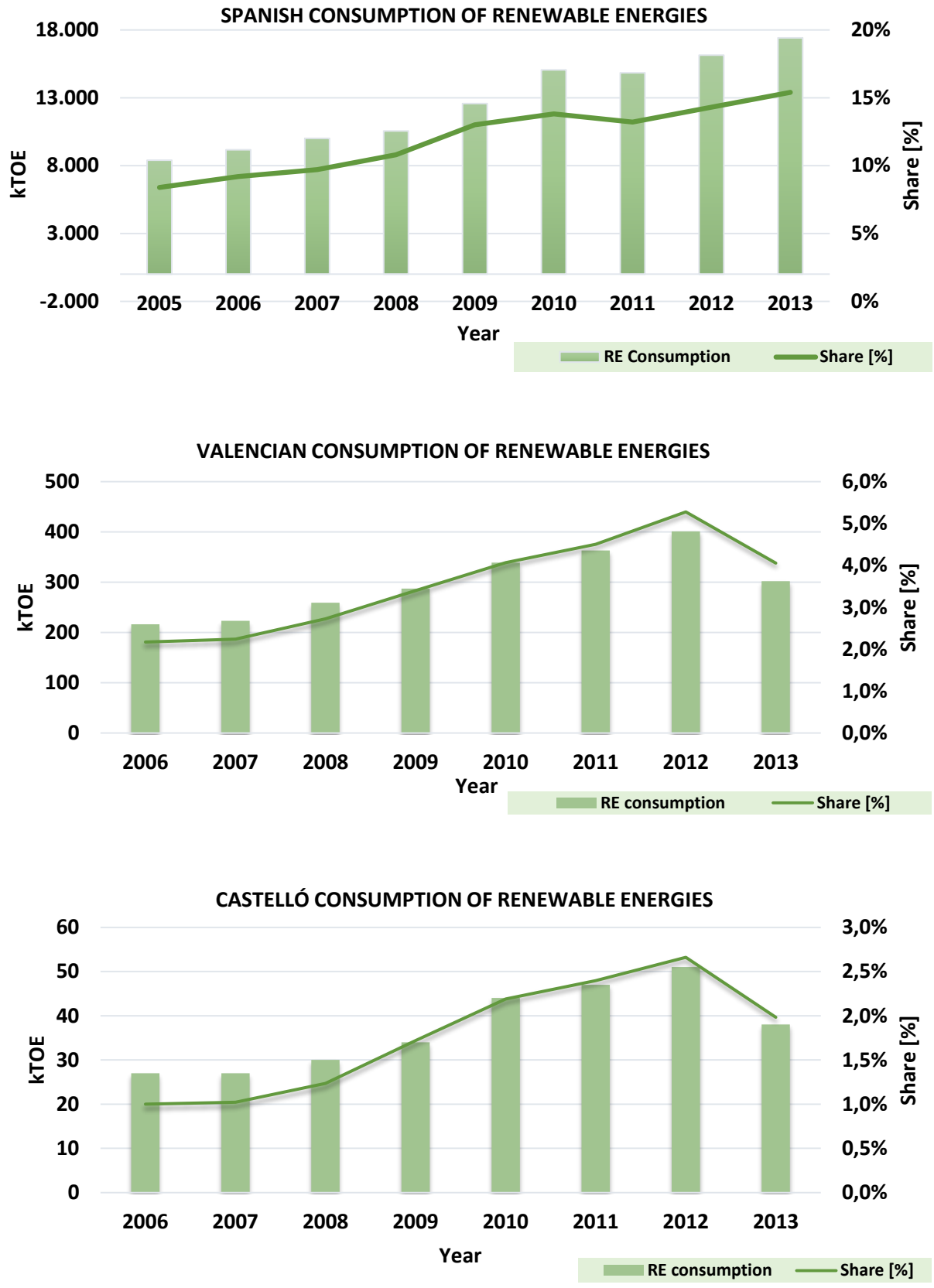


Figure 4-7. Evolution of final renewable energy share at national level (top), regional level (middle) and provincial level (bottom). Source: Own compilation based on IVACE (2013)

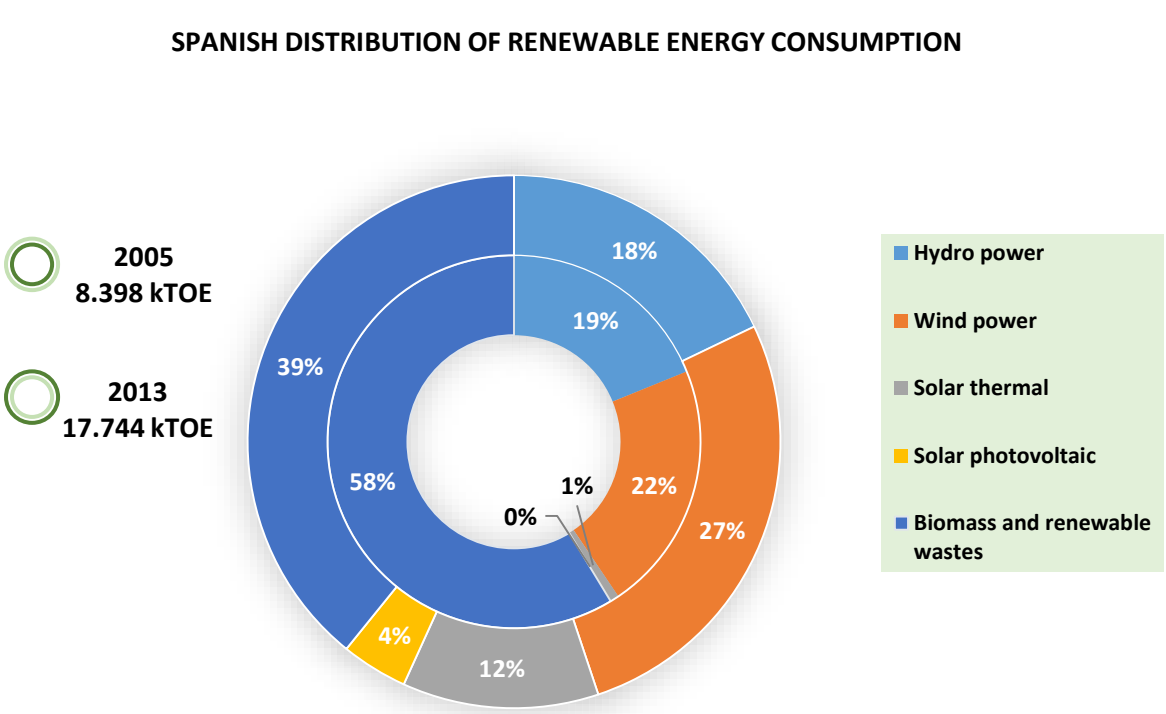
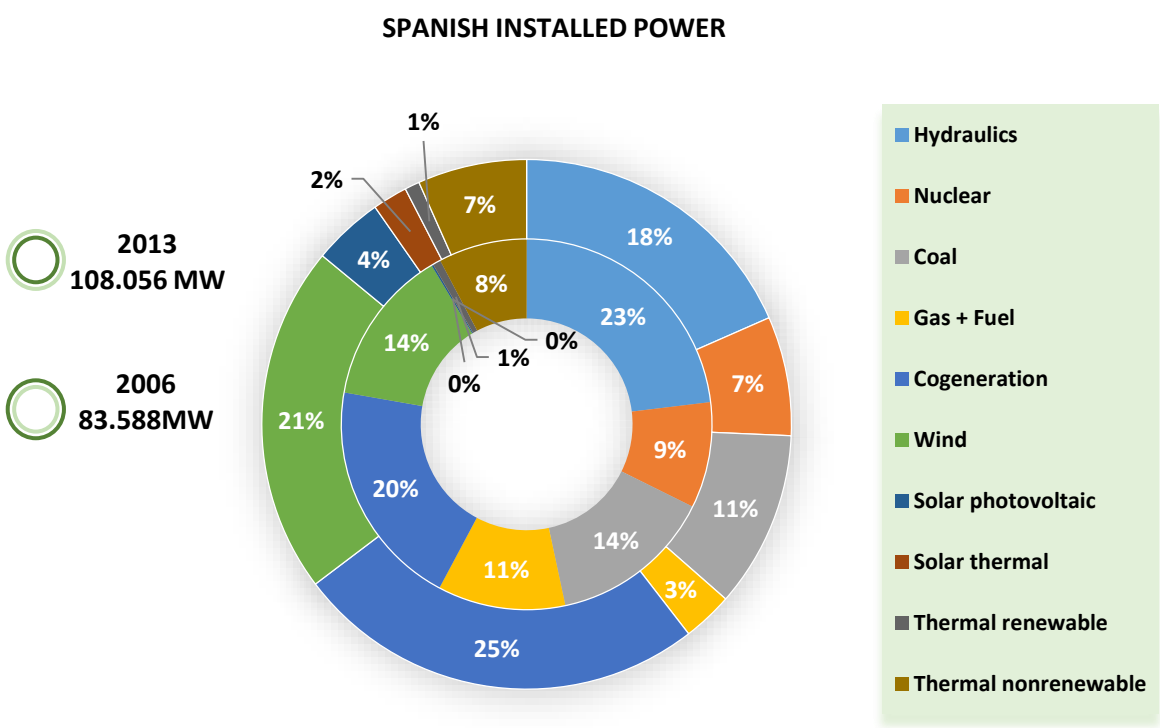


Figure 4-8. Evolution of national distribution of renewable energy consumption.
Source: Own compilation based on Eurostat (2015)



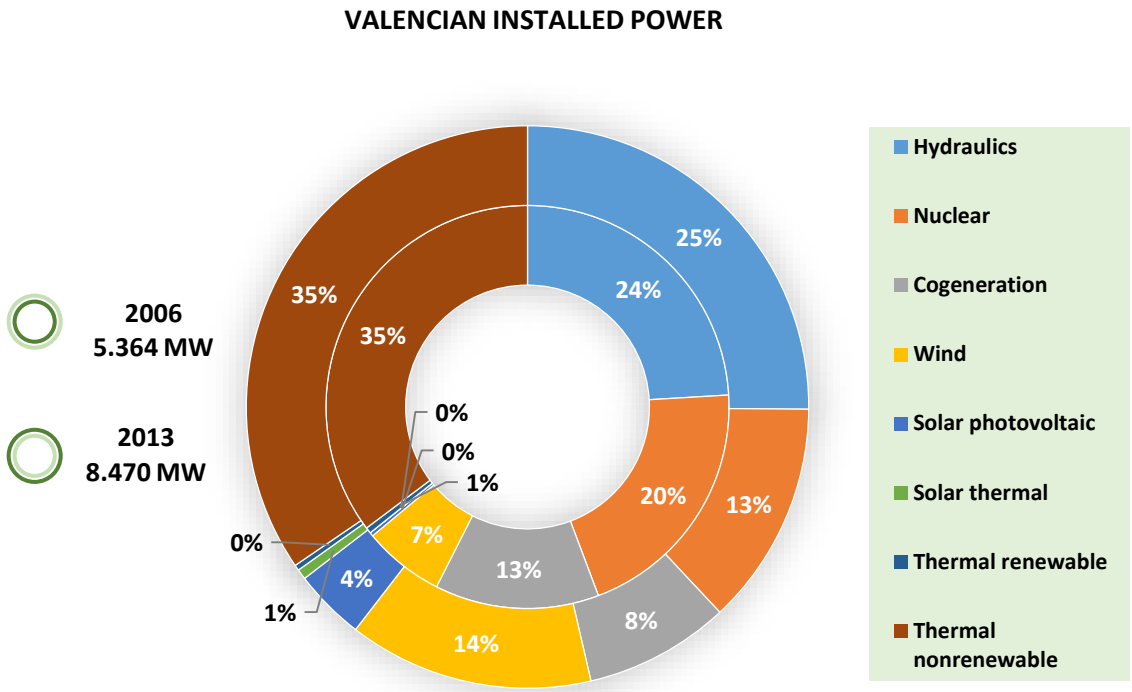


Figure 4-9. Installed power distribution in 2006 and 2013 at national level (top) and regional level (bottom)
Source: Own compilation based on Eurostat (2015) and IVACE (2013)

Above figure shows the comparison between national and regional level of installed power of year 2006 and year 2013. The current installed power at national level reaches 108.056 MW, being around 30% higher than seven years before. In 2013, the power installed at regional level is about 12% of that at Spanish level. Currently, the main renewable energy installations in Spain are wind (21%), hydroelectric energy (18%), solar photovoltaic (4%), while at the level of the Valencian Region are hydroelectric energy (25%), wind power (14%) and solar photovoltaic (4%).

4.2.3. RENEWABLE ENERGY TARGETS AND TRAJECTORIES

The European Renewable energy directive (Directive 2009/28/EC) of the European Parliament and of the Council of 23 April 2009 sets a binding global target of 20% final energy consumption from renewable sources by 2020 in the European Union and at least a 10% of their transport fuels coming from renewable sources to be achieved by all Member States in the field of transport by that year.

To achieve this, each European country defined a National Renewable Energy Action Plan (NREAP), that shows their national renewable target and define their actions to take to meet their renewables targets. Spain committed to reach a national renewables target of 20,8% in their NREAP and 11,3% in transport sector, which was published at the end of 2011 (SpNREAP).

Taking as reference the year 2005, the Spanish NREAP defined evolution of the sectorial targets for electricity, heating and cooling, and transport from 2011 to 2020 as shown in below figure.

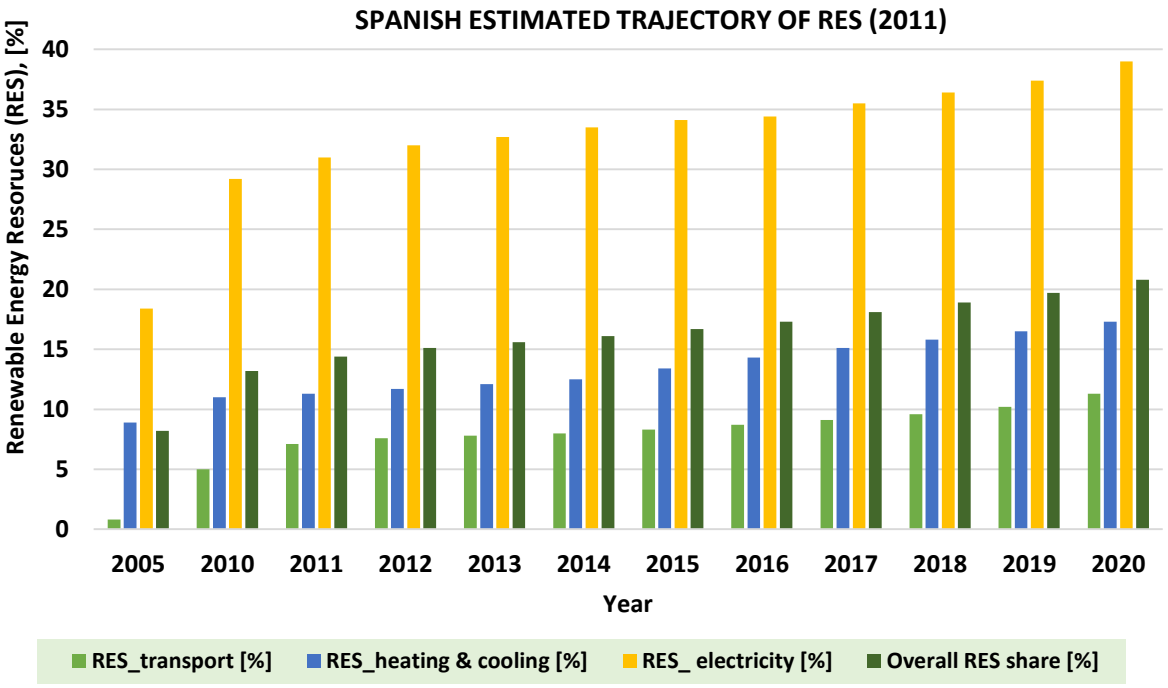


Figure 4-10. Spain's 2020 target and estimated trajectory of energy from renewable sources (RES) in heating and cooling, electricity and transport as defined in 2011. Source: Spanish Government (2010)

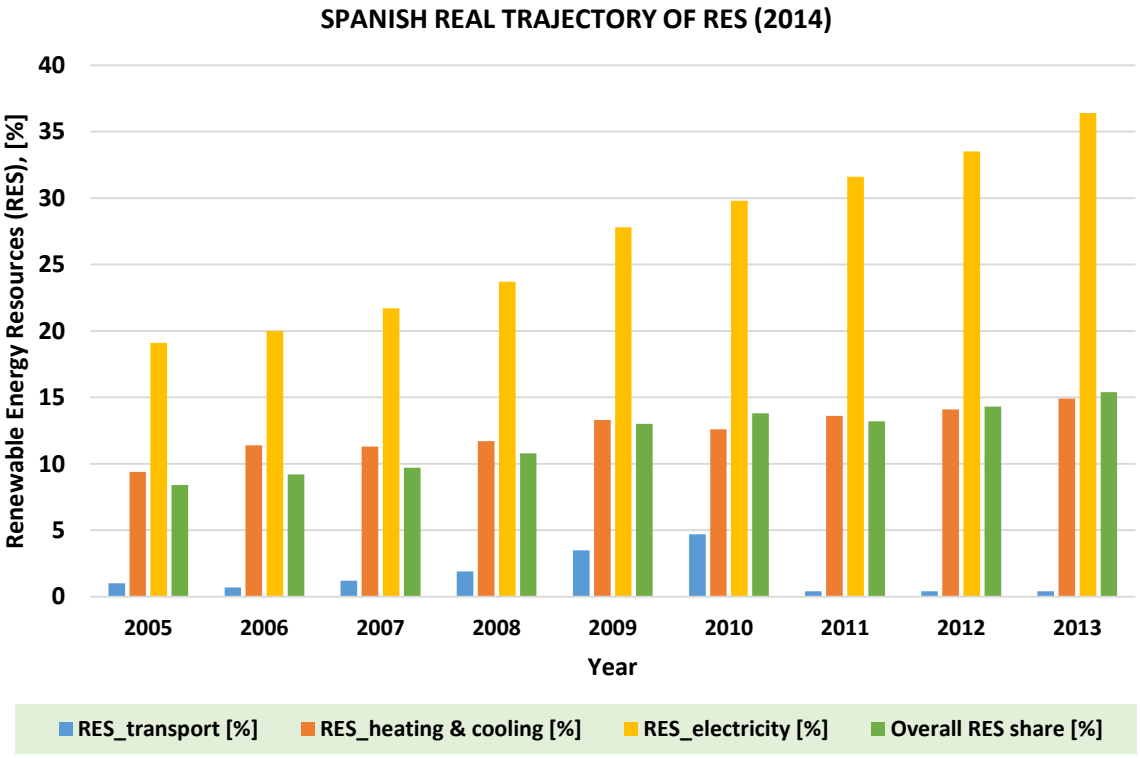


Figure 4-11. Spain's real trajectory of energy from renewable sources (RES) in heating and cooling, electricity and transport from 2005 to 2013. Source: Own compilation based on Eurostat (2015)

Above figure shows the importance, at the estimated trajectory level, of Renewable Energy Sources (RES) for electricity production in the country, while the situation of the RES in the transport section is lower. This can be also confirmed by the actual data of RES from 2005 to 2013, as observed in the mentioned figure.

The country has complied with its 2013 global NREAP target (15,4% over the estimated 15,16%) and also with the electricity and heating and cooling sectors. However, the RES targets for the transport sector are, at this moment, far from being attained (0,4% instead of the expected 7,8% in 2013).

4.2.4. EMPLOYMENT AND RENEWABLE ENERGY

It is important to estimate the employment associated with the promotion of renewable energies. In this section, an evaluation of the employment generated divided by the renewable energy production technologies, by the related areas of activity and by characteristics of generated employments is given. The data are taken from actual sources in 2005 and then by estimations related to NREAP targets by 2020 (SpNREAP) and also from the IDAE report.

According to IDAE (2011), most of the Spanish companies within the renewable energy sector are split into four fields of action, solar photovoltaic (54,6%), solar thermal (41,8%), wind (24,4%) and biomass (22,1%).The size of the renewable energies enterprises at national level are shown in the next figure.

The larger companies are located mainly in the subsectors wind and solar photovoltaic. Around 94% of the companies employ less than 50 workers. Only 1,5% of companies have more than 250 workers, however, they represent a major proportion of the total volume employment.

The largest volume of employment is concentrated in the largest companies of 1.000 employees (38,7%). Companies with between 11-50 and 251-1,000 workers contribute to around 19,0% of employment in the sector. Although small enterprises are quite numerous, they represent only 9,8% of the jobs.

In 2010, it was estimated (IDAE, 2011) that in Spain renewable energies were responsible of 115.722 jobs (around 6,6% of direct jobs) in the renewable energies sector. The direct and indirect employment generated by the different renewable technologies is presented in the next table.

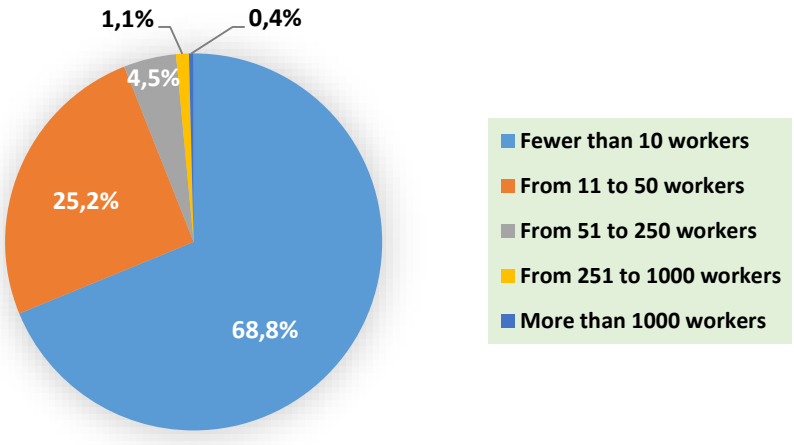


Figure 4-12. Size of the renewable energies enterprises. Source: Own compilation based on IDAE (2011)

Table 4-9. Direct and indirect employment generated by different renewable technologies in Spain in 2010. Source: Own compilation based on IDAE (2011)

	DIRECT EMPLOYMENT	INDIRECT EMPLOYMENT	TOTAL EMPLOYMENT
Wind	30.651	24.521	55.172
Solar photovoltaic	19.552	8.798	28.350
Solar thermal	6.757	3.041	9.798
Activities common to all areas	4.263	2.718	6.981
Biomass	3.191	2.808	5.999
Waste incineration	1.415	637	2.052
Hydropower and mini-hydro	1.078	485	1.563
Biofuels	964	988	1.952
Biogas	664	681	1.345
Solar thermoelectric	511	307	818
Geothermal	415	162	577
Other	268	171	439
Aerothermal (heat pump)	184	83	267
Mini-wind	165	132	297
Tidal power	74	38	112
TOTAL	70.152	45.570	115.722

The breakdown of direct employment by renewable area shows that the main sector is wind with 43,7%, then solar photovoltaic with 27,9% and solar thermal with 9,6%. The rest of the considered sectors accounts for 18,8% of the remaining direct employment.

As shown in Table **4-10** table, the activities creating the most jobs are equipment manufacturing (37,6%), implementation of service projects (18,3%) and plant construction (16,9%). R&D&Innovation activities contribute to employment at a rate of 4,5%, indicating that as far as employment is concerned renewable energy companies contribute more to GDP than the rest of the national economy.

Table 4-10. Distribution of direct employment by activities. Source: Own compilation based on IDAE (2011)

	TOTAL EMPLOYMENT	%
Equipment manufacturing	26.387	37,6%
Construction and installation	11.840	16,9%
Project and services development	12.834	18,3%
Sale of equipment	7.228	10,3%
R&D	3.185	4,5%
Operation and maintenance	8.395	12,0%
Training	283	0,4%
TOTAL	70.152	100,0%

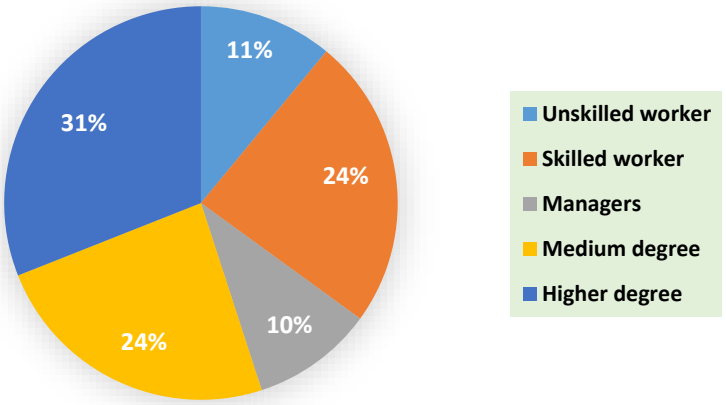


Figure 4-13. Professional qualification of the renewable energy workers. Source: Own compilation based on IDAE (2011)

The professional qualification of the renewable energy workers is presented in the above figure. About 30% of the workers have a higher university degree. Almost a quarter consists of medium university degree.

On the basis of the evolution forecasted by the Renewable Energy Plan 2011-2020 and the socio-economic forecasts, total employment associated with renewable energy sources is expected to reach 302.886 jobs, with 180.175 direct jobs in 2020.

4.2.5. RENEWABLE ENERGY LEGISLATION

Regulation of renewable energies in Spain does not begin to develop until the 1980s, with a law that encourages small hydro power usage (Law 82/1980) in order to cope with the oil crisis, improve energy efficiency and reduce external dependence. And in the following decade, the National Energy Plan 1991-2000 encourages renewable energy production and, by Law 40/1994, the concept of special regime for RES is consolidated.

From this moment, laws and decrees are developed to meet the Development Plan of Renewable Energies (PFER) of 1999 and its update to the Renewable Energy Plan (PER) 2005-2010. In this line, with the Royal Decree 314/2006 it is approved the Technical Building Code (CTE), making compulsory to incorporate solar thermal and photovoltaic panels in certain buildings.

Royal Decree 436/2004 establishes the methodology for updating and systematising the legal and economic regime of electricity production under the special regime and establishes the legal and economic framework in order to create a stable and predictable system.

Because of the economic impact that renewables have on the electric tariff system, Royal Decree Law 6/2009 was approved in order to establish mechanisms regarding compensation system for special regime facilities (except for photovoltaic technology as regulated by Royal Decree 1578/2008), and thus ensure the sustainability of the system, both technically and economically.

In November 2011, the new Renewable Energy Plan (PER) 2011-2020 replaces both PANER 2010-2020 and PER 2005-2010 in response to the mandates of Royal Decree 661/2007 and the Sustainable Economy Law 2/2011.

In January 2012, in order to undertake the resolution of the problem of high tariff deficit in the electricity system, Royal Decree-Law 1/2012 was approved, for which economic incentives are

suspended for projects to install new facilities of electricity production from RES, and it was continued with the electricity reform by Royal Decree-Law 2/2013. It describes the methodology by which fees and premiums power system activities is replaced, also amending Royal Decree 661/2007, whereby the activity of electricity production under the special regime is regulated by deleting the existing premiums.

Finally, Law 24/2013 enshrines these principles and provides that the emoluments of facilities eligible for premium, prior to this law, will be referenced to State obligations to ten years plus a spread of 300 basis points during the first regulatory period until 31 December 2019.

4.3. MAP OF ACTORS

The application of the RES transformation technology, during conditions that favour the rural development, is carried out at different levels of performance that include the international, national, regional and local fields. At all of them the actors' multiplicity is denoted, complementary and interrelated. Taking into account the objectives and the approach of the study, this section will focus on the local and regional levels, as they affect more directly the livelihoods of the rural population.

Next, there are descriptions of some of the most relevant actors in the subject of study for the province of Castellón, under the consideration that the citizenship must be the centre of the proceedings and strictly focusing on the rural municipalities from the interior of the province. As a synthesis, every section includes tables that gather the most significant characteristics of the described actors.

4.3.1. LOCAL GOVERNMENT

The **city councils** can promote a wide variety of activities to promote the use of RES, as contracting equipment and facilities that allow the use of RES for municipal services, awareness about the benefits and viability of RES among citizens, dissemination of good practices, adaptation of municipal ordinances in line with national plans, coordination of actors, etc. In terms of the internal structure, in some cases the Mayor assumes these functions, while in others, Agents of Local Development (ALD) or other municipal technician do it. Although the RES promotion is not an explicit task of the ALD, their role in the rural development is essential and they can therefore be effective facilitators in the use of this type of energy.

As a supramunicipal entity that supports local entities (especially those with little economic and technical capacity) there is the **Provincial Council of Castellón**, a public institution which, among other activities, collaborates and coordinates the management of the services of municipal competition that cannot afford, for being too complex or costly, small municipalities, such as legal aid services, economic and technical treatment of urban waste, etc. (Law 27/2013 rationalization and sustainability of the Local Administration).

By its relation to the study, there is the work exerted from the areas of environment and Rural Development of the above-mentioned Council of Castellon, as well as the training centers CEDES, jointly funded with the FEDER funds. These centers are not specialized in RES but have facilities and equipment that may be appropriate for the training and the awareness activities on the RES. Below table contains a summary of this type of centers.

Table 4-11. Type, purpose, functions and web page of training centers and research related to the RES in the province of Castellón. Source: Own elaboration

KEY ACTOR	TYPE	OBJECTIVE	WEB PAGE
Provincial Council of Castellón	Public Administration	To promote the RES as an instrument of sustainability and local development	http://www.dipcas.es/es
Community Association	Grouping of municipalities	To provide joint services to affiliated municipalities	http://www.dipcas.es/es/servicios-a-municipios/directorio-municipal/
Municipalities	Local Administration	To provide a safe and affordable access to energy, including the RES	http://www.dipcas.es/es/servicios-a-municipios/directorio-municipal/

4.3.2. MANAGERIAL SECTOR

Taking into account the objectives of the study, it was considered important to emphasise those forms of enterprise that can contribute more directly to the local development. For this reason, the analysis is based in an endogenous perspective focused in the structures that already exist in the areas of research. The most widely used technologies in the province are those related to photovoltaic and thermal solar energy, wind power and biomass. Others, still having considerable potential (example: biogas), hardly affect the local economies.

In this way, the business sector includes **autonomous**, already established professionals from related fields (plumbing, heating, electricity and other professionals in the construction field) whose traditional range of services is complemented by the installation and maintenance of small RES installations, most of the time in the municipality or in nearby areas. The slowdown of the construction sector in which, before the current economic crisis, there was a strong demand for labour, has made that some of these professionals leave the sector gradually and move into the RES technologies sector.

Another group within the business sector is represented by the **micro** and **small enterprises** specializing in RES, which may be generating local and qualified employment.

As an example, and for its important role that it plays in students' employability, the following table reflects the characteristics of some of them.

In certain areas of Castellón province, climatology and availability of space conducted to the installation of large wind farms, as happens in Els Ports, L'Alt Maestrat and L'Alt Palancia, where, according to the Wind Power Business Association (2015) there are more than 300 MW installed. On the other hand, there have been located numerous solar orchards, like the implemented one by Valfortec in Benassal, with an installed power of 4.3 MW and with 20,704 photovoltaic panels. However, not in all cases, this type of large-scale facilities generate sustainable local employment, qualified and with a significant number of employed persons, if we bear in mind the considerable financial resources needed. This is the case of the big wind parks whose maintenance runs, largely, with highly qualified personnel who comes from other geographical areas.

In the production context, the companies in the field of **architecture** are called to play an important role in the development of the RES, in their integration in the buildings and in the environment sustainability. Inside the province, there are diverse companies that work to promote a more energy-efficient architecture, with an emphasis on the role of the RES. An example of this would be the newly created *Casilla de Salida* (Square One), a microenterprise working in architecture, urban planning and rehabilitation that develops its work in the Castellón hinterlands.

Table 4-12. Examples of micro and small enterprises in RES in the province of Castellón.
Source: Own elaboration

NAME OF THE COMPANY	TOWN	TYPE(S) OF RES	SERVICES	WEBSITE
Azahar	Castellón	- Biomass - Biocontruction	- Integral management of energy cultivation - Bioconstruction	http://www.azahar.es/
Energy Pellet	Vilafranca	- Biomass	- Manufacture and sale of pellets - Distribution of equipment	http://www.energypelletvilafranca.com/
Forestal del Maestrazgo	Todolella	- Biomass	- Obtaining of biomass - Manufacture, sale and distribution of pellet and splinters - Distribution and instalation of equipment - Projects - Forestry work	http://www.forestaldelmaestrazgo.com/
Heliotec	Vall d'Uixó	- Solar - Biomass	- Installation and projects - Equipment distribution	http://www.heliotec.org/index. html
Imagetec	Almazora	- Biomass - Solar heating - Photovoltaic - Geothermic - Aerothermic	- Installacion and projects - Biomass distribution - Equipment distribution	http://www.imagetec.es/
Implica-T	Castellón	- Biomass - Solar heating - Photovoltaic	- Installation and projects - Equipment distribution	http://www.implica-t.com/
Leñas Oliver	Vilafamés	- Biomass	- Manufacturing and distribution of pellet, firewood, briquettes, sawdust and coal - Forestry work	http://www.lenasoliver.com/
MAER	Burriana	- Solar heating - Photovoltaic	- Installacion and projects - Equipment distribution	http://www.energiasolarmaer. es/
Renovables Castellón	Burriana	- Solar heating - Photovoltaic	- Installacion and projects - Equipment distribution	http://www.renovablescastellon.com/
Siliter	Morella	- Geothermic - Biomass - Solar - Aerothermic	- Installation - Advice, calculation and design - Maintenance	http://www.siliter.com/
Valfortec	Castellón	- Photovoltaic	- Advice on regulations - Simulation of profitabillity - Design and implementation of facilities	http://valfortec.com/

As a **cooperative of consumption**, the role of Som Energia is highlighted. Its main activities include the marketing and production of RES and membership is open to the participation of individuals, businesses and public administrations. It is organised on the basis of local groups, such as the one of Castellón, designed as meeting points to promote the participation of partners in particular geographic areas.

For its close relation with the tackled subject, the **agricultural cooperatives**, as users (real or potential) of RES were included in this section. Most of the municipalities have cooperatives, some of them very active in the search of effective solutions for the use of the RES. This is the case of the Cooperative of Viver, which is provided with a specific section for the promotion of the RES and the protection of the environment. Intercoop is an example of a cooperative business group in the Valencian Region. It is provided with a number of 168 associate cooperatives (124 in Castellón province) and among its priorities there is the production, research, promotion and implantation of RES.

Next, the table synthesizes the diverse actors described in this paragraph.

Table 4-13. Type, purpose, functions and web pages of the companies related to RES in the province of Castellón. Source: Own elaboration

KEY ACTOR	TYPE	OBJETIVE	WEBSITE
Installer (electrician, plumber)	Physical person (self-employed)	Meet the demand at the local level in small facilities (alone and in collaboration), updating their services to the needs of customers.	Example: https://fiecov.com/aiecs/asociados/
Microenterprise and small business dedicated to the RES	Society with different forms of business (limited partnership, corporation, community of goods, etc.)	Offer comprehensive projects that are looking for energy efficiency and profitability (provincial level).	Example: Heliotec (http://www.heliotec.org/)
Microenterprise and small business dedicated to architecture	Society with different forms of business (limited partnership, corporation, community of goods, etc.)	Choosing the most appropriate energy systems for architectural works.	Example: La Casilla de Salida (www.facebook.com/laCasilladeSalida)
Consumer Cooperative of RES	Consumer cooperative	To commercialize the energy of an independent way, impelling an energy model based on the RES.	Example: https://www.somenergia.coop
Agricultural Cooperative	Cooperative Society	To protect the interests of the members of a cooperative, as well as to promote the diversification of activities and the professionalization.	Example: Cooperativa de Viver (http://www.aceiteolivavirgenextra.org/)

4.3.3. FORMATIVE CENTERS AND RESEARCH

The training centres involved in the RES capacity building include **universities, vocational training institutes** and centres that issue **professional certificates.**

Due to its close relationship with the rural development and the direct work with the Local Development Agents, it needs to be remarked the work of the **University Extension Programme** of Universitat Jaume I, whose goal is to facilitate collaborative processes for improving the living conditions of the municipalities with less than 5.000 inhabitants. Its experience and trajectory have managed to generate a framework between the local actors and the university, which facilitates an effective communication channel for the achievement of formative activities, research and knowledge transfer between the university and the municipalities of the interior of the province.

Regarding **research**, there has not been identified any specialized center with RES and rural development among their priority lines, although in the frame of the university there have been carried out works linked with this field of knowledge. Other public administrations, like the County Council have developed applied studies, focused in most cases on analyzing the viability of future projects in which RES might contribute to the rural development. The following table contains a summary of this type of centers.

Table 4-14. Type, purpose, functions and web page of training centers and research related to the RES in the province of Castellón. Source: Own elaboration

KEY ACTOR	TYPE	OBJECTIVE	WEB PAGE
Universitat Jaume I de Castellón	University	Provide training and develop research related to the RES	http://ujiapps.uji.es/ University Extension Program http://in2rural.ub.ro/ IN2RURAL project
CIPFP Benicarló	Public Integrated Center of Professional Training	To train future professionals specialized in RES through formal, continuous and occupational training	http://mestreacasa.gva.es/web/cipfpbenicarlo http://www.peu-uji.es/ca/
Institutes of secondary education	Secondary education institutions	To train future professionals in various fields (forestry, electrical) with knowledge in RES	Example: IES Alto Palancia http://intercentRESedu.gva.es/intercentres/12003663/
Study Centers for occupational training	Training company	To train qualified professionals and workers with expertise according to the demands of the labour market	Example: http://www.espadaformacio.com/

4.3.4. OTHER STAKEHOLDERS LOCALLY REPRESENTED

Together with the companies listed above, there are other organisations whose activity is closely related to the promotion of the RES for rural development. These include the **Natural Parks** (under the administration of Generalitat Valenciana), three of them being located in inland areas of the province (Serra d' Espadà, Penyagolosa and Tinença de Benifassà). These parks conduct environmental education activities, promoting the use of renewable energies in their facilities and the sensitization on the use of RES in the villages located in the Park.

A number of **associations and foundations**, such as AMUFOR (Association of Forest Municipalities of the Valencian Region), established in fifteen municipalities of the province of Castellón, are represented also at the local level. This association seeks to promote forest management as an activity within spatial planning, contributing to the search for new energy solutions for its partners, especially related to forest biomass.

Other organisations related to the RES are **professional organisations** such as La Unió de Llauradors i Ramaders (the Union of Farmers and Ranchers), agrarian organisation of autonomous presence in seventeen towns in the interior of the province of Castellón. Specifically, La Unió advises and facilitates the achievement of projects based on RES (solar panels and biogas).

The next table reflects the main features of the organisations mentioned in this paragraph.

Table 4-15. Type, purpose, functions and web page of actors with local representation linked to the RES in the province of Castellon. Source: Own elaboration

KEY ACTOR	TYPE	OBJETIVE	WEB PAGE
Natural Parks	Public Administration (Generalitat Valenciana)	To protect and promote the variety of habitats and the biodiversity in the Valencian Community.	Example: http://www.citma.gva.es/web/parques-naturales/
Civil society organisations	Association, Foundation	Varied (example: to promote forest management, to protect environment, etc.).	Example: http://www.amufor.es/
Professional organisations	Association, Foundation	To defend and promote the general interests of a specific professional sector.	Example: http://www.launio.org/es/index.asp

4.3.5. OTHER LEVELS

Together with the entities described in the preceding paragraphs (all of them located in the areas of study), local actors also interrelate with organisations working at the local, regional, national and international level. In this regard, it is emphasized the multiplicity and diversity of actors that comprise a complex network which, on occasions, can be difficult to access for local entities. In the following paragraphs, the study reflects some of these instances, whose detailed analysis is beyond the scope of this research.

In the field of **public administration**, local councils have direct communication with the **Generalitat Valenciana**, the set of institutions of self-government of the Valencian Region. In the Council of the Generalitat, the area of energy and mines is part of the competences of the Department of Economy, Industry, Tourism and Employment.

Among the agencies attached to the Department is the **Valencian Institute of Business Competitiveness** (IVACE), which has among its objectives the energy planning in the Valencian Community. The Valencian Community participates in the program **Climate KIC** (Knowledge and Innovation Communities), the main initiative of the European Union for public-private partnerships on climate change.

In the structure of the Government, other firms are involved in infrastructure, planning and environment, through their centres of environmental education and the public company **VAERSA**, which promotes the transition towards a market of biomass in the Valencian Community.

The network of **European Centres of Innovative Companies** (CEEI), based in Castellón, has among its purposes to support the creation of new enterprises and the promotion of the diversification of already existing companies that provide an innovative activity.

As an example of public-private partnership, there are various associations and foundations, such as the **Energy Efficiency Foundation of the Valencian Community.** The patrons of this foundation are BP, the City Council of Castellón and the Universitat Jaume I. Its mission is to promote a more efficient use of energy through innovation, dissemination and awareness-raising, the business meeting, training and funding.

As well as in the previous cases organisations working in the various RES have been described, it is also worth mentioning other instances with a greater degree of specialization. This would be the case of the association **Valencia's Forest Platform** which is focused on the use of bioenergy of the surplus of forest of the Valencian Region's forests and its contribution to the prevention of forest fires.

The **IDAE** (Institute for the Diversification and Saving of Energy), a body attached to the Ministry of Industry, Energy and Tourism in order to contribute to the achievement of the commitments assumed by Spain in the field of energy efficiency and other low carbon technologies. To do this, it performs actions of dissemination and training, technical advice, program development and funding of innovative projects.

Finally, the work done by non-governmental organisations (NGOs) in rural areas of developing countries can be pointed out and can serve as guidance for the implementation of projects in certain European contexts. Such an example is **ONGAWA**, which aims to put technology at the service of human development to build a more fair and solidary society. Its priority work areas include energy and environment, and their training activities and materials are a benchmark at international level.

Next table collects essential data on the various entities to which reference has been made in this section.

Table 4-16. Type, purpose, functions and review bodies at the provincial, regional, national and international level that relate to local actors in the province of Castellón. Source: Own elaboration

KEY ACTORS	TYPE	OBJETIVE	WEB PAGE
Department of Economy, Industry, Tourism and Occupation, Generalitat Valenciana	Public Administration (Regional Level)	Political and administrative action in various fields.	http://www.indi.gva.es/
Valencian Institute of Competitive Entrepreneurship	Entity of public law of the *Generalitat Valenciana*	Energy efficiency and renewable energy sources.	http://www.ivace.es/
Climate KIC	Association	Contribution to mitigate climate change.	http://www.climatekic-valencia.org/
VAERSA	Public enterprise	Protect and improve the natural environment, promote infrastructure and prevention of forest fires.	http://www.vaersa.com/
European Centres of Innovative Companies	Association	Encourage and facilitate the creation and growth of innovative companies in the province.	http://ceeicastellon.emprenemjunts.es/
Chamber of Commerce of Castellón	Public law corporation	Represent, promote and defend the general interests of the business of the province of Castellon.	www.camaracastellon.com/
Foundation for the Energy Efficiency of the Valencian Community (f2e)	Foundation	Promote a more efficient use of energy through knowledge and innovation.	www.f2e.es/
Valencian Forestry Platform	Association	Promote the development of the forestry sector.	http://www.plataformaforestalvalenciana.com/
Spanish Association of Energy Valorization of Biomass (AVEBIOM)	Association	Promote the development of the bioenergy sector in Spain.	http://www.avebiom.org/es/
Photovoltaic Spanish Union (UNEF)	Association	Defend the interests of the companies related to photovoltaic solar energy in Spain.	http://unef.es/
CIEMAT	Public research organisation	Transfer knowledge and technology to promote innovation.	http://www.ciemat.es/
IDAE	Public research organisation	Contribute to the targets acquired by the country in the field of renewable energy.	http://www.idae.es/
ECOOO	Social enterprise	Promote a new energy, social and economic model.	http://www.ecooo.es/
Renewable Energies Foundation	Foundation	Contribute to the acceleration of the energy change model.	http://www.fundacionrenovables.org/
ONGAWA	Association (NGO)	Put technology at the service of human development, to build a fair and solidarity-based society.	http://www.ongawa.org/

4.4. TRAINING, RENEWABLE ENERGIES AND RURAL DEVELOPMENT

In this section, the training situation about RES in the province of Castellón is described, with reference to the possibilities offered in the state framework. Apart from specific experiences, it is noted that it has not been explicitly identified any structured and specific training which establishes a potential link between RES applications and rural development. However, there are preliminary contributions to this approach within the training resources at the provincial level that are mentioned in the section 4.4.1.

The main source of information on the state framework has been the Ministry of Education, Science and Sports, which provides updated information about studying and training in its various forms. It is worth noting that, at present, the educational structure is in a dynamic process to converge with the European Union guidelines.

For the training offered in the province of Castellón it has been consulted, in addition to the Ministry, the State Employment Public Service (SEPE) and both public and private training centres. The documentary research has been completed by carrying out interviews with teachers and managers of the various entities included in this network.

4.4.1. EDUCATION AND TRAINING ABOUT RENEWABLE ENERGIES IN THE PROVINCE OF CASTELLÓN

From the general classifications described in the previous section, the training offer in the field of RES can be organised into the following groups:

- Training through public or private entities physically located in the province of Castellón, face-to-face or blended.
- Distance learning, with or without face-to-face tests.
- Self-training, focused on professional improvement.

The training offered by public or private entities located in the province includes Professional Certificates, Vocational Training cycles and university education.

The **Professional Certificates** are taught in training centres authorized by the SEPE, which can be public or private. The courses are mainly financed by public subsidies for unemployed workers, although some of them (the "Professional Certificates") are privately financed.

Certificates offered in the province directly related to RES are focussed on applications of thermal and photovoltaic solar energy. Specifically:

- Installation and maintenance of photovoltaic solar installations (Castellón and Vall d'Uxó)
- Installation and maintenance of solar thermal systems (Castellón and Vall d'Uxó)
- Organisation and projects of solar photovoltaic installations (Castellón)

As for the **Vocational Training certificates,** the educational landscape in the province is not homogeneous, but the three professional families associated with the RES are represented, for example, water and energy, installation and maintenance, and electricity and electronics (the most widespread in the province). The vocational training certificates that are most closely related to the field of study and its location are listed below.

- Intermediate Vocational Training
  - Technician in Heat Production Facilities (Benicarló)
  - Technician in Electrical and Automatic Installations (Benicarló, Burriana, Castellón, Onda, Segorbe and Vila-real)

- Advanced Vocational Training
  - Senior Technician in Renewable Energy (Benicarló)
  - Senior Technician in Energy Efficiency and Solar Power (Benicarló)
  - Senior Technician in Project Development of Thermal Installations and Fluids (Burriana)

Note that there are other cycles in which the contents are related to RES, such as the Intermediate Vocational Training cycle in Forest Conservation and Environment, offered in the High School Alto Palancia. In these studies, the participants can learn basic skills related to forest biomass and the use of RES in agricultural facilities.

University education related to RES is provided at the Universitat Jaume I of Castellón. While there is no specific degree on this subject, there are bachelor and master degrees in which RES fundamentals and applications are taught. The main ones are:

- Bachelor in Electrical Engineering
- Bachelor in Technical Architecture
- Master in Energy Efficiency and Sustainability

Note that, with the subjects that include content on RES (such as renewable energy facilities in Electrical Engineering), the student has the possibility of doing the Bachelor's Final Project or Master's Final Project on this subject. That results in universities and companies working together to enable students to apply their theoretical knowledge in solving specific and real problems. Note that, in recent the years, several students have carried out their final project on the development of RES installations in rural areas.

Regarding **distance learning**, with or without face to face tests, the following offer is available:

- Preparation for the professional certificates accreditation, organised by the regional governments.
- Preparation for accessing to the intermediate and advanced vocational training cycles, organised by the regional governments.
- Bachelors, with face to face tests.
- Postgraduate degrees (expert, specialist and master).

In general, distance learning in the field of RES is comprehensive, although its economic cost can be considerably high. Some institutions have regional support centres with training workshops in which students can perform exercises for the acquisition of manual skills. In this centres, agreements for internships in local companies can be reached. An example of entities providing distance learning is given in the following table.

Table 4-17. Examples of entities that provide distance learning on RES. Source: Own elaboration

ENTITY	TRAINING	DEGREE	WEB PAGE
EXITAE	Professional certificate	Organisation and projects in solar thermal. The course is supported the Catholic University of Avila.	http://www.exitae.es/cursos/curso-organizacion-proyecto-instalaciones-solares-termicas_48
SEAS	Bachelor	Maintenance and Management Production, speciality in renewable energy	http://www.seas.es/energias-renovables/bachelor-mantenimiento-gestion-produccion-energias-renovables
CEPADE	Continuous training	Renewable Energy and Energy Markets	http://www.cepade.es/Formacion/vcurso.asp?nombre=ENR
UNED	Expert Specialist Master	Wind Energy: Fundamentals and Technology	http://formacionpermanente.uned.es/tp_actividad/idactividad/7339

Finally, there is the self-training, targeted to professional improvement at different levels, using various channels such as:

- Exhibitions, conferences and seminars in the geographical area.
- Publications of public entities, foundations and professional associations.
- Information on projects promoted by the EU with an impact at the local level.

These actions are very suitable for professionals working in the RES field and / or coming from related disciplines with a previous training, such as electricity or installing and maintaining thermal facilities. The following table contains some of these possibilities.

Table 4-18. Examples of activities aimed at the self-training on RES. Source: Own elaboration

ENTITY / EVENT	DESCRIPTION	WEB PAGE
IDAE, Institute for Diversification and Saving of Energy	Its website offers: - A Renewable Energy Business Directory. - Studies, reports and statistics. - Free publications, online access and downloadable PDF on RES and Energy Efficiency.	http://www.idae.es/
Euroinnova	- Specialized e-learning company for independent learning. - Training of trainers	http://euroinnovaeditorial.es/
IC Editorial	Manuals with modular structure adjusted to the content required for the issue of "Professional Certificates".	http://www.iceditorial.com/
Renewable Energy "Newspaper of clean energy"	With a digital newspaper format offers: - Monographic magazines - Directory - Agenda with all the events in the sector - Job supply and demand - Training opportunities	http://www.energias-renovables.com/
RURAL-RES, Rural Renewable Energy Systems	As a result of this EU project, training packages are available: - Small hydro power - Small wind power	http://ruralRESdiphuelva.es/formacion.php
CLIMATE-KIC	European initiative focused on innovation to mitigate the effects of climate change. Among its training activities, it is included "Pioneers in practice," "School of Business" and "Summer School" as well as a doctoral program.	http://www.climate-kic.org/
ITForest, Innovative Training in Forest Biomass for Sustainable Rural Development	Erasmus Intensive Program for university students to familiarize with the use of forest biomass. Its activities include specific training through seminars, visits to good practices and work in multidisciplinary and international teams.	http://www.itforest.uji.es/

To conclude this section, the following Table **4-19** aims to synthesize the various training options.

Table 4-19. Summary of the training about RES in the province of Castellón. Source: Own elaboration

LEVEL	MODALITY	DEGREE	CENTRE	WEB PAGE
Professional certificate	Face-to-face	Installation and maintenance of photovoltaic installations	Example: Multioficios Formación S.L.	http://www.multioficiosformacion.es/cursos/
	Face-to-face	Installation and maintenance of solar thermal installations	Example: Fundación Laboral de la Construcción	http://comunidadvalenciana.fundacionlaboral.org/
	Face-to-face	Organisation and projects of solar photovoltaic installations	Academia Didáctica	http://www.audiogil.es/
	Distance training	Organisation and projects of solar thermal installations	Example: EXITAE Universidad Católica de Ávila	http://www.exitae.es/cursos/curso-organizacion-proyecto-instalaciones-solares-termicas_48
	Face-to-face	Technician in heat production facilities	Centro Integrado Público de FP	http://mestreacasa.gva.es/web/12000733400

Intermediate Vocational Training	Face-to-face	Technician in electrical and automatic installations	Example: High School Alto Palancia	http://intercentRESedu.gva.es/intercentres/12003663/
Advanced Vocational Training	Face-to-face	Technician in renewable energy	Centro Integrado Público de FP	http://mestreacasa.gva.es/web/12200733400
	Face-to-face	Technician in energy efficiency and solar thermal	Centro Integrado Público de FP	http://mestreacasa.gva.es/web/12200733400
	Face-to-face	Technician in development of projects of fluids and heating installations	High School Llombai	http://iesllombai.edu.gva.es/
Bachelor	Face-to-face	Electrical Engineering	Universitat Jaume I	https://ujiapps.uji.es/institucional/
	Face-to-face	Technical Architecture	Universitat Jaume I	https://ujiapps.uji.es/institucional/
	Distance training	Maintenance and production management, speciality in renewable energy	SEAS	http://www.seas.es/energias-renovables/bachelor-mantenimiento-gestion-produccion-energias-renovables
Master	Face-to-face	Master in energy efficiency and sustainability	Universitat Jaume I	https://ujiapps.uji.es/institucional/
	Distance training	Wind Energy: Fundamentals and technology	UNED	http://formacionpermanente.uned.es/tp_actividad/idactividad/7339
Self-training	On line	Publications	Example: IDAE	http://www.idae.es/
	On line	Training of trainers	Euroinnova	http://euroinnovaeditorial.es/
	On line	Digital newspaper	Energías Renovables	http://www.energias-renovables.com/

4.4.2. ACCREDITATION FOR FACILITIES IMPLEMENTATION AND CERTIFICATION

It should be emphasised that, both the provincial and state levels, the accreditations to which we have referred are not sufficient for performing RES installations. In addition to the functions regulated by law for projects and construction management by competent workers (architects and senior or technical engineers), assembly and maintenance equipment for electrical energy generation (mostly photovoltaic and wind power) has to be performed or supervised by professionals who hold a Specialist Installer in Low Voltage Generating Facilities card (IBTE) and belong to the performing company, registered as such in the Competent Territorial Agency (OTC). It is the same with the solar thermal facilities, which require companies to have workers with the installer card stipulated by the Regulation of Thermal Installations in Buildings (RITE) and being also registered in the OTC.

The most direct routes for obtaining both cards go through certain intermediate and advanced vocational training cycles or holding a university degree, such as electrical engineering, architecture and certain Expert, Specialist or Master's degrees.

4.5. EMPIRICAL STUDY. PERCEPTION OF THE ACTORS ABOUT THE TRAINING NEEDS ON RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

4.5.1. SAMPLE

Considering the qualitative nature of this empirical study, its theoretical frame and its objectives, the research team has selected a sample consisting of eighteen persons closely linked to RES from different approaches. Due to the importance of the complementarity of their experience and knowledge, their profile and the organisation which they belong to are briefly described in the following paragraphs.

Owing to their proximity to the local actors (SMEs, educational centres, citizenship…), local governments can promote the use of RES in the rural areas, by using this kind of energy in the municipal

facilities and stimulating that people living in the villages increase their interest in changing to a new energy model. Thus, two representatives from local governments have been interviewed:

- Mayor of the Municipality of Todolella, promoter of the municipal network of district heating.
- Local Development Agent of the Municipality of Benlloch, interested in extending the use of RES as a resource for rural development.

Representing the business sector, the sample counts with different SMEs working in RES (mainly solar and biomass). All these SMEs have experience in developing projects for the rural zones of the province of Castellón and are specialist in small installations and facilities for isolated areas. For this reason, four professionals have participated in the interviews and/or focus group:

- Technician of Forestal del Maestrazo (former student of UJI), expert in the biomass value chain.
- Technical Director of Heliotec, with a wide knowledge on solar and biomass projects linked to rural areas.
- Sales representative of Implica-T, which complements the technical work with activities for awareness raising about RES
- Manager of NETPLC, specialist in ICT and investor in solar farms in the province of Castellón.

Cooperatives, associations and foundations are playing a key role in the field of social economy. Representing different sectors of the society, such as farmers or RES consumers, these organisations are highly interested in the use of RES to improve the conditions of their associates and the environmental protection. The opinions of the following persons have been collected in the study:

- Manager of the Cooperative of Viver, who is actively involved in the search of new technical solutions based on biomass and solar energy.
- Local representative of Som Energia, consumers' cooperative that commercializes and produces RES.
- Local representative of the Farmers Union, with a wide experience in the use of RES for farming in the province.

Due to the scope of the study, it has been considered that the participation of educational centres is essential in order to identify the current situation of the educational offer on RES and to detect the possible needs of knowledge in this area. The perception in these centres has been known through the information provided by:

- Director of the Master in Energy Efficiency (Universitat Jaume I), in which RES are taught in different subjects.
- Lecturer specialized in rural development (Universitat Jaume I) with experience in linking technologies and local contexts.
- Lecturer of RES (Universitat Jaume I) that delivers classes on this subject to engineering students and is a member of the Foundation for the Energy Efficiency.
- Lecturer of ICT (Universitat Jaume I) and active user of RES, who has contributed through his own experience with solar energy in rural areas.
- Lecturer of forestry (High School Alto Palancia) that teaches contents related to the use of biomass for agrarian facilities.
- Lecturer of electricity (High School Alto Palancia) that imparts classes on solar energy from a practical approach.
- Sales representative of a private educational centre specialized in professional certificates related to RES.

It is also highly interesting to know the point of view of the Natural Parks (managed by the regional government), as they are part of the rural context, and promote local development in the villages that are in the coverage of the Park. In the case of the study, two representatives of the Natural Park Sierra Espadán have been interviewed:

- Director of the Park and representative of a local government, who has provided his knowledge from a decision maker perspective.
- Technician of the Park, with an extensive experience in forestry management and the use of biomass as a mechanism for land use control and fire prevention.

In summary, the Table **4-20**below shows the main characteristics of the participant persons and organisations.

Table 4-20. Persons and organisations that have participated in the interviews and the focus group. Source: Own elaboration

ORGANISATION		PERSON		PARTICIPATION IN	
NAME	TYPE	LOCATION	POSITION	INTERVIEW	FOCUS GROUP
Municipality of Benlloch	Local government	Benlloch	Local Development Agent	x	
Municipality of Todolella	Local government	Todolella	Mayor	x	
Forestal del Maestrazgo	SME	Todolella	Technician	x	
Heliotec	SME	Vall d'Uixó	Technical Director	x	x
Implica-T	SME	Castellón	Sales representative	x	
NETPLC	SME	Castellón	Manager	x	
Cooperative of Viver	Cooperative	Viver	Manager	x	
Som Energia	Cooperative	Burriana	Local representative		x
Farmers Union	Association	Vall d'Uixó	Local representative	x	
Master in Energy Efficiency - Universitat Jaume I	University	Castellón	Lecturer	x	
Rural Development area – Universitat Jaume I	University	Castellón	Lecturer		x
RES area – Universitat Jaume I	University	Castellón	Lecturer		x
RES area – Universitat Jaume I	University	Castellón	User		x
High School Alto Palancia (Forestry)	Secondary School	Segorbe	Lecturer	x	
High School Alto Palancia (Electricity)	Secondary School	Segorbe	Lecturer	x	
Espadán Centre of Studies	Private vocational training centre	Vall d'Uixó	Sales representative	x	
Natural Park Sierra Espadán	Natural Park	Eslida	Director	x	
Natural Park Sierra Espadán	Natural Park	Eslida	Technician	x	

As for the age of the sample, the major part (69%) is between 36 and 45 years of age, 21% is older than 45 years, and only 10 % is between 25 and 35 years of age.

In reference to the sex, the major part of the persons are men, constituting the 83% of the sample. It is remarked that the participant women are working in the public administration (educational sector and National Park), but not in the private sector.

Regarding the studies, 89% of the sample has university degrees at graduate, postgraduate and/or doctoral level. Among these, 63% belong to the technology and experimental sciences, 31% come from the juridical and economical sciences and 6% have background in human and social sciences.

4.5.2. ANALYSIS OF THE INTERVIEWS AND THE FOCUS GROUP

RURAL CONTEXT

Current situation of rural areas in the Castellón regions

The current situation described by all the respondents clearly reflects a negative perception, regardless of the origin or activity to which it is dedicated. It is pointed out in several interviews that the population pyramid is clearly aged in small hinterlands towns (not in big coastal cities).

Some of the interviewed people remarked the bad situation of agriculture and livestock due to low profitability, lack of skilled jobs (nowadays there are very few opportunities for those trained in universities to develop their competences in the rural environment), poor communications and deficiencies in basic infrastructure for citizens. Other causes that are discussed to a lesser extent are dispersed population, the economic system which drives people to urban areas or dependence on European subsidies for projects that may have a low return.

Evolution of the current situation of rural areas in Castellón regions.

In general, the evolution of the current situation described in the previous section also has a clear, negative connotation, and a possible turning point in the situation is directly linked to the changes that everyone understands what should be done. There are also views in the direction of that in any case, some of the smallest isolated towns eventually will disappear as stable population point, and the rest can be maintained over time, and even in some cases, improve the current economic and demographic situation. The most pessimistic view is launched from the small hinterlands towns, describing the trend of the hinterlands as "clearly worse". On the contrary, the most optimistic is launched from the capital, and predicts that the situation will improve with the new perspectives in rural areas.

In fact, from a university teaching sector is considered that, right now, we are at a turning point regarding rural development, raising the idea that more and more people will decide to return their hinterlands, where their parents or grandparents lived. In addition, there are examples of rural businesses that are growing and creating jobs based on innovation in traditional products (such as Masía Els Masets, in Torre d'En Besora, region of Alt Maestrat, where traditional milk products are made). Finally, it is generally considered that, the rural areas can be a great opportunity for people with the philosophy of life based on living with the basic and with more time instead of living for making a lot of money.

Initiatives that exist or could exist to reverse the current situation

Among the concrete initiatives to bring about the changes that have been named in the preceding paragraph, municipalities seem to have or should have a central role for most respondents. They demand involvement to boost small municipalities with a focus on rural tourism, for example, network recovery of old bridle paths for hiking, reform of homes or farms for rural properties or suitability for camping areas. However, from a more institutional hinterlands profile, it is thought that the existing housing spaces in the hinterlands are more than enough, and what is lacking is coordination (for example between Morella and the surrounding villages) to attract people that occupies the already existing the places. However, other ideas such as the implementation of third age residences that generate employment and social services in the hinterlands are released.

From a more technical profile self-supply equipment can be installed by local councils together with the need for pedagogy. It is also highlighted the need of changing the Spanish legislation for renewable energy: to change the present barriers and impediments and to promote these energies.

Other proposals were also added to these ones, that have more cultural aspect, highlighting that rural development must be based on culture, as a basic tool in order to regain self-esteem of the villages and its people.

Agriculture and farming are urged to promote the proximity consumption, avoiding the costs of long-distance transport and contributing to the local economy (the hinterlands produce for cities and for its own population).

Finally, from a university teaching sector, an idea was released of decentralizing the state and regional administration to the hinterlands for creating jobs, boosting economic activity and setting population in the hinterlands.

RENEWABLE ENERGY AND RURAL DEVELOPMENT

Knowledge of the renewable energy sector

There are people in the sample of the interviews who have either general or specific knowledge in the field of renewable energies. Within this broad spectrum, there are user profiles with domestic own equipment; project promoter; engineers dedicated mainly to biomass and solar energy; investor in large photovoltaic installations; teacher / researcher in a high school or university; from a more institutional (local council) profile, business or simply for personal interest in the subject.

In general, biomass is the technology that raises more interest and in which it is seen a great untapped potential among the interviewees and more people link it to rural development, either by own experiences that have launched or success stories they know. However, solar technology remains the best known and, in some cases, biomass is not seen like a sufficiently competitive technology due to equipment prices, so they would continue focusing more on solar photovoltaics, which is considered to be more developed and competitive. Finally, wind technology is conceived more suitable for high power installations, considering it unattractive to self-sufficiency and only if used as backup power.

Current role of renewable energy for rural development

In retrospect, many comments were made on linking RES and rural areas. Thus, renewable energies have always been linked to the rural context (for example, in the use of firewood for heating and cooking). All this changed with new technologies based on fossil fuels, but with the present increase in oil prices and the modernization of RES technologies, there is now a new opportunity for RES in these areas.

The general feeling among respondents is, that renewable energies play an important role in rural development, but it is clearly below its potential (many people comment the halt of renewable energies with the economic crisis and the cessation of incentives or premium energy prices). Within the description of that role, we found differences depending on the origin of the interviewees and the most common installations in their environment. For example, in the region of Els Ports a greater importance is given to the development generated with wind power than in the capital of La Plana, since the wind farms of the region directly employ about 60 people in such small towns.

Criticism of the self-consumption energy law (recently discussed in the Ministers Council of the Spanish State) and the dismissal of the net energy balance (to compensate the excess production of a few hours a day with the consumption of others) by the Spanish government is widespread. Going into details, according to the university teaching sector, energy production that cannot be consumed instantly, has to be given to the electric company in addition of paying a tax for using the electric network. During the focus group, an unbending criticism was done to the Spanish energy system mostly controlled by a few big enterprises.

Biomass and solar thermal and photovoltaic energy are linked to energy self-sufficiency to result in a contribution to rural development, otherwise, as a large scale, there are some drawbacks that are the following: difficulty in finding and reaching an agreement with the forest owners, difficult usage of biomass in some places due to the steep topography of the land... So, facilities, such as farms, rural houses or other facilities not connected to the network are the major beneficiaries of this type of small industrial projects. Apart, from technical profiles it is emphasised that distributed generation would avoid the saturation of large electrical distribution lines, the reason of large energy losses (up to 30% of the total energy generated) and a high environmental impact. In this line, from the sector of university teaching it is categorically stated that "the pattern of energy consumption in the Spanish State is not working; the only viable solution is a system of decentralized renewable energy generation." Others emphasise the advantage of self-sufficiency in order, in his opinion, not to be energy dependent of anyone.

Finally, talking about the different opinions that exist in the relationship between the size of facilities (some respondents have made no comment on it) and the creation of wealth and employment. Most respondents and focus group participants believe that small plants are more beneficial to rural areas, because they set more population, create more economic dynamism in the area and cause less impact, while larger facilities usually conducted by large companies contribute less to rural development. However, there are some dissenting opinions, claiming that there are large facilities which create more jobs.

Role of RES in short, medium and long-term rural development

All the respondents agreed that, in the future, renewables could be a good complement to encourage rural development, giving RES an important or very important significance for this purpose. And once again, a large part of respondents warn that the policies carried out in the future will also mark the level of importance that renewable energy can have on the development of rural areas (legislative, investment in infrastructure, etc.).

In this regard, from the photovoltaic industry legal certainty is demanded, which, according to the interviewees, is completely lost in recent years.

From this same point of view, in the short term opportunities are seen in further increases of the facilities, where there is no grid connection or small domestic heating equipment or farms (there are many experiences in Europe in this regard). In the medium term self-consumption with net energy balance could be developed and in the long term talks can start about the widespread introduction of electric vehicles (always linked to the development of energy storage) that would help to stabilize the network and would encourage further energy self-consumption.

From other less technical profiles, the role of RES for rural development is evaluated as "very important" because of the economic savings that these energies may imply and also due to the possible job creation in tasks such as clearing of forests (fight against forest fires) or other technical jobs. Other respondents believe that it will be very important because, together with rural tourism, it will be the only sector capable of creating quality jobs and setting people in the hinterlands. The use of resources offered by the rural environment is also a recurring response.

Factors or initiatives that could boost renewable energy in rural areas

Legislation, infrastructure, financial aid and other topics have already been widely discussed. At this point we focus on more concrete initiatives to promote renewable energy in rural areas.

Other measures that have been proposed can be encompassed in a set of "boost from the administration", that is, installation of renewables in public buildings, promotion of renewable energy

consumption and dissemination of projects (has been set as a positive example the Catalonia administration or villages of Castellón as Todolella, Benlloch, Azuébar, Forcall, Morella...). From a more critical perspective it is asserted that "the administration simply must not hinder, but facilitate procedures; from that point, young people and interested companies will contribute with their ideas".

Other specific initiatives that have emerged from more technical energy profiles are facilitating the installation of solar parks on rural land unprotected; facilitating the access to financing by banks for the implementation of renewable energy installations; lowering the fixed part of the electricity bill (contracted power) instead of the variable portion (energy consumption) to avoid prejudicing the profitability of renewable energies and encourage energy saving.

Some interviewees, both from technical and user points of view, highlight the need to ensure good quality of equipment and facilities to avoid creating a feeling of mistrust towards renewables. Negative examples in renewable facilities do terrible damage in small towns and completely discourage the investment into them.

Finally, the need for institutional awareness campaigns on environmental issues and making a priority of combating climate change are highlighted. Relating renewable energies to environmental value is an obligation of the institutions.

Current demand for renewable energy in rural areas

In this section strong opinions can be found, which are for and against the demand of renewable energies. According to some opinions, there is a high demand for renewable energies, and others state that the demand is rather scarce for specific renewable energies. This second idea is based on that, in general, environmental value is an issue most people are not aware of, has not been explained properly in many cases, or the general population does not have financial culture (that is, people are aware of initial investment for buying an equipment, but find it hard to analyse the period of return of an investment).

Current demand is described with the own experiences by some respondents from rural areas; demand for biomass from poultry and pig farms, which get lower costs compared to oil or electricity (between 20% and 40% of farms in hinterland areas have already installed biomass). Solar panels have also been installed on farms or in housing facilities or isolated farmhouses, and, in some villages, it is starting to be a high number of biomass boilers in homes and municipal buildings.

Knowledge of renewable energy facilities in rural areas

Starting with a profile focused on teaching and academic research, many renewable energy projects in the hinterland regions of Castellón are named: solar farms, large wind farms, generation and consumption of biomass (pellets, chips ...) or biogas generation in a plant with several digesters installed in Catí. Some mini hydraulic technologies are also named in the Morella area. These latter two cases are the least known among the respondents of the sample.

From Els Ports region, with institutional and technical profiles, are well knows: small or large photovoltaic plants, biomass (both extraction and use, and facilities) for home use, farms, Todolella district heating, solar collectors to heat Todolella swimming pool, geothermal energy in a multipurpose hall in Morella and large wind farms installed in the villages. It is also worth recalling that local councils also receive bonuses for having wind farms or solar farms in their municipality.

There are some more focused profiles on photovoltaic solar energy who have a vast knowledge of these facilities and technology, both homes in non-electrified areas and large solar farms, but they claim not to know other facilities in the province of Castellón.

From the user point of view, some facilities are named, such as a heated swimming pool with solar thermal energy and biomass boiler; photovoltaic or thermal solar panels in their own homes or homes of acquaintances; biomass boilers or pellet stoves for homes, school or rural hotel heating.

Success case in the contribution of renewable energy to rural development

In this section, specific cases of facilities have been related that have already been started up in rural areas and have resulted, in the respondents' opinion, an aid for the development of the population or the area where it is situated.

As it is mentioned above, from the proximity of an institutional profile of the Castellón hinterlands the capital increase of the local councils is highlighted that host wind farms or solar farms, which in many cases are very small municipalities and that affects a significant percentage of their budget. The job creation is also highlighted (counted in 60 permanent jobs in the region of Els Ports in wind farms, 4 technicians in solar farms, or more than 20 direct jobs in the biomass sector, as well the increase in workload for non-specialized professionals and technicians). Finally, the savings in fuel were also mentioned that has meant the installation of biomass for the local council of Todolella, reducing from € 16000 a year on diesel to less than € 2000 in biomass, and the whole process has been made by local companies.

From the photovoltaic sector, solar energy is directly linked to the area's economic revitalization and also in an integrated and respectful manner with the countryside, and it is stood out as an example of a solar plant: during installation economic activity is mobilized because the needs of services (food, accommodation ...) and materials.

Some pellet factories have also been named that exploit products of wood industry (Vilafranca, Vilafamés, Villahermosa ...) and create jobs and wealth. This is an industrial process that requires workers and gives an added value to a product promoting indigenous employment.

Finally, only from a university teaching profile it has been discussed as a known case the use of agriculture and farming biological wastes for biogas production in the facilities placed in Catí, being the technology of biogas production the most unknown among people without a technical background in the field.

Known actors linked to renewable energy in rural areas

The most transversal answer we find are the local councils that, as is clear from reading this document, in many sections are named as key institutions on renewable energy for rural development in the respondents' opinion. While this is true, it has also been qualified in many cases that it depends on each local council and the personal involvement of those people who work in it. Other public institutions which to a lesser extent have been discussed are: IVACE (Valencian Institute for Business Competitiveness), in its role of providing subsidies for renewable installations; VAERSA (Public Company of the Generalitat Valenciana), carrying out a plan for the management and use of forests for biomass; Diputació of Castellón, in its role in promoting the use of renewable energies by CPER (Provincial Centre of Renewable Energies) and IDAE (Institute for Diversification and Energy Saving) in its role of managing renewable subsidies and dissemination of studies. In addition, some associations related to the world of biomass are also named: ASAJA Castellón (Provincial Federation of Farmers and Ranchers), Avebiom (Association for Energy Recovery from Biomass), APROBI and FEPAC.

In the business field, companies have been named which some respondents have worked with (not remembering its name sometimes) and some companies known through third parties: various installers of solar panels; Forestal del Maestrazgo (biomass supply and facilities); Acciona (wind farms); Heliotec (projects for installations with renewable); pellet mill located in Vilafranca; installations of solar panels in cooperative societies; engineering (projects related to rural renewable energy facilities); plumbers and electricians who install biomass boilers or solar panels, Mas de Noguera (Cooperative) and LM Windpower, multinational located in Les Coves de Vinromà which is dedicated to the manufacture of blades for wind turbines (over 260 workers), etc.

Some schools have also been named in this section, where some kind of module, degree or course related to renewable energy is imparted: Alto Palancia High School (Segorbe), Benicarló High School, Jaume I University or some schools approved for issuing certificates of professionalism.

Generation of employment and business opportunities related to renewable energy in rural areas

In general, all respondents agree that renewable energies provide a possibility for numerous opportunities to create jobs and economic revitalization in rural towns of Castellón, and that has previously been discussed in several sections, for example, in the contribution of renewable energy to rural development. From the responses, we can guess a better understanding of the economic situation in interviewees currently residing in rural areas, essential to know what kind of businesses or jobs can be created in the future based on the hypothesis of the development of renewable energies in rural areas.

Some of the possibilities that arise in this section by respondents are: biomass energy cooperatives due to investments paralyze much implementation; companies related to the installation of boilers, solar panels or collectors and technicians to maintain them (companies or self-employed); companies related to the management and use of forests for biomass; companies involved in metal structures for solar panels or masonry; public companies to take charge of the collection and energy recovery of waste for biomass or biogas; technology companies related to renewable energies (such as LM Windpower in Les Coves de Vinromà) and pellet mills.

TRAINING IN RENEWABLE ENERGY FOR RURAL DEVELOPMENT

Knowledge about the training / educational situation of renewable energies in Castellón

The educational situation about renewable energy in Castellón has a degree of knowledge very different depending on the job field, being obviously much higher among those dedicated to training (either in the university, courses or training modules). University education is best known, although in a very generic way.

From the educational profile in the training cycles of public education viewpoint, the contents of each cycle in which they are involved are well known. Specifically, the vocational training cycles in electricity (offered in several schools), which are related to the technology installation (especially photovoltaic) and the vocational training cycle in renewable energy provided in a high school of Benicarló are discussed.

From the point of view of training centres, professional certificates are put in value and two examples related to renewable energies are discussed: certificate of photovoltaic / solar thermal and certificate in hydraulic systems (linked to installation of biomass boilers). They explain that these certificates are used to justify a professional experience with an official title for those people who did not have the opportunity to follow training in the past.

Concerning the university teaching, it is said that, in the UJI, there are some degrees (Industrial and Food Technology) and masters (Energy Efficiency) that include some RES subjects, but not with a specific orientation. The interviewee is also aware of the existence of a vocational training module. Furthermore, about RES, in the interviewee's opinion, there is enough online training.

Finally, from a non-technical but knowledgeable profile on the training situation in the province, it is believed that there is little training about renewable energy in the province of Castellón and more dissemination is needed, in addition to more technical training. In his opinion, dissemination and training in RES should start at school with children.

Knowledge of specific training offer on renewable energy and rural development

Probably, this is the question on which there has been much agreement on the answers, which could be qualified as unanimity in the absence of this specific training offered in the province of Castellón. Following this line, some respondents believe that there should be this kind of training (either with a specific master, a vocational training cycle or specific training courses).

Some sectors of the university teaching remember that much of the training in renewable energy can be applied directly in rural areas (technical training in technology) and training relating specifically renewable energy and rural areas would not be necessary because, technically, it's exactly the same. Moreover, in his opinion, there is sufficient technical university training in photovoltaic systems, and other technologies are not seen with enough entity to be incorporated in the contents of a technical university training; opinion that has been discussed in the focus group with some discrepancies.

Rating of this training offer

Because of the direct relationship of this section with the previous one, the evaluation from the respondents was that the offer was "non-existent".

Still, it is noteworthy that the vast majority of respondents have added to their response that this training is very necessary and therefore should already exist (except as it has been said in the previous section in relation to the discussion in the focus group). Probably, we should differentiate between strictly technical training of applied technology and more general training directly linking renewable energy and rural development.

Unmet training needs and possible improvements to be made

Also in this section, we have a broad support to the finding that there are training needs which, nowadays, would not be covered. And these unmet needs are referred to both renewable energies in general as them directly related to rural development.

One of the claims most mentioned by the entire interview sample is the lack of practical education in the on-site renewable energy installations assembly. Acquiring skills and abilities to assemble some facility opens many doors for people that are being formed because, from this practical training, various initiatives can be implemented to start in the field of renewable energy.

Another contribution that is made from a technical profile is the need of increasing training in electronics because, according to the respondent, it is a very important part of the equipment and installations of renewable energies. Moreover, it is also indicated that one of the training needs that is not covered today is technical training in order to do the selection of materials and equipment for any renewable facility, taking into account the needs of the environment where it is installed.

Another proposal that is launched from a teacher profile is creating a technical committee with the Universitat Jaume I and vocational training centres to agree on an educational program oriented to renewable energy and rural development.

From the position of environmental activism a comprehensive education in renewable energy and sustainability is claimed in all stages of the education system as a solution to the problem of lack of awareness and involvement in an important part of society. Training and awareness should start from the beginning with children and should be able to awaken the natural interest that they have about the natural environment.

Finally, from a user and personal interest viewpoint, it is noted that training in renewable energies should be carried out in rural areas and use it as a stimulus for the use of these energies in the villages of Castellón hinterlands.

COMPETENCES OF RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

The interviewees have also been asked about their opinion on the competences needed to improve the students' employability in the area of renewable energies for rural development. Below tables shown the opinions about the basic and specific competences.

Table 4-21. Basic competences of renewable energies for rural development. Source: Own elaboration

BASIC COMPETENCES	MEAN	VARIATION COEFFICIENT
1. Capacity for analysis and synthesis	4,00	20,4%
2. Troubleshooting	4,40	15,9%
3. Information management skills	3,70	13,1%
4. Interpersonal skills	3,90	18,9%
5. Planning and time management	3,70	22,3%
6. Oral and written communication	3,60	23,4%
7. Use of ICT (Information and Communication Technologies)	4,10	24,3%
8. Knowledge of English	3,30	20,5%
9. Knowledge of local language	4,20	18,8%
10. Teamwork	4,10	24,3%
11. Networking (ability to work with different entities)	4,30	15,7%
12. Ability to work in an international context	3,20	32,3%
13. Ability to learn	4,30	11,2%
14. Ability to apply knowledge in practice	4,40	15,9%
15. Ability to adapt to new situations	4,20	18,8%
16. Priority for quality	4,20	15,1%
17. Ability to generate new ideas (creativity)	4,20	21,9%

Note: meaning of the values: (1) Not important at all; (2) Somewhat unimportant; (3) Neutral; (4) somewhat important; (5) very important.

Table 4-22. Specific competences of renewable energies for rural development. Source: Own elaboration

SPECIFIC COMPETENCES	MEAN	VARIATION COEFFICIENT
1. Know the scientific-technical language and the theoretical foundation of the technologies for the application of renewable energy	4,30	15,7%
2. Ability to research and develop technologies in the field of renewable energies	3,30	24,9%
3. Be able to evaluate the advantages and disadvantages of the various primary and/or final sources of renewable energy, including hybrid systems	4,20	18,8%
4. Know how to calculate, measure and evaluate small installations for export and/or self-consumption of renewable energy	4,60	15,2%
5. Perform environmental impact studies of the various renewable energy technologies	3,80	24,2%
6. Analyze the environmental problems related to energy and relate them to global warming	4,10	18,0%
7. Analyze the role of energy as a production factor in the economic system	4,00	16,7%
8. Apply legal and tax issues affecting the renewable energy sector	4,10	18,0%
9. Understand the fundamentals of transport and distribution of electricity through the public nets of low and high voltage	4,10	18,0%
10. Know the interconnection systems between public networks and small production and / or consumption plants of electricity from renewable energy sources and current charging systems in the EU	4,10	13,8%
11. Identify the technical characteristics of the reception facilities of electricity in low voltage, consumer devices and its protection systems	4,20	15,1%
12. Analyse the potential for exploitation of energy crops and local processing plants for biofuels	3,80	20,8%
13. To be permanently informed about innovations in the field of bioclimatic architecture	3,80	20,8%
14. How to apply the Technical Building Code as far as energy efficiency is concerned	3,90	18,9%
15. Provide ongoing information about innovations in the field of renewable energy for rural development	4,30	15,7%
16. Provide ongoing information about innovations in the field of energy efficiency and savings	4,30	11,2%
17. Know the basics of accounting and financial analysis applied to the renewable energy sector and energy efficiency and savings	3,80	24,2%
18. Promote the automation and monitoring of production processes and / or final energy consumption from renewable energies	4,10	13,8%
19. Understand and relate renewable energy to rural development from a social, economic and environmental perspective	4,20	15,1%
20. Have abilities and specific skills for installation and maintenance of small installations using renewable energy	4,20	15,1%

Note: meaning of the values: (1) Not important at all; (2) Somewhat unimportant; (3) Neutral; (4) somewhat important; (5) very important.

5. CASE STUDY: BACAU (ROMANIA)

5.1. CONTEXT

5.1.1. DELIMITATION OF THE TERRITORY

The division of the geographical areas included in this analysis is based on Law no.2 / 1968 on the administrative organisation of the territory of Romania, republished in the Official Gazette no.54-55, July 27th, 1981. The Constitution of 1991, republished in 2003, in the paragraph 3, article 3, states that "the territory of the country is administratively organised in communes, towns and counties". At present, the Romanian territory is divided into 41 counties and the municipality of Bucharest, which is separately administered.

According to the same law, the commune as an administrative territorial unit is ”a unit comprising rural population united by common interests, traditions, consisting of one or more villages, depending on their economic, social, cultural, geographic and demographic condition”. Currently, in Romania there are 2.859 communes comprising 12.961 villages, which sum about 45,00 % of the population (9.759 million), according to Eurostat (2015).

Bacău County is a part of the North East Development Region (N-E Region), with a population of 616.168 inhabitants (2,84 % of Romania's total population). This region also includes the counties of Suceava, Botosani, Iasi, Neamt, Vaslui Figure 5-1. N-E Development Region. Source: ADR N-E.

The N-E Region has an area of 36.850 square kilometers (15,46 % of the total area of the country), the largest counties being Suceava (8.553 square kilometers) and Bacău (6.621 square kilometers). It includes all forms of relief: 30,00 % mountains, 30,00 % Subcarpathian relief, 40,00 % hills and plateaus (ADR N-E, 2015).

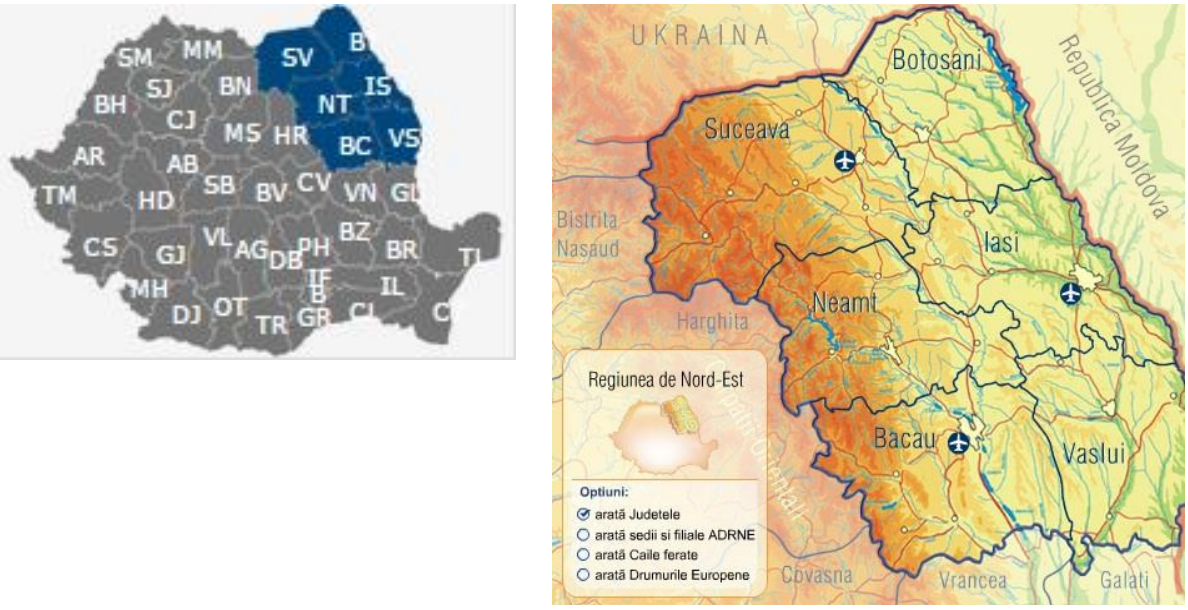


Figure 5-1. N-E Development Region. Source: ADR N-E (2015)

5.1.2. ECONOMIC CONTEXT

In 2008, the largest number of companies in Bacău County were functioning in the field of trade (4.951 companies – 42,97 %), followed by the service sector (2.197 companies – 19,07 %), the construction sector (1.576 companies – 13,68 %), agriculture (208 companies – 1,81 %) and food industry (225 companies – 1,95 %) (Bacău County Council, 2015 a).

However, most of the GDP was recorded in construction (41,07 % of GDP), followed by services (20,40 % of the total) and trade (19,34 % of the total). The lowest share of profit corresponds to the tourism sector (1,02 % of total) and to agriculture (0,63 % of total), as its shown in the next table.

Table 5-1. The GDP data. Source: Own compilation based on National Institute of Statistic (2015)

YEAR 2014	GDP (M€)	GDP PER CAPITA (€/PERSON)
Romania	149.346	7.135,4
Bacau County	2.828	4.484,2

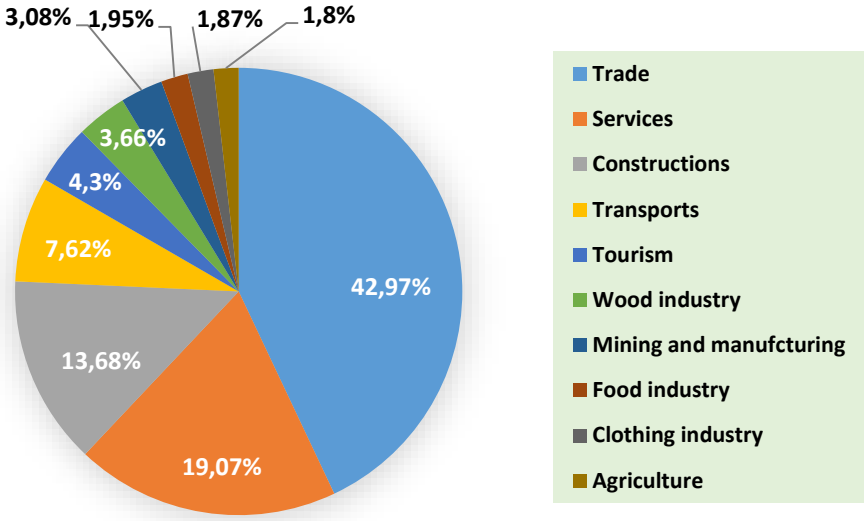


Figure 5-2. The share of sectors in the economy of the county. Source: Bacău County Council (2015 a)

The values of Gross Domestic Product (GDP) at national and regional level are given in Table 5-1. The Bacau County GDP value reported to the Romania's GDP is given in Table 5-2.

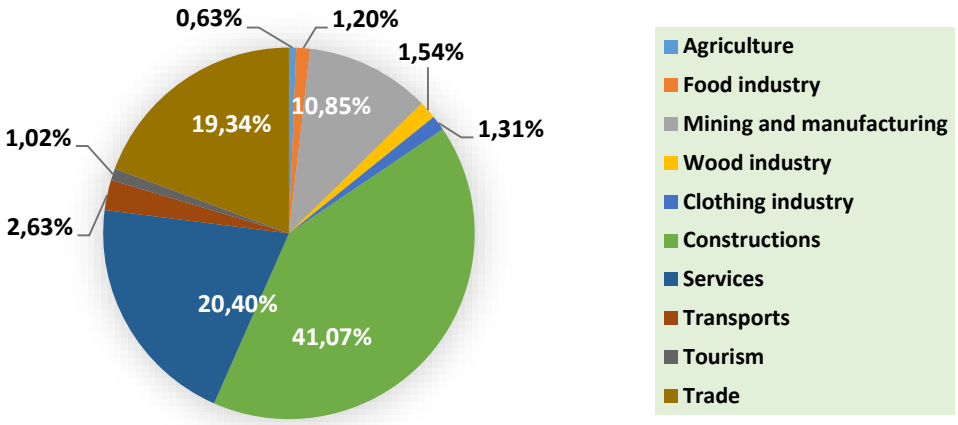


Figure 5-3. The share profit by industry sectors. Source: Bacău County Council (2015)

5.1.3. GEOGRAPHICAL AND DEMOGRAPHIC CONTEXT

In Bacău County there are 8 cities and 491 villages, grouped in 85 communes (below figure). The county population is of 616.168 people (according to the 2011-2012 census), 12,80 % less than in the 2002 census. From the point of view of its surface, Bacău County represents 2.80 % of the country surface (6.621 km^2). In this area all forms of relief are found. Thus, 34,00 % of the county is a mountainous region, 28,00 % is covered by Eastern Subcarpathians, 11,00 % by Moldovian Plateau and 27,00 % by Siret Valley. The wooded area occupies 42,20 % of the county, while agricultural lands occupy 55 % of the total.

The urban population of Bacău County includes 267.141 inhabitants (43,40 % of the county population), according to the same in 2011-2012 census, while the rural population includes 349.027 people (56,60 %). The largest population is found in Dofteana (9.346 inhabitants), and the lowest number of inhabitants in Izvorul Berheciului (1.537). The average population of a commune is of 4.106 inhabitants, while the average population of a village is of 718 people.

Table 5-2. The percentage of GDP local value in national GDP. Source: Own compilation based on National Institute of Statistic (2015)

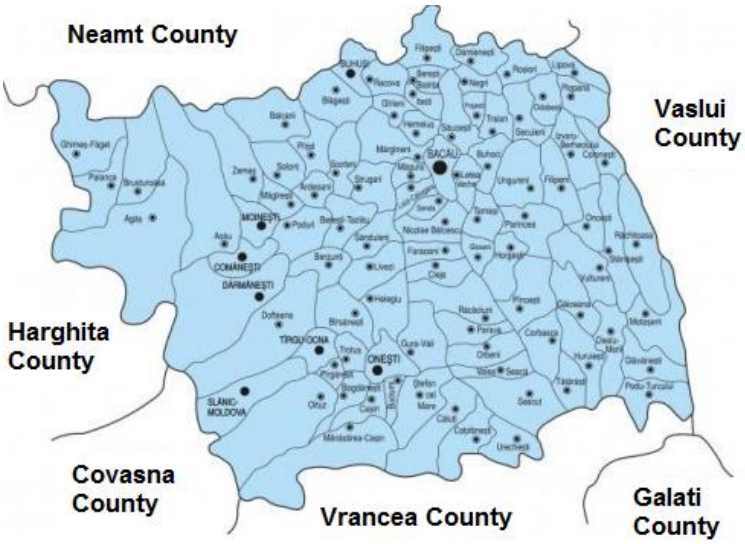
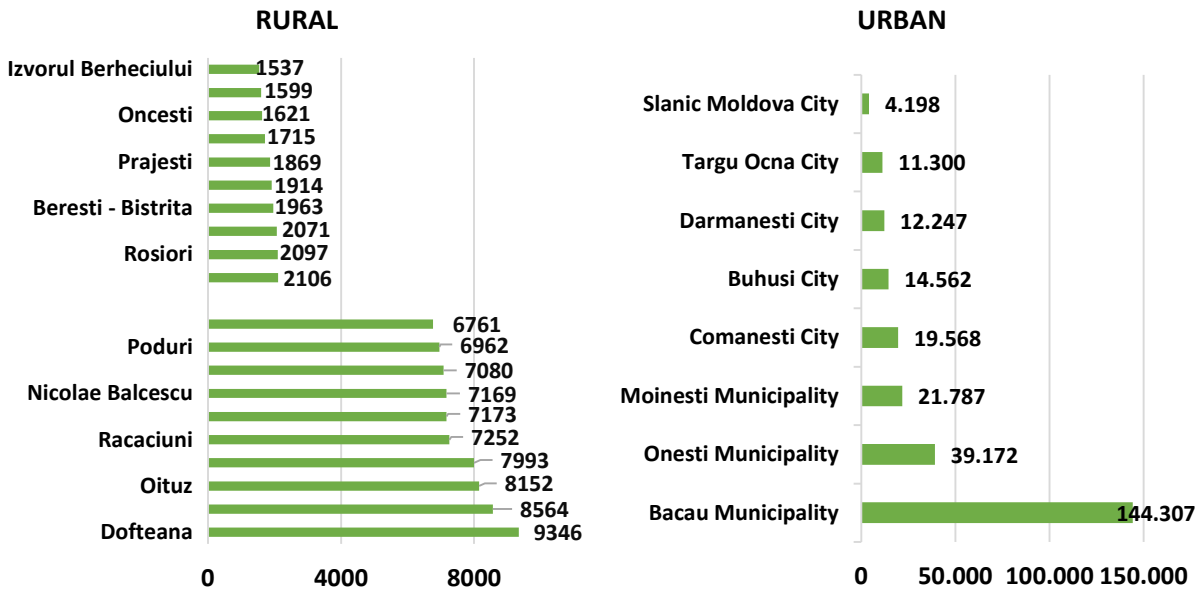


Figure 5-4. The administrative map of Bacău County. Source: Bacău County Council (2015 a)

YEAR 2014	% National GDP (M€)
Bacau County	1,89

Figure 5-5. Urban and rural population of Bacău County. Source: National Institute of Statistic (2015)



5.1.4. SOCIO-ECONOMIC DIAGNOSIS OF TERRITORY

In this section the socio-economic dimension of the territory is analysed by taking into account the structure of the population and its level of training, the production structure (enterprises, economic activities and the labour market), the infrastructure and equipment.

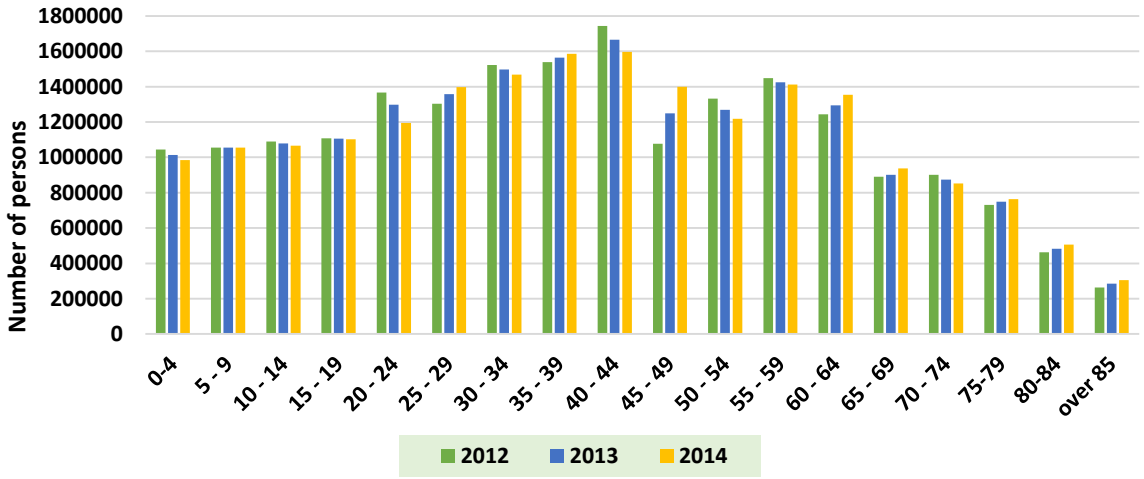


Figure 5-6. Stable population by age in Romania. Source: Own compilation based on National Institute of Statistic (2015)

STRUCTURE OF THE POPULATION

The following tables show the distribution by age of the population of Romania and Bacău County in 2014.

Analysing the chart, we notice an increase in two age categories: the 45-49 years population segment and the over 85 years one, and a decrease in young people between 20-24 years.

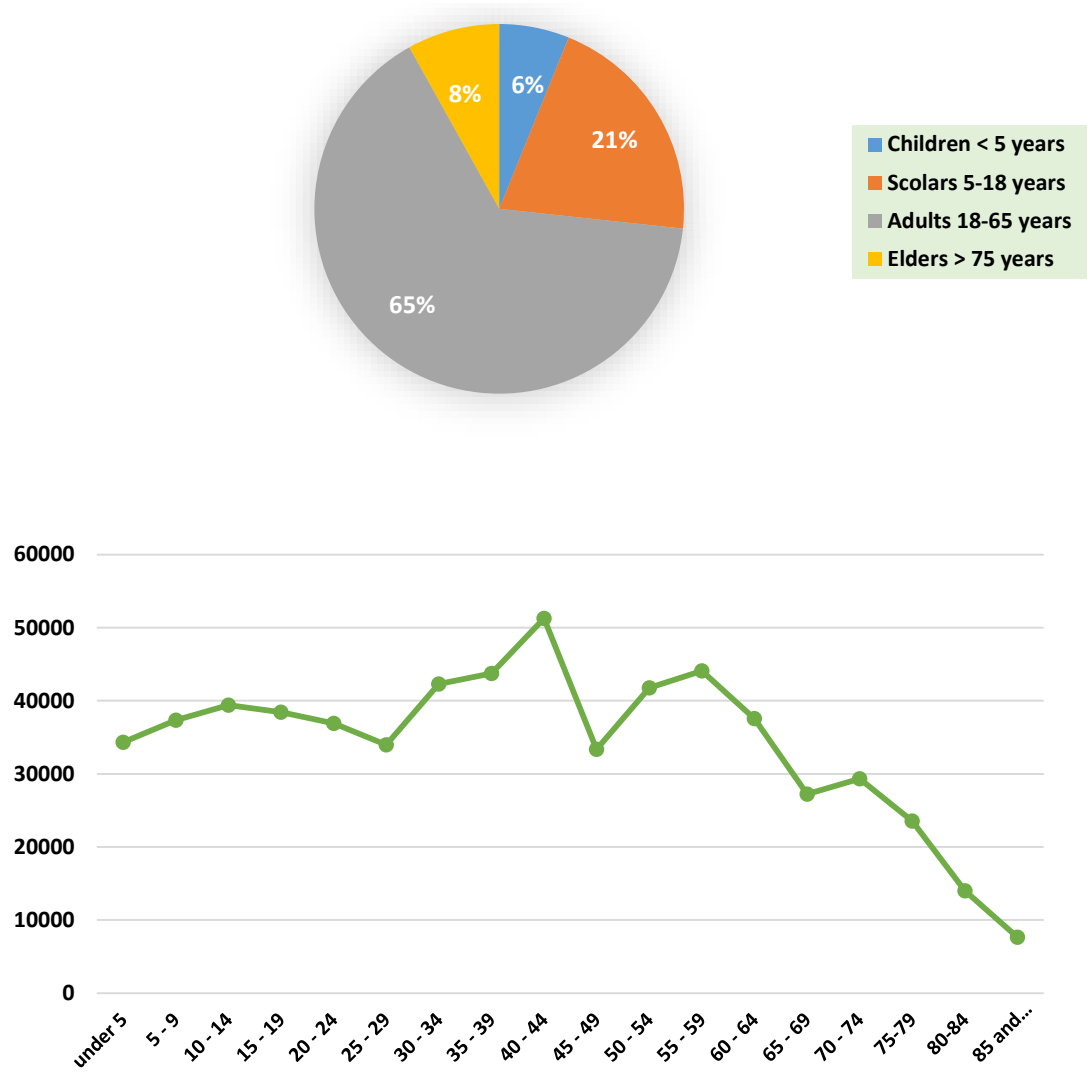


Figure 5-7. Stable population by sex and age group in Bacău County. Source: own compilation based on National Institute of Statistic (2015)

Table 5-3. School population by level of education in Bacău. Source: Own compilation based on National Institute of Statistic (2015)

BACĂU COUNTY / SCHOOL YEARS	TOTAL	PRESCHOOL	PRIMARY AND SECONDARY EDUCATION				HIGH SCHOOL	VOCATIONAL STUDIES	POST HIGH-SCHOOL	HIGHER EDUCA-TION
			TOTAL	PRIMARY	SECONDARY	SPECIAL EDUCATION				
2008 / 2009	126.206	23.336	63.716	31.218	32.185	313	24.206	6.292	1.144	7.512
2009 / 2010	124.286	23.466	62.377	30.413	31.635	329	25.914	3.707	1.354	7.468
2010 / 2011	120.063	23.164	60.558	29.349	30.830	379	26.371	1.513	1.665	6.792
2011 / 2012	114.971	22.386	57.832	28.452	29.011	369	26.802	276	1.786	5.889
2012 / 2013	112.668	18.696	61.215	32.143	28.671	401	24.796	880	2.092	4.989
2013 / 2014	109.431	18.038	60.260	31.941	27.953	366	23.338	1.124	2.089	4.582

Training of the population

The tables show the level of education of the population in the analysed territory of Bacău County. It has been grouped by level of education.

This information shows a general decrease in the number of persons involved in the educational process, due to the negative demographic growth in the 90s.

PRODUCTION STRUCTURE

In this section the production structure of the territories concerned is discussed. In particular, data on the number of businesses, as well as their size, number of workers or economic activities they develop are presented.

Companies

The number of active companies in a territory and its size reveal interesting information on the economic dynamics of the region.

Table 5-4. Number of companies and variation before the crisis. Source: Own compilation based on National Institute of Statistic (2015)

	2007	2013	Variation
Romania	520.032	485.082	-1,07 %
N-E Region	57.168	51.395	-1,11 %
Bacău County	11.630	10.577	-1,09 %

The effect of the crisis is clearly visible in the disappearance of companies between 2007 and 2013. This destruction of companies is more significant in the N-E Region of Romania.

Table 5-5. Number of private entrepreneurs (family businesses and independent persons) and variation before the crisis. Source: Own compilation based on National Institute of Statistic (2015)

	2007	2013	Variation
Romania	520.032	485.082	-6,72 %

We notice the same reduction in these small businesses, as in the case of other active companies

Table 5-6. Number and percentage of companies depending on the number of employees in 2013. Source: Own compilation based on National Institute of Statistic (2015)

EMPLOYEES	COMPANIES IN ROMANIA	%	COMPANIES IN N-E REGION	%	COMPANIES IN BACĂU COUNTY	%
0 - 9	426.775	87,97 %	45.098	87,75 %	9.413	88,99 %
10 - 49	48.287	9,95 %	5.350	10,41 %	971	9,18 %
50 - 249	8.414	1,73 %	819	1,59 %	163	1,54 %
> 250	1.606	0,33 %	128	0,25 %	30	0,28 %
Total	485.082	100 %	51.395	100 %	10.577	100 %

The trade of Bacău is marked by the predominance of small businesses, as 89% of them employ between 0 and 9 workers, but this is the case in the whole N-E Region and Romania.

Economic activities

The next section shows the importance of economic activities in the various territories considered in this study.

Table 5-7. Contribution of the economic sectors to GDP in 2014 (Romania, N-E Region and Bacău County). Source: Own compilation based on Economic Analysis.

	ROMANIA	N-E REGION	BACĂU COUNTY
Agriculture	4,7 %	7.39 %	0,63 %
Industry	23,39 %	21,15 %	14,92 %
Constructions	8,46 %	8,66 %	41,07%
Services	50,27 %	50,47 %	20,40%
Other	13,18 %	12,06	22,98 %

The weight of activity sectors in the achieving of GDP has different values as in other territories. The most important sector is services, followed by industry.

Table 5-8. Percentage of workers by economic sector in 2013 (Bacău). Source: Own compilation based on National Institute of Statistic (2015)

	WORKERS %
Agriculture	3,05 %
Industry	10,77 %
Constructions	10,06 %
Services	76,13 %

Table 5-9. Distribution of sectors of activity in the economy (2013 and 2014). Source: Own compilation based on National Institute of Statistic (2015)

	ROMANIA (2014)	N-E REGION (2014)	BACĂU (2013)
Agriculture	27,90 %	40,06 %	1,81 %
Industry	20,84 %	31,50 %	14,90 %
Constructions	7,41 %	6,22 %	41,07 %
Services	43,86 %	22,21%	42,22 %

In the case of Bacău County, the service sector involves 42,22 % of the county's enterprises, but it includes most of the workers (76,13 %).

LABOUR MARKET

The next section covers the main indicators of employment in the territories considered in this study, along with its evolution before and during the economic crisis.

Most tables below show the quarterly data of the Labour Force Survey, since this is the most important statistical source for the labour market data.

Table 5-10. Comparison of the rate of unemployment in Romania, N-E Region and Bacău County in the first quarters (1Q) of 2007 and 2015. Source: Own compilation based on ANOFM (2015) and National Institute of Statistic (2015)

	2007 1Q	2015 Q1	INCREASING
Romania	4,00 %	5,37 %	34,25 %
N-E Region	5,10 %	6,89 %	35,1 %
Bacău County	4,40 %	6,63 %	50,68 %

After the crisis period, the unemployment rate began to decline, being approximately equal to that of 2007.

Table 5-11. Unemployment rate by level of education, N-E Region and Bacău County, 1st Quarter 2015. Source: Own compilation based on National Institute of Statistic (2015)

	N-E REGION	BACĂU COUNTY
Total	78.850 persons 6,89 %	13.980 persons 6,63 %
Less than Secondary Education	5,10 %	4,69 %
Secondary Education	1,30 %	1,32 %
Higher Education	0,49 %	0,62 %

The level of unemployment is similar at regional and local level, and in both cases is higher when the level of studies is lower.

5.2. RENEWABLE ENERGIES AND DEVELOPMENT

This section presents a set of statistical data that enables the analysis of the energy structure of the current renewable energy status, as well as its future targets.

Regarding the spatial coverage of the data, whenever it was possible, data related to Romania, to the N-E Region and to Bacău County has been included.

Regarding the temporal coverage, data from the last decade (starting with the year 2005) has been included to show the evolution of the data. In most cases, the available and consolidated data to show the current situation was from 2013. For the future targets, and due to its relevance at European level, the year 2020 has been selected.

At national level, Eurostat and National Regulatory Authority for Energy (ANRE) have been important sources of information. Most of the data at regional and provincial levels has been obtained from the National Institute of Statistic reports. The information provided by Romania´s National Renewable Energy Action Plan 2011-2020 (Ro NREAP) has been very relevant, especially in terms of future prospects.

5.2.1. CURRENT ENERGY SITUATION

Due to its geographical position, the Romanian energy system is interconnected with the energy system of neighbouring countries. This advantage enables bidirectional exchanges of energy, allowing an easy balancing of the system (below figure).

Regarding the primary energy, in 2013, the gross inland consumption was 32,34 MTOE (Mega Tonnes of Oil Equivalent) in Romania and 3,43 MTOE in the N-E Region.

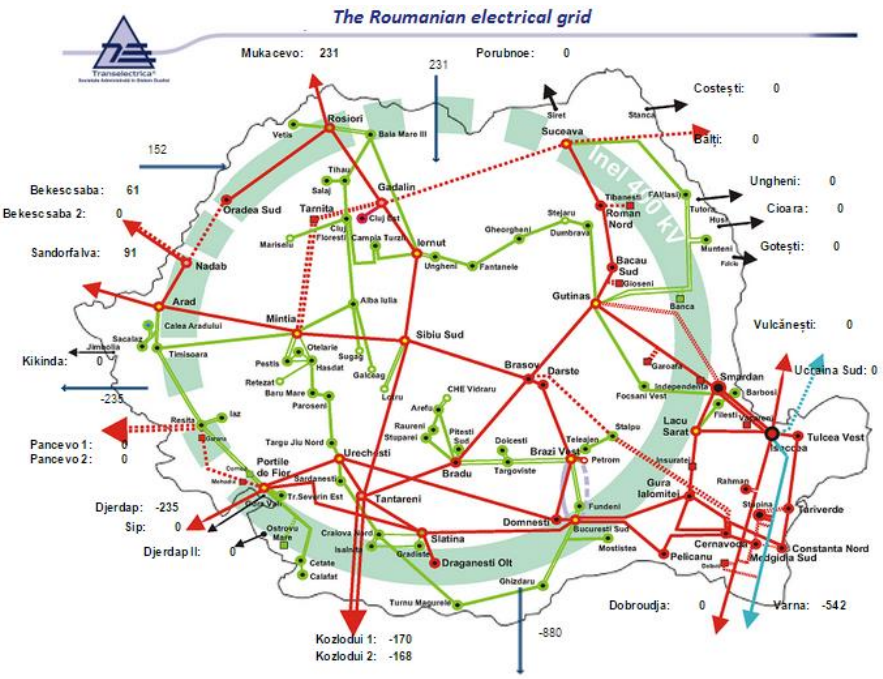
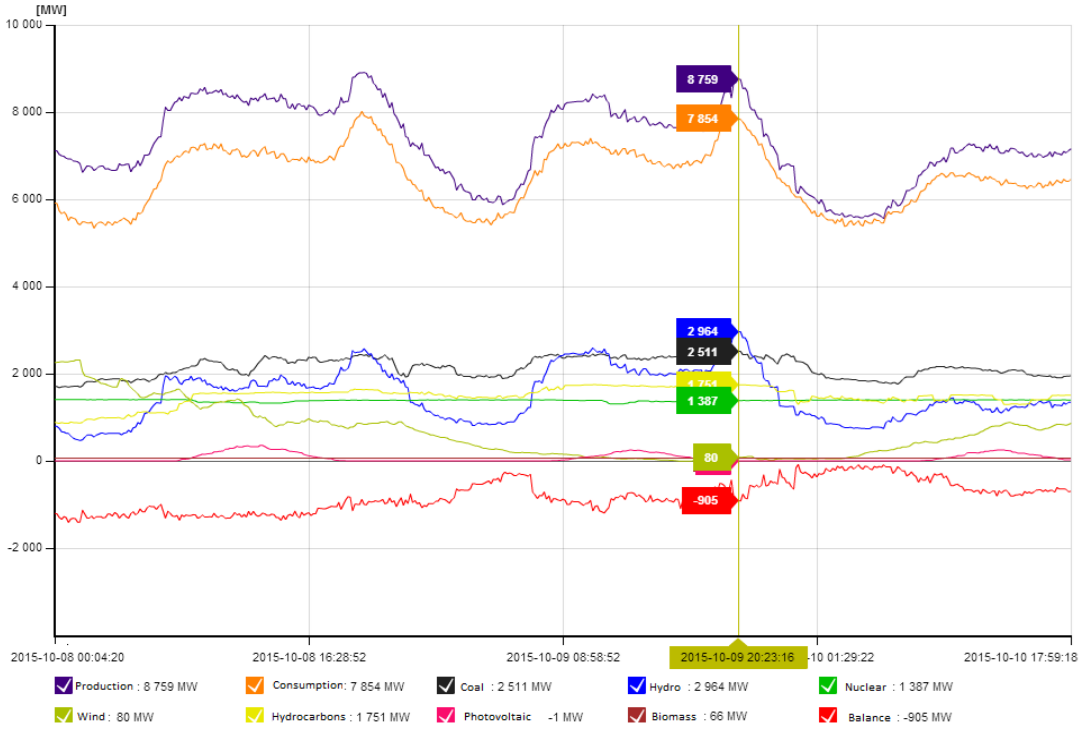


Figure 5-8. The Romanian electrical grid. Source: Transelectrican (2015)



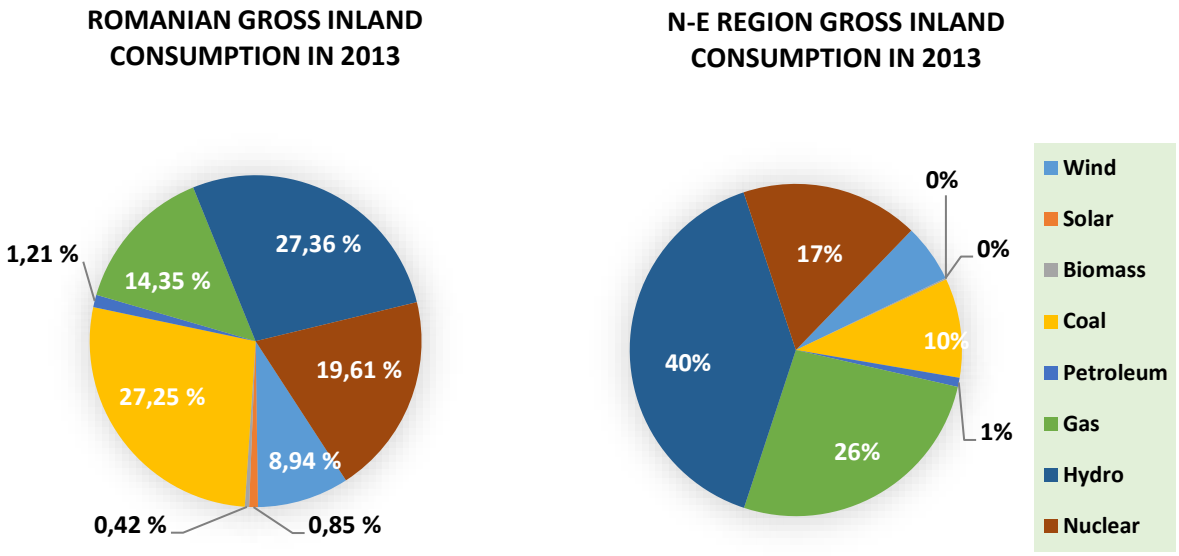
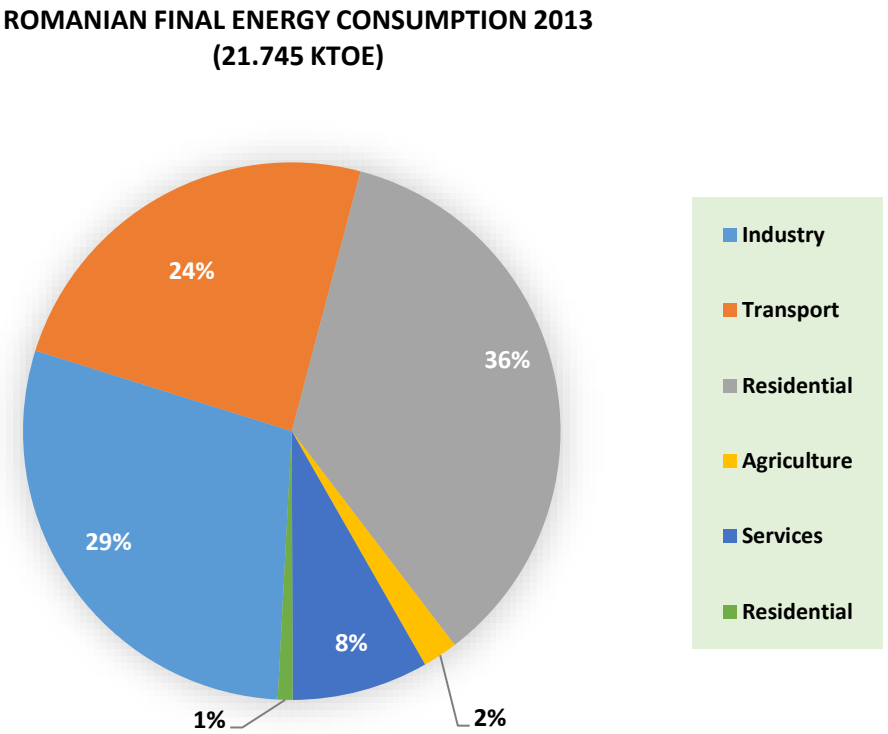


Figure 5-9. Real time energy production at national level (2015.10.09), in MWh, (Up), Primary energy gross inland consumption in 2013 at national level (left) and regional level (right). Source: Own compilation based on ANRE (2015) and National Institute of Statistic (2015)

The Romanian final energy consumption and Bacău County final energy consumption in 2013 are shown in the next figure.



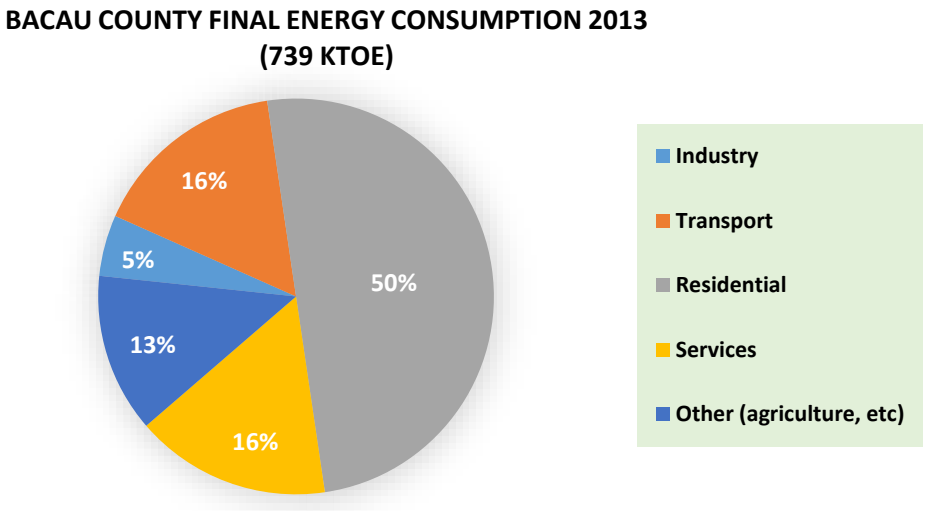


Figure 5-10. Final energy consumption in 2013 at national level and local level.
Source: Own compilation based on National Institute of Statistic (2015)

At national level, the largest energy consumer is the residential sector, followed by industry and transport.

At local level, the largest energy consumer is the residential sector, but in a larger proportion, as compared to the services and transport sectors.

5.2.2. DEVELOPMENT OF RENEWABLE ENERGIES

The contribution of renewable energies to the energy system in Romania has had an increasing trend since 2005. After this year, consumption has been oscillatory, but increasing until 2010, when it reached its maximum.

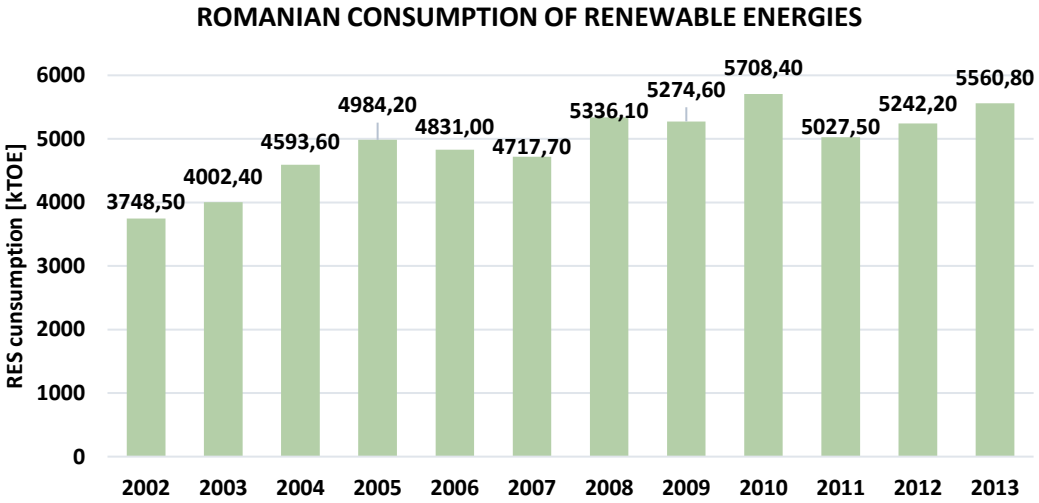


Figure 5-11. Evolution of renewable energy consumption at national level (kTOE). Source: Own compilation based on National Institute of Statistic (2015)

The evolution from 2005 till 2013 at national level of the renewable energy consumption is shown in Figure 5-12.

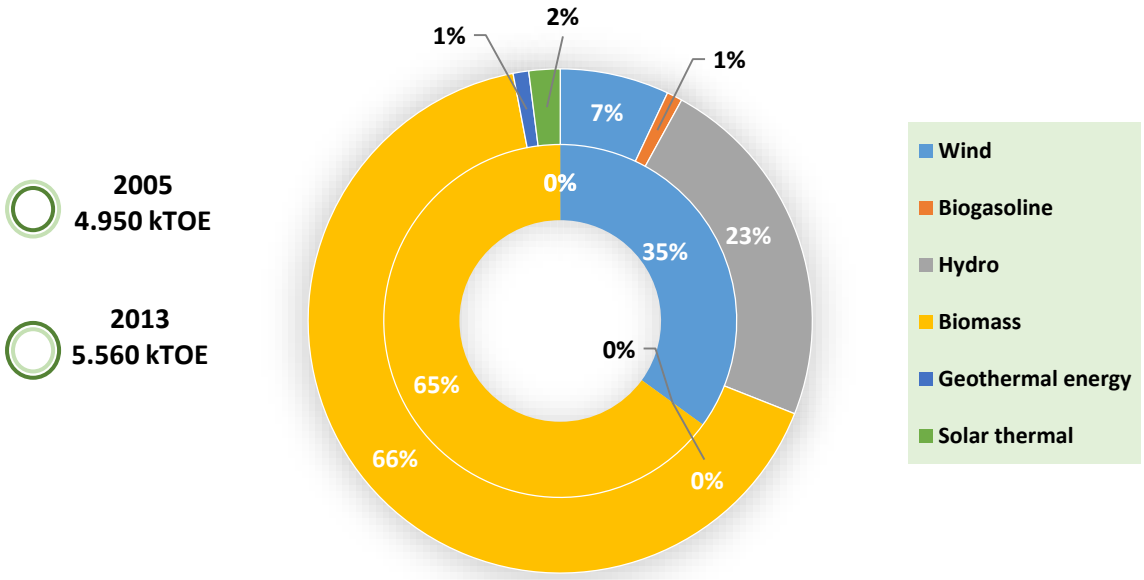


Figure 5-12. Evolution of national distribution of renewable energy consumption. Source: Own compilation based on National Institute of Statistic (2015)

Figure 5- shows the installed power of year 2006 and year 2013 at national level.

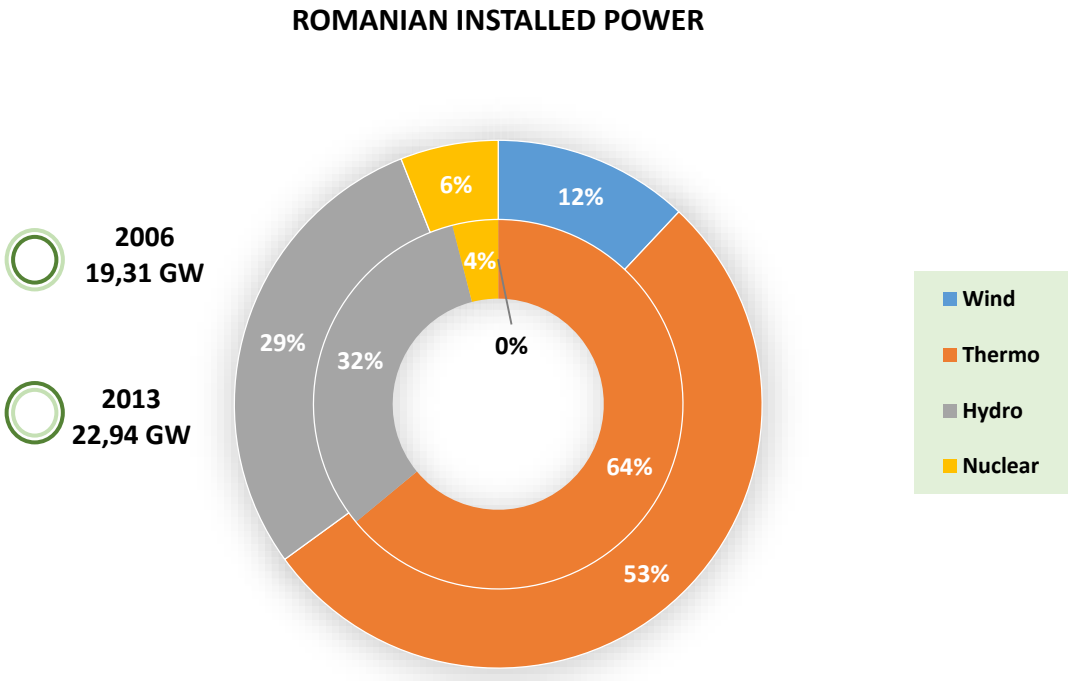


Figure 5-13. Installed power distribution in 2006 and 2013 at national level. Source: Own compilation based on National Institute of Statistic (2015)

5.2.3. RENEWABLE ENERGY TARGETS AND TRAJECTORIES

The European Renewable energy directive (Directive 2009/28/EC) of the European Parliament and of the Council from 23rd April 2009 sets a binding global target of 20% final energy consumption from renewable sources by 2020 in the European Union and a target of at least 10% of transport fuels coming from renewable sources to be achieved by all Member States in the field of transport by that year.

To achieve this, each European country has elaborated a National Renewable Energy Action Plan (NREAP) which shows its national renewable energy target and defines the actions to be taken in order to meet the renewable energy targets.

Up to 2020, the Romanian assumed target was 24% for final energy consumption coming from renewable sources. In December 2013, Romania had achieved 23,9 % of this.

Also, the Romanian assumed target for 2020 was 10% for transport fuel coming from renewable sources. In December 2013, Romania had achieved 4,6 of this.

Taking as the reference year 2005, the Romanian NREAP defined evolution of the sectorial targets for electricity, heating and cooling, and transport from 2011 to 2020 as shown in the following Figure **5-**.

Below it, the next figure shows the real trajectory of the Romanian Renewable Energy Sources (RES). The country almost targeted 24% of the assumed rate of renewable energy.

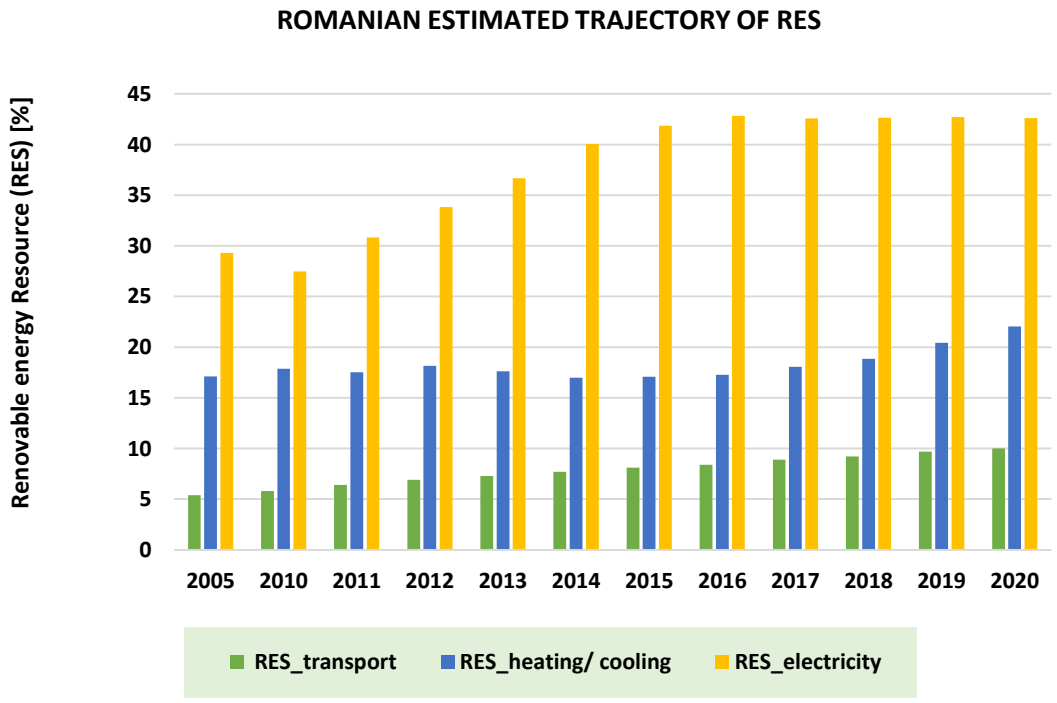


Figure 5-14. Romanian's 2020 target and estimated trajectory of energy from renewable sources (RES) in heating and cooling, electricity and transport as defined in 2011. Source: Romanian Governement (2010)

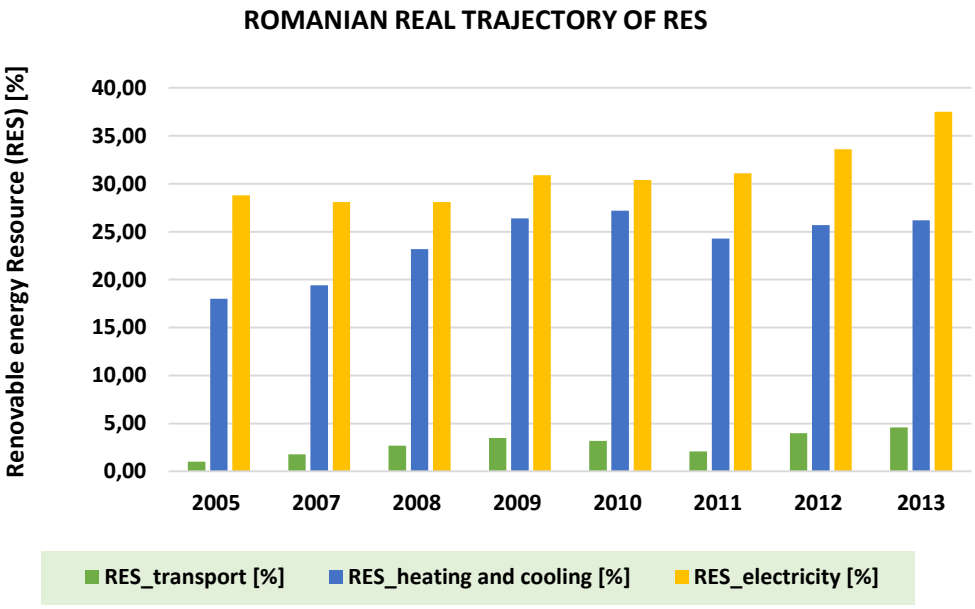


Figure 5-15. Romanian's real trajectory of energy from renewable sources (RES) in electricity, transport and heating and cooling from 2005 to 2013. Source: Own compilation based on Eurostat (2015)

Below table reflects the comparison between Romanian energy consumption from renewable sources in 2005 and 2013; it can be noticed an increase from 17.6 % to 23.9 %.

Table 5-12. The comparison between Romanian energy consumption from renewable sources in 2005 and 2013. Source: Own elaboration

	Consumption of RES (kTOE) 2005	Consumption of RES (kTOE) 2013	% of RES 2005	% of RES 2013
Romania	4.984,2	5.560,8	17,6 %	23,9 %

5.2.4. EMPLOYMENT AND RENEWABLE ENERGY

The national and regional statistics do not offer information concerning the value of labour force working in renewable energy.

5.2.5. RENEWABLE ENERGY LEGISLATION

As a signatory of the Rio de Janeiro sustainable development conference from 1992, Romania took measures to protect the environment and to sustain renewable energy even before it became a member of the European Union. One of the first documents dates from 10th of April 2003 (GD no. 443) and its stated goal was promoting electricity production from renewable energy sources. Subsequently this GD was completed in the following years with more detailed legislative acts.

After joining the European Union in 2007, Romania adjusted its legislation in accordance to European rules.

The first main document concerning RES was the Law no. 220/2008, which establishes the system for promoting energy from renewable sources, and which transposes the European Directive no. 2009/28 / EC of the European Parliament and Council in the legislative framework of Romania.

According to Law 220/2008, in Romania there was established a system for promoting the production of energy from renewable sources through green certificates, correlated with an annual mandatory quota system for electricity suppliers. The goal of these measures is to achieve the national target of 24% share of renewable energy in gross final energy consumption until 2020. The law stipulates the number of green certificates and the granting conditions for each type of renewable energy. The trading value of green certificates is set annually by the National Regulatory Authority for Energy.

In June 2010, the National Action Plan for Renewable Energy 2010-2020 was adopted (Ro NREAP). It contains the national strategy, the targets and political principles in promoting the production of energy from renewable sources.

Because the cost of the green certificates is finally paid by consumers, including the domestic consumers, in order to temper the rise of the bills, the Government decided to postpone the granting of a number of green certificates for the 2017-2020 period. Thus, according to the Government Emergency Ordinance (GEO) 57/2013, photovoltaic projects receive four green certificates per MWh, two certificates less than before 1st July 2013, wind projects receive one certificate instead of two, and two certificates instead of three for small hydropower stations.

Another reason why these modifications were made was the high rhythm of development of RES in Romania. Thanks to the support scheme offered by the State, in 2011 and 2012 the installed capacity of electricity generation from renewable sources increased at a rate of over 190% annually, reaching 2339 MW at the end of 2012. The same increase was registered in the first months of 2013, the authorities estimating that the proposed target of 24% of electricity consumption to come from renewable sources would be achieved by 1st January 2014. So, an important deviation from the National Action Plan for Renewable Energy was registered. Also, some problems appeared to the safe integration of electricity from renewable sources especially because of the high degree of geographical concentration.

Considering all these problems, a new modification was introduced at the end of 2013 through the GEO 994/2013 and the number of green certificates granted was reduced starting in 2014. Therefore, the new photovoltaic parks, built after 1 January 2014 will receive only half of the subsidies stipulated by the Law 220/2008, which means three certificates instead of six. In the case of wind farms, the number of allowances is reduced by 0,5 until 2017 and by 0,25 beginning with 2018. Therefore, new investors will only receive 1,5 green certificates until 2017 and 1,75 certificates starting with 2018. Also, small hydropower stations will receive 0,7% less green certificates per MWh, that is, only 2,3 certificates for new plants.

In 2014, the Law 23/2014 was promulgated which took over and clarified the provisions of GEO 57/2013. Also the law decided that from 2014 to 2020 the annual quota requirements be estimated by the National Energy Regulation (ANRE) depending on the degree of achievement of the national objective and the impact on the end consumer, an estimation to be further approved by the Government.

The last law promulgated in the area of RES is the Law 122 from 2015 which introduced significant changes for the small producers. The producers with an installed capacity between 0.5MW and 3MW, as most producers from renewable sources, are allowed to conclude directly negotiated bilateral contracts of energy sale / purchase.

5.3. MAP OF ACTORS

The economic development of a territory is largely influenced by the strategy adopted by the authorities that administrate that territory at different levels.

Bacău County is an administrative territorial unit made up of 3 municipalities, 5 cities and 85 communes. The latter ones are made up of 491 villages. The local autonomy of communes, towns and cities is realised through the authorities of the public administration, represented by the local, town and city councils, which are deliberative authorities, and by the city halls, which are executive authorities. (art. 23, paragraph 1, Law No 215/2001).

Both the mayor and the local council of an administrative territorial unity are elected by the citizens' direct vote (Law 67, 2004).

In each county, a County Council is constituted as authority of the local public administration, for the coordination of the activities of the commune, town and city councils, whose aim is to manage public services important at county level (Resolution No 87, 31.05.2015 concerning the Regulation on the Organisation and Functioning of Bacău County Council).

The development strategy of a town or of a commune is conceived by the local council and the mayor.

The county development strategy includes the individual proposals of the territorial administrative units (towns and communes), by which we mean their own projects, which are added to the general policy of the County Council, designed to be in keeping with the development guidelines proposed by the Government through its ministries. Furthermore, the County Council is also responsible for certain public objectives outside administrative territorial units, such as roads. The county development strategy is the result of a public debate, in which all interested factors are involved, and is subsequently corrected and approved.

An important contribution to the promotion of concepts and development of certain strategies is also brought by factors such as: local and regional development agencies, SME, vocational education centres, civil society, etc. All these may lead to a better use of renewable energy sources and to the sustainable development of rural territories.

5.3.1. LOCAL GOVERNMENT

Bacău County Council and the Strategy for Sustainable Development of Bacău County for the 2010-2021 period

Bacău County Council elaborated, submitted to public debate and approved the Strategy for Sustainable Development of Bacău County for the 2010-2020 period (2015 b). The strategy makes an analysis of the development potential of the county and establishes the objectives that must be achieved in the set timeframe.

Strategic Objective 3 of this document is entitled**: The Use of Renewable Energy Sources,** and it contains the following items:

1. **The use of renewable energy sources from the county through:**

   1.1. The elaboration of a county strategy for energy potential;

   1.2. The development of educational programmes on environmental protection and sustainable development by promoting green energy;

1.3. The *Sustainable Energy for the County* programme.

2. Stimulating investments in the production and use of renewable energy

2.1. The development of instruments for stimulating the production of energy from renewable sources.

The use of renewable energy sources has been considered an important objective, taking into consideration the targets for sustainable development of Bacău County together with the level of pollution generated by the industries operating in the county territory. The strategy stipulates the importance of identifying alternative means for energy generation, whose exploitation is meant to increase life quality and to improve local economic development.

According to the document, the use of resources can be accelerated through the support offered by the public authorities in the identification of the renewable energy potential and the facilitation of investment. Once the renewable energy potential and its territorial distribution are known, this information will be communicated to local authorities in the county to accelerate measures for the exploitation of these resources.

In order to facilitate the achievement of this objective, the strategy proposes the implementation of an information-education programme in order "to create a culture on the use of renewable energy". The notion of *renewable source* must be part of the common language and a habit should be formed to use this kind of resource, no matter where and in what form it may be found, if the available potential allows this thing.

For the second item of this objective, the strategy proposes the fiscal stimulation of local authorities so as to have them preparing their own projects concerning the use of renewable energy. Also, a *bottom-up approach* is proposed*,* meant to stimulate citizens to purchase specific equipment for renewable sources exploitation and to subsidize the energy obtained from renewable sources.

The North-East Regional Development Agency (N-E RDA)

An important actor in promoting the use of RES and of rural development is represented by the N-E RDA. The agency was created in 1999 and its area of influence includes six counties in the north-eastern part of Romania: Suceava, Iasi, Neamt, Vaslui, Botosani and Bacău. The N-E RDA was created as an organism meant to support the promotion of the social-economic development of the area. RDA develops and promotes strategies, attracts resources, identifies and implements financing programmes, and offers stimulating services for the sustainable economic growth of partnerships and entrepreneurship.

According to its attributions, the agency has elaborated the Plan for North-East Regional Development 2014-2020. The studies conducted for the elaboration of this plan highlighted a good potential of renewable energy in the area, and a number of projects were initiated, as can be seen in the next figure.

Considering this potential, several measures have been proposed which may support the use of renewable sources, and at the same time actively contribute to the development of the area:

- Support for the acquisition of technological lines and technologies that can make use of renewable energy;
- Investments aiming to obtain energy from existing renewable sources.

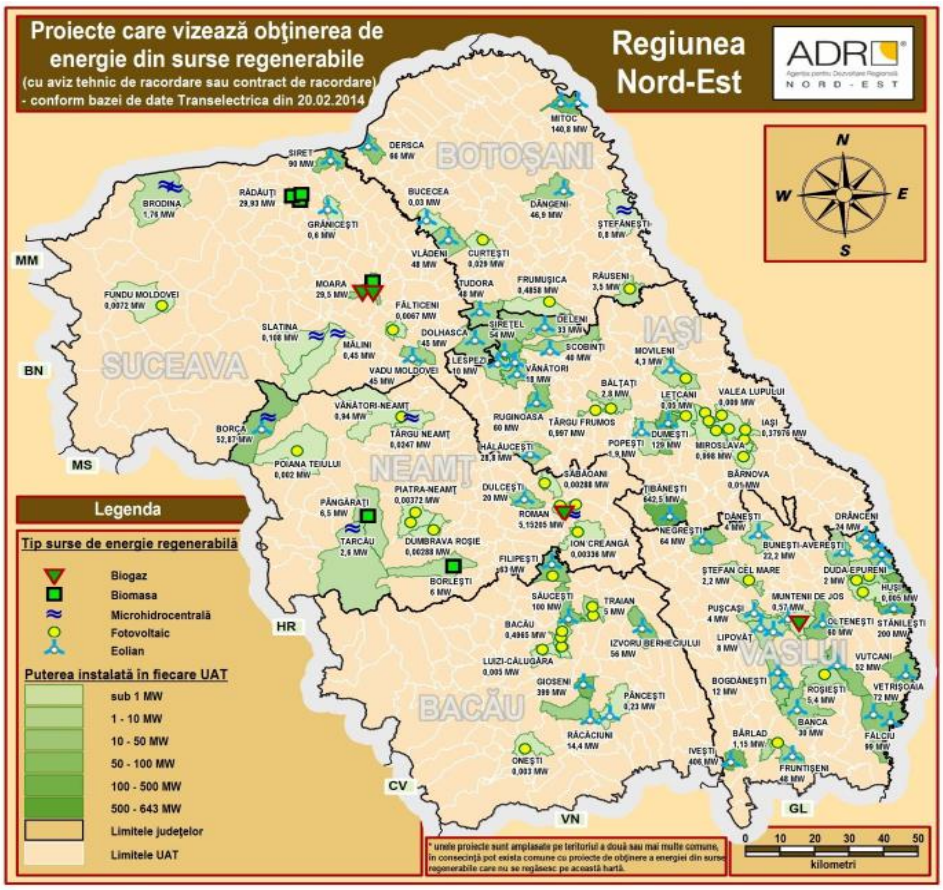


Figure 5-16. Projects aimed at obtaining energy from renewable sources. Source: North-East Development Strategy (n.d.)

The corresponding surface of Bacău County, as it can be observed in the figure, had, at the beginning of 2014, when the study was conducted, less projects initiated, but the neighbour counties made greater effort to use the renewable energy available. It must be mentioned that a part of these projects have not been completed because of the legislative changes concerning the number of certificates (some of the private investors abandoned them) but there is still potential and it can be used.

Also, the development of these renewable source exploitation projects in our neighbour counties increases the possibility of transfer and dissemination of the results of IN2RURAL project. Vaslui County, which has the highest number of wind turbines in the area, has its county seat at only 85 km distance from Bacău.

Bacău Local Development Agency

The main objective of Bacău Local Development Agency is the achieving of the body of measures, programmes and professional activities which contribute to the socio-economic development of Bacău city and of its metropolitan area.

The agency works under the authority of the Local Council of Bacău County and it also represents an interface between the local administration and the private sector.

Bacău LDA is a partner in several European projects on energy efficiency, sustainable transport etc., and it elaborated the Sustainable Energy Action Plan of Bacău.

5.3.2. MANAGERIAL SECTOR

The connection between the industrial sector and renewable energy sources is quite weak in Bacău County, given that the implemented exploitation of such sources is reduced. Several commercial companies have activities related to renewable sources through the production, setting and maintenance of some subsets necessary to the exploitation of RES, especially wind energy. Within the frame of the IN2RURAL project there were cooperation agreements made with the most active of these companies.

Table 5-13. Enterprises with experience in equipment for RES. Source: Own elaboration

NAME OF THE COMPANY	TOWN	TYPE(S) OF RES	SERVICES	WEBSITE
General Electric	Bacău	- Wind energy	- Power transformer stations for wind park; procedures and maintenance activities for wind park	http://www.general-electric.ro/
Electrotehno	Bacău	- Wind energy	- Transformer stations in concrete casing for wind park	http://www.electrotehno.ro/
Electro Standard	Bacău	- Wind energy	- Design, production and maintenance of power transformers; repairing electric motors; Design of small wind turbine	http://www.electrostandard.ro/
DTV project	Onești	- Wind and photovoltaic energy	- Equipment and electrical systems related to renewable energy sources	http://dtvproiect.ro

It must be mentioned that in Bacău City and county there are numerous industrial and consultancy firms, but the experience in the RES field is rather reduced, due to the low demand in the area at present. The firms mentioned in the table above have carried out their RES activities outside the geographic borders of the county mainly.

5.3.3. FORMATIVE CENTERS AND RESEARCH

In Bacău County, the most important vector in the promotion of renewable sources in general and as a possibility of sustainable rural development is “Vasile Alecsandri” University. This is the result of both its study programmes and of its projects and research activity.

The Faculty of Engineering at “Vasile Alecsandri” University of Bacău offers study programmes in two fields directly connected to renewable energy sources: Power Engineering and Environment Engineering. Also, the master’s degree programmes include the following study programmes:

- Equipment and modern technologies in power engineering
- Environmental protection and engineering in industry
- Control and monitoring of environmental quality

The University also offers a number of postgraduate programmes of professional continuing education and training, such as:

- Environmental protection Inspector
- Environmental auditor
- Environmental assessor
- Town and Spatial Planning Technician - initiation programme

One of the PhD programmes offered by "Vasile Alecsandri" University of Bacău is related to the Environmental Engineering field, and some of its topics address renewable energy sources.

Starting with 2008, Vasile Alecsandri" University of Bacău has been constantly involved in international projects on the use of renewable energy in rural environment (RURENER, 100% RES communities), energy efficiency and environmental protection (Promoting Green Products: GREEN-PRO, Life + Programme). These projects have created a strong connection with the rural environment and have brought about a change of vision at the level of local administrations and of Local Action Groups, which included measures concerning renewable energy in local development strategies, as it has been mentioned in the previous paragraphs.

As for secondary technical education (technical training in the pre-university system), there are several technological high-schools in Bacău County which are presented in detail in the next section, including the specialization areas they offer training in.

It is important to mention that continuing professional training is offered by two categories of providers:

- **Public sector providers**
  - Education units under the authority of the Ministry of Education and Scientific Research.
  - Centres of professional training under the authority of the National Agency for Professional Training and Recruitment.

- **Private sector providers**
  - Centres of professional training which offer courses under the auspices of Chambers of Commerce and Industry, employers, trade unions, employers' associations, economic operators, non-governmental organisations, houses of culture, etc.

At the level of Bacău County there are several centres of vocational training, the most important of them being run by ***Bacău County Agency for Workforce Recruitment (AJOFM)***. AJOFM Bacău periodically organises training, retraining, introductory and refresher courses. The majority of these courses are organised for unemployed people or for persons who want to reorient their career, depending on the demand expressed by employers at a certain moment. Among these courses, those that are related to the field of renewable energy sources offer training for energy installations electricians and plumbers, but, if there are demands from the economic sector, it is also possible to organise more specialised courses in the RES field.

The Chamber of Commerce and Industry from Bacău is another important institution that organises professional training courses as a result of the estimation of the present tendencies on the labour market. Its offer is varied, covering jobs from both the technical and services fields.

The following table synthesizes the present situation in professional training at the level of Bacău County.

Table 5-14. Type, purpose, functions and web page of training centers and research related to the RES in the Bacău County. Source: Own elaboration

KEY ACTOR	TYPE	OBJECTIVE	WEBSITE
"Vasile Alecsandri "University of Bacău	University	To provide training and develop research related to the RES.	www.ub.ro

Institutions of secondary education	Technical High Schools	To provide training for young people in different professions connected with RES.	http://www.primariabacau.ro/fisiere/proiecte_hcl/02.PROIECT_RETEA_SCOLARA.PDF
Bacău County Employment Agency of labour force	Continuing Cocational Training -CVT	To provide training for adults in professions connected with RES.	http://www.bacau.anofm.ro/FormareProf.html
Chamber of Commerce and Industry of Bacău	Professional association	Training for adults in different technical professions.	http://ccibc.ro/formare-profesionala/
Vocational Training Centres	Training companies, NGOs, etc.	To train qualified professionals and workers with expertise according to the demands of the labour market.	

5.3.4. OTHER STAKEHOLDERS LOCALLY REPRESENTED

Local Action Groups (LAGs) have a significant role in rural development. Being created through the LEADER programme, these groups represent partnerships between rural communities and also include various representatives of the socio-economic sector of the territory, whose collaboration determines the development direction of that area. Since they are directly active in the territory and know best the realities of the member communities, these LAGs have proved their efficiency by elaborating development strategies adapted to the specific characteristics of each area.

There are many LAGs in Bacău County, each of them joining together 10 to 20 communities. The participation of some representatives of these groups in various European projects, as well as the measures proposed in the **Strategy for the Sustainable Development of Bacău County**, drew attention to the possibility of using existing renewable energy sources. Thus, in several communes, projects concerning public lighting through photovoltaic panels led to the replacement, in many cases, of standard light bulbs from the street lighting network by efficient LED systems. Moreover, 12 rural communities formed a group which joined, as a single entity, the Covenant of Mayors, as a result of their activity within the 100 RES Communities project.

It must be mentioned that the development and implementation of all these projects encountered difficulties due to the lack of trained staff in this field.

At the level of Bacău County, there are several **active non-governmental organisations** that have as main activity area the environmental protection sector, including the promotion of renewable energy sources. Among the most representative ones, we mention the following: the Regional Ecology Centre, the Association for Local Economic Development, “Come with us” Regional Centre for Ecological Education, Art and Tourism, “We Love Nature” Association, etc.

5.4. TRAINING, RENEWABLE ENERGIES AND RURAL DEVELOPMENT

Considering the main objectives of the IN2RURAL project, a research study concerning the educational offer in the field of RES in Bacău County and in the neighboring area was conducted. It was important to know if this demand of the market labour was satisfied and at what level and also the added value which could be brought by the IN2RURAL project.

The professions in the field of RES are quite new in Romania and the adaptation of the study programmes is difficult and could take time. For this reason the activities of the present project can improve the professional training of the young people who could work in the development of RES in the rural area.

The educational system in Romania has a public component financed by the state and a private one. In this analysis both components were taken into consideration.

5.4.1. EDUCATION AND TRAINING ABOUT RENEWABLE ENERGIES IN BACĂU

In Bacău City, which is also the county seat, there are two universities, but the RES-related specializations are only offered by "Vasile Alecsandri" University of Bacău, a public university.

The following undergraduate RES-related specializations were found:

- Engineering of sustainable rural development
- Engineering of environmental protection in industry
- Power engineering
- Ecology and environmental protection
- Economic engineering in the field of mechanics

At graduate level, the educational offer includes the following master's degree programmes:

- Equipment and modern technologies in power engineering
- Management of environmental protection in industry
- Control and environmental monitoring
- Use of biological resources and environmental protection

The University also has a laboratory of unconventional energies which helps teachers and students in their research. During the last years some students have chosen RES as a topic for their graduation project. The specialization which is closest to the topic of the IN2RURAL project, Engineering of sustainable rural development, has just been introduced and the development of this new specialization has been demanded by the realities of the regional area: a large rural territory and the existing potential of RES.

Also, it is important to mention that "Vasile Alecsandri" University of Bacău was involved in different projects for rural development and implementation of RES in the area which resulted in studies or training for students:

- RURENER - Network of small RURal communities for ENERgetic-neutrality - http://rurener.eu/
- 100% RES-Communities - Towards 100% RES rural communities - http://www.100-res-communities.eu/
- ITForest, Innovative Training in Forest Biomass for Sustainable Rural Development - http://www.itforest.uji.es/
- Education for sustainable development and climate change prevention in collaboration with Bacău City Hall

Every year "Vasile Alecsandri" University of Bacău organises or is involved in the organisation of national or international conferences having sections dedicated to renewable energies:

- OPROTEH - Optimization of constructive and technological design in machine building field http://oproteh.ub.ro/en/
- CNEI - National Conference on Industrial Power Engineering http://www.electrica.ro/resources/images/Files/Invitatie_CNEI_2009en.pdf
- PLUMEE – in collaboration with University of Limoges, France - Colloque francophone Pluridisciplinaire sur les Matériaux, l'Environnement et l'Electronique http://plumee2013.ub.ro/

The published scientific articles produced for these conferences represent a good material for the individual study of the students and scientists interested in the topic.

In the area of Bacău County there are high schools with technical/vocational profiles. Their educational offer connected with RES is presented in the following table.

Table 5-15. Technical high schools. Source: Own compilation based on Bacău School Inspectorate brochure.

NAME OF HIGH SCHOOL	PROFILE	QUALIFICATION CERTIFICATE *ISCED*
N.V. Karpen High-School	Technician for electrical installations	Level 3
	Electrician low voltage operation	Level 2
"Dumitru Mangeron" Technical High-School, Bacău	Technician for Electrical installations	Level 3
"Grigore Antipa" High-School, Bacău	Ecological and environmental quality technician	Level 3
"Gheorghe Asachi" Technical High-School, Onesti	Ecological and environmental quality technician Construction and civil engineering technician Technician for electrical installations	Level 3
"A.Saligny" Technical High-School Bacău	Technician in construction and public works	Level 3
"Petru Rareş" Technical High School Bacău	Mechanical Technician for maintenance and repairs	Level 3
"Dimitrie Ghika" Technical High-School COMANESTI	Ecological and environmental quality technician	Level 3
"Grigore Cobalcescu" Technical High-School Moinesti	Ecological and environmental quality technician Electric technician Electronics automation technician	Level 3
"I.Borcea" Technical high-school Buhusi	Construction and civil engineering technician	Level 3
"Letea" technical high-school Bacău	Technician in electrical installations	Level 3
"Petru Poni" technical high-school Onesti	Ecological and environmental quality technician Technician in electrical installations	Level 3
	Electrician low voltage operation	Level 2
Technical high school Darmanesti	Electronics automation technician	Level 3
"Al.Vlahuta" technical high school Podu Turcului	Technician for Construction, installation and public works	Level 3
"J. M. Elias" technical high school sascut	Ecological and environmental quality technician	Level 3
Inclusive education school center no.1, Bacău	Construction, installation and public works	Level 1/ Level 2
Technical high school Onesti	Electrician relay protection, automation and power system measurements	Level 1/ Level 2

As it can be observed in the table above, there are many professions of secondary level education in professions connected with RES. An extra training for these types of qualifications could lead to good professionals in RES installation, exploitation and maintenance.

According to the Romanian educational system, the vocational and technical education is achieved by means of two vocational training paths:

The direct vocational training path, also named technological high school, which includes:

- The junior years, technology educational track, which includes the 9th and 10th grades, offering unattested general competence divided into three profiles: natural resources and environmental protection, technical and services.
- The senior years, technology educational track, which includes the 11th and 12th grades, offering professional qualification level 3.

The gradual professional training path named the vocational path, which includes:

- The junior years, technology educational track, 9th and 10th grades, the school of arts and trades, which offers a level 1 qualification certificate.
- 11th grade, the additional year, which offers a level 2 qualification certificate; this year is, at the same time, a passageway towards the next qualification level.
- The senior years, 12th and the 13th grades, held at the technological high schools, which offers a level 3 qualification certificate corresponding to level 3 ISCED*.*

5.4.2. ACCREDITATION FOR FACILITIES IMPLEMENTATION AND CERTIFICATION

At the moment, there is no accreditation or certification process in Romania dedicated exclusively to perform RES installations. General notions regarding this issue are included in various other specializations.

5.5. EMPIRICAL STUDY. ACTORS' VIEW ON THE TRAINING NEEDS REGARDING RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

5.5.1. SAMPLE

The development of a certain area, of a county or of a locality is largely decided by those who live there, by the authorities in that certain area and by the manner in which they get involved into its development strategy.

On this basis, a survey was conducted within the IN2RURAL project, regarding the opinion of certain groups of people from Bacău County with respect to the possibility of development of rural areas and the impact of the exploitation and development of renewable energy sources. There have been other aspects discussed during this research, connected to the necessary skills for a person who works in the RES exploitation domain and the necessary level of training.

Bacău County has a strategy for sustainable development that also includes the use of sustainable energy resources available in this territory. Thus, there have been installed photovoltaic panels on the roof of the municipal hospital, there are localities that use photovoltaic lighting, the instalment of wind farms is also encouraged, many institutions and private individuals use solar collectors, a great attention is directed to energy efficiency through thermal insulation and the use of biomass power stations where possible.

Taking into consideration the importance of the local and regional authorities with respect to the development strategy, the following institutions were invited to participate in the interview:

- The North-East Regional Development Agency
- Bacău County Council
- The Agency of Local Development, Bacău

The first of the institutions mentioned above, due to the management changes which occurred while the survey was being carried out, referred the researchers to the official document, *The North-East Regional Development Plan for 2014-2020.* The opinions of the other institutions will be discussed in the following paragraphs.

The production of equipment necessary for the exploitation of renewable energy resources is rather reduced, both in Romania, as it was shown in the previous chapters of this paper, and in Bacău County. However, a part of the companies that carry out their activity in this county have been involved in various stages in the production and fitting of renewable energy sources or have preoccupations related to this activity. The selection of the participating companies for this interview was based on this criterion and also according to their willingness to answer to the interview and to support future activities in this project. Therefore, the industrial areas, as well as small and medium enterprises were represented in this study by:

- General Electric – with experience in wind power stations; it currently provides maintenance for the wind farm near Vutcani locality.
- Electrotehno – having as main activity domain the production of compact transformer points, of low and medium voltage electric equipment, and of electric gear. Over the past years, the company participated in the development of wind farms not only in Romania, but also abroad.
- DTV Project – a company accredited for the design and execution of low and medium voltage networks, transformer points, electric stations and installations of the electric elements of power stations, monophased and triplephased electric extensions, consultancy and technical solutions for a more efficient public lighting, etc.
- Electro Standard – is involved in production and reparation of power transformers, reparation of electric motors and production of spare parts for electric cars, with more than 30 years of experience in this field.
- URBIOLED – a company which, even though it does not have its headquarters in Bacău, has performed several studies and actions in this area, especially involved in the efficient public lighting based on the use of LED systems. URBIOLED was also a partner in one of the projects run by "Vasile Alecsandri" University of Bacău regarding the use of renewable energy sources in the rural area. Consequently, the company knows the realities of the region very well and it was considered that its opinion was a valuable one.

As for the industrial activity and production fields, it was considered necessary to find out the opinion of an organism directly involved in the supporting and development of industrial activities and services in the county, namely, Bacău Chamber of Commerce and Industry.

- Bacău Chamber of Commerce and Industry is the most important organisation of the entrepreneurs from Bacău, representing 10.000 companies and small and medium enterprises. As a public utility organisation, it acts as an interface between companies and public authorities, taking permanent action for the sustainable development of Bacău County. Bacău Chamber of Commerce and Industry supports the internationalisation of companies and promotes the economic potential of Bacău County through its partners and collaborators at both national and international level: the Enterprise Europe Network, foreign Chambers of Commerce and international organisations.

A special participant in the IN2RURAL survey project is represented by Itesti Fruit-Growing Association. The interview evolved somehow unexpectedly, but the association's administrator offered relevant opinions concerning the rural area, the present situation and future evolution tendencies, and the impact that renewable sources of energy might have on the rural communities from an economic point of view.

In order to know the current level of training, the skills developed by the current educational system and the possible corrections necessary to satisfy the present demands of the labour market, the representative sample also included institutions and persons from the educational and professional training network:

- "Vasile Alecsandri" University of Bacău – represented by a university professor from the Power Engineering master's degree programme.
- "Gheorghe Asachi" Technical University of Iasi – represented by a university professor specialised in Power Engineering, efficient lighting systems and smart buildings.
- "N.V. Karpen" Technical College of Communications - represented by its deputy director.
- "Ion Ghica" Economic College from Bacău – represented by a teacher.
- "Ion Borcea" Technical College, Bacău – represented by a teacher.
- Darmanesti Technological High School – represented by a teacher from the professional training area.

Due to the intrinsic connection between renewable energy sources and the environment, representatives of two essential institutions from Bacău County and Municipality were invited to participate in the interview and to fill in the attached questionnaire:

- The National Agency for Environmental Protection – through its local representative.
- The Local Agency for Environmental Protection, Bacău – represented by a specialised inspector.

The study was supposed to let each participant express his/her opinion in his/her area of competence, without any obligation or constraint regarding the number of questions answered or gaps filled in.

Although statistically speaking, the 18 collected surveys and questionnaires represent a relatively small number, the importance of the participants to this opinion survey and the fact that they come from various fields of activity, allow us to form a general view on the addressed subjects.

Table 5-16. Persons and organizations that have participated in the interviews and the focus group. Source: Own elaboration.

ORGANISATION				PARTICIPATION IN	
NAME	TYPE	LOCATION	RESPONDENT	INTERVIEW	FOCUS GROUP
Băcau County Council	Administration	Bacău	Adviser		x
Local Development Agency, Băcau	Administration	Bacău	Manager	x	x
Bacău Chamber for Commerce and Industry	Association	Bacău	Manager	x	
General Electric	SME	Bacău	Head office	x	x
Electrotehno	SME	Bacău	Head office	x	
DTV Proiect	SME	Onești	Head office	x	
Electro Standard	SME	Bacău	Manager	x	
URBIOLED	SME	București	Head of service	x	
Fruit Trees Association, Itesti	Association	Iteşti, jud. Bacău	Administrator	x	
"Vasile Alecsandri" University, SER domain	University	Bacău	University professor	x	x
„Gheorghe Asachi" Technical University, Iasi	University	Bacău	University professor	x	
"N.V. Karpen" Technical High-school	High-school	Bacău	Deputy director	x	
„Ion Ghica" Economic College, Bacău	High-school	Bacău	Teacher	x	

Technology High School, Darmanesti	High-school	Darmanesti, Bacău County	Teacher	x	
"Ion Borcea" Technical High-school	High-school	Bacău	Head of the department	x	
The National Agency for Environmental Protection	Government agency	Bucuresti	Counsellor	x	
The Local Agency for Environmental Protection, Bacău	Government agency	Bacău	Counsellor	x	
Vasile Alecsandri University of Bacău	University	Bacău	Assoc. Prof. PhD		x

The participants to those discussions correspond to the following categories:

- Gender:
  - 4 women
  - 14 men
- Age group:
  - 4 under 35 years old
  - 4 between 36 and 45 years old
  - 9 older than 45 years
  - 1 person who did not declare his/her age
  - Regarding the level of education, all the persons have a university degree, either a Master's or a PhD degree.

5.5.2. ANALYSIS OF THE INTERVIEWS AND THE FOCUS GROUP

RURAL CONTEXT

Evolution of the current rural areas situation in the Bacău County

The analysis of the discussions concerning the rural context emphasised different aspects, based on the respondents' level of familiarization with and knowledge of the field. The synthesis of these conclusions is presented below.

Rural areas represent a large part of Bacău County, where 350.000 people live, which is 56% of the county population. Statistically speaking, over the last few years there has been registered a slight increase of the population in the rural area as compared to the urban one, in the context of the economic crisis and job scarcity. Despite this, the situation still remains difficult, given that there is a continuous demographic ageing of villages due to young people's emigration abroad or in other areas of the country.

This migration is caused, first of all, by economic factors, unemployment and lack of job diversity. The main activity in the rural area is agriculture, as people practise subsistence farming that cannot offer conditions for prosperity. The few companies that exist in the rural areas, in fields like constructions, wood processing, services, etc. are small and there are few jobs offered. It can also be noticed that there is a concentration of these companies in the villages situated nearby urban centres, while there is almost no company in isolated rural areas.

Another cause that keeps young people abroad is represented by the lack of services and utilities in rural areas. "Currently, even though the Law 51/2006 on public utility services is in force, only one locality out of the visited 12 has an organised public service for lighting, only one locality out of 12 has paved roads in the village" (Urbioled). The same problem is also found in the case of services for water supply or sewerage: few villages benefit from these facilities.

All these negative aspects being presented, the majority of the participants in the survey consider that, in the future, this situation may be improved through the return of the young people who are abroad. This would be possible by accessing EU funds and by offering better support from the state to the agricultural and animal husbandry activities.

While the infrastructure is in a poor condition in most rural areas, the internet and mobile phone services have a better status. “The majority of rural areas are developed enough from the point of view of communications and services, this is being possible mainly because young people leave to work abroad and are coming back with capital, knowledge and the desire to adopt new technologies, and to find new sources of information”, the representatives of Bacău Chamber of Commerce and Industry have declared.

Another competent opinion (“Ion Ghica” Economic High-School) states that: “At present and in the short run, communication and services are less developed in the rural environment, but I consider that they will manifest a slight tendency of improvement, due to the development of land line, mobile phone networks and the internet. More and more people from rural environments learn how to use a computer (children already know that), or the mobile phone network (...) Children from rural areas are sufficiently educated in school to be able to educate their uneducated parents in turn.”

Summing up the received answers, it can be said that, even though, currently, the situation is not precisely positive in the rural area, there is hope that in the future this situation can be improved, probably in 15-20 years.

Estimations regarding the future evolution of the rural area and initiatives that may contribute to its development

The discussions with the participants during interviews emphasised several possibilities for a future development of the rural area, available both in Bacău County, and in the whole country.

A main positive factor, already existing, but which must be further supported, is represented by the setting up of the Local Action Group (LAG). Through this, there is an easier possibility to access the funds available through the National Strategy for Rural Development. There can be noticed an increase in project writing and fund accessing by the rural communities. In this way, roads have been repaired, schools have been renovated and public lighting has become efficient. Furthermore, “the small farmers can associate with one another, thus having the opportunity to purchase raw materials and gear at favourable prices and, at the same time, to sell their products in markets or supermarkets even during the off-season at prices that can withstand competition” (LDA Bacău). However, the percentage of this encashment is still small in comparison with the needs of the rural communities.

A second element that may contribute to a positive evolution of the rural area is the application of policies and measures prescribed in the National Action Plan for Renewable Energy Sources (NAPRES). The smaller demand of energy at village level could be met by using the available renewable energy. National and/or regional authorities should be involved in this, as the rural communities cannot fund this type of investments from their local budgets. But this plan must be put into practice and not left only on a sheet of paper.

According to the opinion expressed by the majority of respondents, the return of young people and adults from abroad has and will have an important contribution to rural development. As a result of their gained experience and the things they learned abroad, these young people bring with them a different vision and want to implement in their birthplaces the things they saw in other countries. Their involvement in the community life will certainly lead to a better quality of the services, to a more comfortable rural life and to an increased respect of the authorities for their citizens. Moreover, the investments these people will make, the companies they will build and the new agricultural

technologies they will implement will create new jobs. Perhaps these investments will be small, as they are at present, but they will have a multiplying effect, as they will be adopted by other persons and communities afterwards.

The interviews also revealed interesting opinions on the initiatives proposed for a good evolution of the rural areas.

It should be noted that a considerable part of the respondents, and not only those from the educational system, have affirmed the necessity for the growth in the level of education and training of the population in the rural environment. Workers from villages are generally unqualified, with few options even in the case of a future larger offer of employment, and this aspect must be corrected. There is a need for campaigns that should promote the importance of education and training for employment. “I advise those from rural areas to complete their studies, to get a qualification, to have more personal initiatives for the development of the area in which they live and for the improvement of living conditions”- this is the opinion expressed by the representative of General Electric and, also, in different words, by Bacău Chamber for Commerce and Industry.

Other proposed initiatives which that can lead to the positive evolution of the rural communities are presented below:

- The improvement of the legislation, in order to develop ecological agriculture, by offering stronger incentives to those who want to develop this type of agriculture.
- The promotion of the rural tourism in the region, respectively the involvement of the local population in this domain.
- Accessing non-refundable financing for activities in rural areas.
- Accessing European funds for the development of human resources, in order to implement study programmes at rural level for those who want to develop small and medium enterprises.
- The granting of some fiscal facilities to inhabitants from rural areas which are willing to invest in agriculture and rural tourism.
- Development of the public-private partnerships.
- A more important role played by intercommunity associations.
- Higher training in business and commerce and business management.
- Granting of facilities for setting up LAGs and for accessing European funds.

By analysing the received proposals the following conclusions can be drawn:

- The development of rural areas is strongly dependent on the financial resources and it requires support, which may come as non-refundable financing, national and European funds, fiscal facilities for SME development and investments in agriculture. This economic development will lead to an increase in the local budget, which will make possible investment in infrastructures and services and will increase inhabitants’ living conditions.
- The capacity to open small businesses, to identify opportunities, to develop projects and to access funds is strongly connected to the level of education and training of the population. Local and regional authorities must be preoccupied with this problem.

RENEWABLE ENERGY AND RURAL DEVELOPMENT

All participants in the interview showed a good knowledge of the rural environment and proved to be informed about renewable energy sources and their importance. Some scepticism was shown, related to the real possibilities of implementation of these resources in rural environment. The explanation for this attitude is connected to the fact that in the area of Bacău County there is no example of good practice in this sense or important exploitation of renewable energy, but only some isolated cases, with no real impact on the community.

The only form of renewable energy frequently used is biomass, under the shape of wood, wood waste, and vegetable agricultural waste, which is used as source of thermal energy in individual households. Unfortunately, biomass is used in old heating systems, traditional stoves, with a low energy efficiency and only in rare and individual cases gas and pellet power stations are used.

As a result, the answers referring to the current role of RES in rural communities emphasised that they are used only punctually, by individual families. The Green House programme, even though it was applied many times in other regions of the country (especially in the urban environment where the population is better informed), did not manage to bring significant changes at the level of Bacău County. As a conclusion, it can be said that at the present moment there is no demand for exploitation systems of RES at the level of rural areas.

Analyzing the received responses it can be observed again, a poor knowledge of the principles of sustainable development. Although the area has good potential of renewable sources, the local administration did not take firm measures to valorize these resources. Two reasons underlying this situation: lack of information and low budgets of the rural municipalities. Unfortunately, although in the county have implemented certain measures in some villages, these best practice examples are too little known.

The role of RES in the future and the ways to promote them represented a subject that created more optimism among the interviewed people.

Being experienced in this field, the majority of the respondents referred to the impact on the environment and, very importantly, to the costs of energy. “The invoice for energy has an important weight in Romanian families. Any reduction of these costs, thanks to RES, is good” (“Gh. Asachi” University, Iasi). On the other hand, the existence of alternative sources of energy would break the monopoly owned by large companies which are sole energy providers/producers for large areas of the country.

The ways in which RES were proposed to be promoted are varied and demonstrate the concern of the interviewed ones:

- Informing the population with respect to the danger of the degradation of living conditions as a result of environment pollution.
- The involvement of town halls and regional and county public authorities in RES promoting campaigns.
- Fiscal facilities granted by municipalities (subsidies, reduction of building taxes, etc.) (ADL).
- Designing pilot exhibitions to boost and stimulate the RES use (URBIOLED, GE).
- Consultancy services from experts for farmers, young people and local SMEs.
- Promotion campaigns for the growth of energy efficiency, of energy saving and the use of renewable energy.
- Organisation of promoting courses for increasing the awareness of population from rural areas regarding the advantages of RES.
- The educational system could have an important role in the education of young people by including RES among its subjects and by organising interactive optional courses.

The link between the implementation of renewable energy sources exploitation and rural development has been met with favourable appreciation from the majority of respondents. As a first effect, the introduction of RES in rural areas would lead to the growth of the quality of life and, it would also generate an intensification of the economic activities within activities directly connected to their exploitation: service, warehouses, installation works, etc. At the level of local administration, the use of RES would determine, after the amortisation of the installation, smaller energy bills and the possibility of orienting the available budget towards local investments. Also, a series of partners have

discussed that cheaper sources of energy may attract investors and, consequently, the opening of new jobs.

Some concrete ideas concerning the use of RES through the programs of local administration or through individual initiatives, suggested during the discussions are:

- Hydro mills and wind mills.
- Photovoltaic systems for public lighting.
- Solar heating systems for households.
- Solar drying of fruits and cereals.
- Solar refrigeration.
- Cooperative for energy crop cultivation and local processing factories for biofuels.

Other respondents had more outspoken positions, considering that the development of RES would create places to work only from time to time, and, with respect to the possibilities for business, they are also limited, because the developers, who are investors in these areas, prefer to keep control over the business, most of them being foreign investors.

The survey also contained questions about any successful renewable energy source implementations which have determined the development of specific communities. Unfortunately, such successful stories do not exist in Bacău County and for this reason they could not be reported by the people involved in this survey.

Analysing the wide range of answers referring to the connection between RES and rural development, it may be concluded that the incomplete information, the relative lack of trust and the lack of concrete successful cases in this area make this issue appear theoretical rather than real.

Concerning the main actors which could improve the development of the renewable energy in rural areas, the majority of the answers indicated the Local Councils and Bacău County Council. So, the authorities can decide about the use and the implementation of the RES in the communities. The possible role of the NGOs acting on this topic to inform and to act with people from territory was not mentioned.

TRAINING IN RENEWABLE ENERGY FOR RURAL DEVELOPMENT

The educational offer in the area of renewable energy sources was the last subject discussed during the interviews:

Regarding higher education, the respondents indicated specialization connected with RES at university level: Engineering of sustainable rural development, Environmental Engineering and Power Engineering of Faculty of Engineering of “Vasile Alecsandri” University of Bacău. There are similar offers for higher education in other academic centers outside Bacău county, as “Gheorghe Asachi” Technical University of Iasi with the Faculty of Power Engineering and Faculty of Civil Engineering, Department of Engineering Installations - where installing operating systems for RES are studying.

At the level of secondary education, no options were identified. Just one respondent referred to a possible training of Agency for Vocational Educational which should be introduced for the youth and adult qualifications in this field.

The connection between education, renewable energy sources and rural development was indirectly highlighted by several teachers during the interview. It was emphasised that it would be necessary that the curriculum of high school, especially those of the vocational path, is more applied. For example, as in the study of various fundamental disciplines (physics, chemistry, etc) there could be connections

with elements of environmental protection, climate change and renewable energy sources. Another option would be the introduction of optional practical training in the renewable energy use.

Considering these proposals, we can conclude that the offer in the field is poor and the relevant requirements in the area are not met.

COMPETENCES OF RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

Considering important to prioritize the necessary skills that must be formed in renewable energy and rural development, a closed set of questions was sent to interviewees.

The responses received were summarized in the tables below. The first column contains the skills, the second the average score and last column reflects respondents' preferences in terms of importance. Obviously, there are two or more competences which have identical positions.

Table 5-17. Basic competences of renewable energies for rural development. Source: Own elaboration

BASIC COMPETENCES	AVERAGE SCORE	HIERARCHY
1. Capacity for analysis and synthesis	4,25	Position 10
2. Troubleshooting	4,75	Position 4
3. Information management skills	4,37	Position 7
4. Interpersonal Skills	4,19	Position 9
5. Planning and time management	3,88	Position 13
6. Oral and written communication	3,50	Position 14
7. Use of ICT (Information and Communication Technologies)	4,38	Position 7
8. Knowledge of English	4,25	Position 10
9. Knowledge of local language	4,50	Position 6
10. Teamwork	4,81	Position 3
11. Networking (ability to work with different entities)	4,69	Position 5
12. Ability to work in an international context	4,19	Position 11
13. Ability to learn	5,00	Position 1
14. Ability to apply knowledge in practice	4,81	Position 3
15. Ability to adapt to new situations	4,94	Position 2
16. Priority for quality	4,25	Position 8
17. Ability to generate new ideas (creativity)	4,00	Position 12

Table 5-18. Specific competences of renewable energies for rural development. Source: Own elaboration

SPECIFIC COMPETENCES	AVERAGE SCORE	HIERARCHY
1. Know the scientific-technical language and the theoretical foundation of the technologies for the application of renewable energy	4,75	Position 2
2. Ability to research and to develop technologies in the field of renewable energies	4,06	Position 8
3. Be able to evaluate the advantages and disadvantages of the various primary and/or final sources of renewable energy, including hybrid systems	4,56	Position 4
4. Know how to calculate, measure and evaluate small installations for export and/or self-consumption of renewable energy	4,94	Position 1

5. Perform environmental impact studies of the various renewable energy technologies	3,75	Position 12
6. Analyze the environmental problems related to energy and relate them to global warming	3,81	Position 11
7. Analyze the role of energy as a production factor in the economic system	3,88	Position 10
8. Apply legal and tax issues affecting the renewable energy sector	4,31	Position 6
9. Understand the fundamentals of transport and distribution of electricity through the public nets of low and high voltage	3,50	Position 14
10. Know the interconnection systems between public networks and small production and / or consumption plants of electricity from renewable energy sources and current charging systems in the EU	4,00	Position 9
11. Identify the technical characteristics of the reception facilities of electricity in low voltage, consumer devices and its protection systems	4,31	Position 6
12. Analyse the potential for exploitation of energy crops and local processing plants for biofuels	4,13	Position 8
13. To be permanently informed about innovations in the field of bioclimatic architecture	4,00	Position 9
14. To know how to apply the Technical Building Code as far as energy efficiency is concerned	4,38	Position 5
15. Provide ongoing information about innovations in the field of renewable energy for rural development	4,31	Position 6
16. Provide ongoing information about innovations in the field of energy efficiency and savings	4,56	Position 4
17. To know the basics of accounting and financial analysis applied to the renewable energy sector and energy efficiency and savings	3,69	Position 13
18. Promote the automation and monitoring of production processes and / or final energy consumption from renewable energies	4,25	Position 7
19. Understand and relate renewable energy to rural development from a social, economic and environmental perspective	3,81	Position 11
20. Have abilities and specific skills for installation and maintenance of small installations using renewable energy	4,69	Position 3

6. CASE STUDY: HEVES (HUNGARY)

6.1. CONTEXT

6.1.1. DELIMITATION OF THE TERRITORY

The delimitation of the municipalities included in this analysis must be based on a definition of rural areas. This is not easy, and then we will discuss several possible definitions.

One possibility for the delimitation of rural municipalities in the county of Heves would be based on the definition of rural areas of the OECD (2011) because the population density of Heves County is 85 inhabitants / km^2 (HCSO, 2011). This agency considers that rural areas are that ones, where more than 50% of the population live in municipalities with a population density of less than 150 inhabitants / km^2.

Located in Northern Hungary region, Heves County belongs to the smaller counties of Hungary. From the aspect of territorial expansion, it is in the 16th place amongst the counties. It occupies 3,9% of the national territory with only 3.637 square kilometres. In Heves County, 9 cities and 112 administratively independent villages can be found. Seven out of the nine cities are centres of micro-regions. In the northern part of the country, as a continuation of the area of small villages of the neighbouring counties, one can find multitude of small settlements where the population is below 1.000 inhabitants. There is no big city in the region. The most populous cities of the two micro-regions of the area are the centres of the micro-regions: Pétervására has 2.300 inhabitants and Bélapátfalva has 3.100 inhabitants (HCSO, 2014).

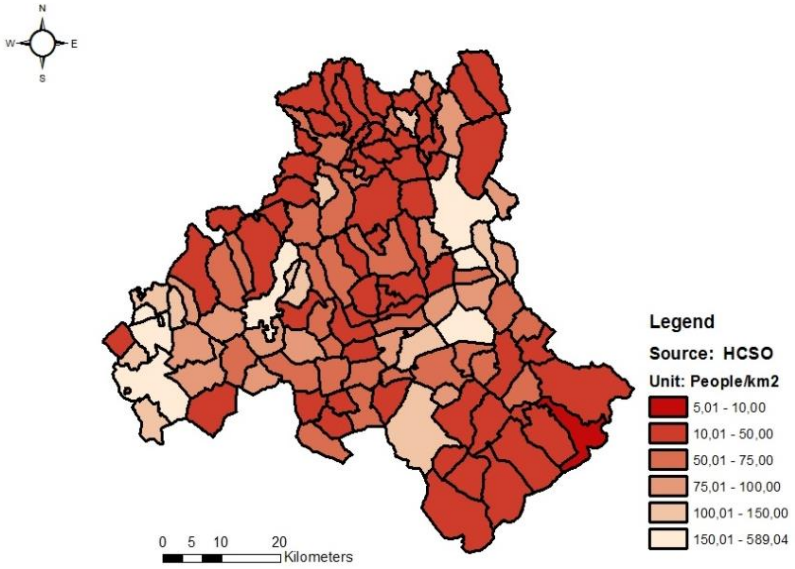


Figure 6-1. Population of Heves county in 2014. Source: HCSO (2014)

In the middle, economically most developed lane of the county, the average size of settlements is considerably higher. The average population of settlements surrounding the three most populous cities (Eger, Gyöngyös and Hatvan) is 2.000 people (above figure). Their development is highly facilitated by the proximity to the major industrial and service centres.

Next table shows that most of the inhabitants live in the Eger micro-region of Heves County, but even here it does not reach the non-rural value for population density specified by OECD.

Table 6-1. Extension, population and population density, relative and absolute, of the territories of reference 2013. Source: HCSO, 2014

	AREA (KM^2)	% OUT OF TOTAL	POPULATION	% OUT OF TOTAL	DENSITY (PEOPLE/KM^2)
Hungary	93.024,42		10.051.837		108,05
Northern Hungary Region	13.429,9		1.213.644		90,36
Heves County	3.637,21	100,00%	309.351	100,00%	85,05
Eger Micro-region	602,05	16,55%	86.454	27,95%	143,59
Other parts of Heves County (Gyöngyös-Hatvan-Heves-Bélapátfalva-Pétervására)	3.035,16	83,45%	222.897	72,05%	73,43

6.1.2. ECONOMIC CONTEXT

Due to the absence of sufficient job opportunities, the population retaining ability and the ability to economically provide for a population is small. The proportion of elderly population is high. Amongst the working age population, the unemployment is significant. The supply of public utilities is unfavourable. The majority of micro-enterprises is engaged in forestry and wood processing activities. The largest number of employees are seasonally employed by the municipalities in the framework of municipal public work programmes.

The GDP expresses the economic development in a complex way and reflects the existing differences in performance between certain areas of the country. According to this indicator, the region of Northern Hungary has been more and more developed compared to other regions, which made the regional differences more stressful (following tables).

Table 6-2. GDP data Hungary. Source: Eurostat (n.d.)

YEAR 2013	NATIONAL GDP (M€)	GDP PER CAPITA (€/PERSON)
Hungary	100.536	10.146

Table 6-3. Economical contribution to the national GDP, year 2011. Source: Eurostat (n.d.)

YEAR 2011	NATIONAL GDP (%)
Northern Hungary Region HU31 (Hungary)	7,09

The economic performance of Heves County is well characterised by the fact that out of Hungary's gross domestic product (GDP), the proportion of the county is more or less similar to the previous years, but the amount has been decreasing, which is less than the importance of the population of Hungary (above figure). According to the data of Hungarian Central Statistics Office (HCSO) in 2013, Heves County has 3,1 percent of Hungary's population and 2,85 percent of the labour force. By them 576 billion Hungarian Forint (HUF) gross domestic product (GDP) was produced in 2012 in Heves county, which is 2,05 percent of the national performance. Both the share and the volume of the

produced GDP has been declining since 2008. However, in relation to GDP per capita, one can found an improving trend. In 2008, a decrease occurred, but then it returned to the level of 2008 in 2012. (HCCC, 2014)

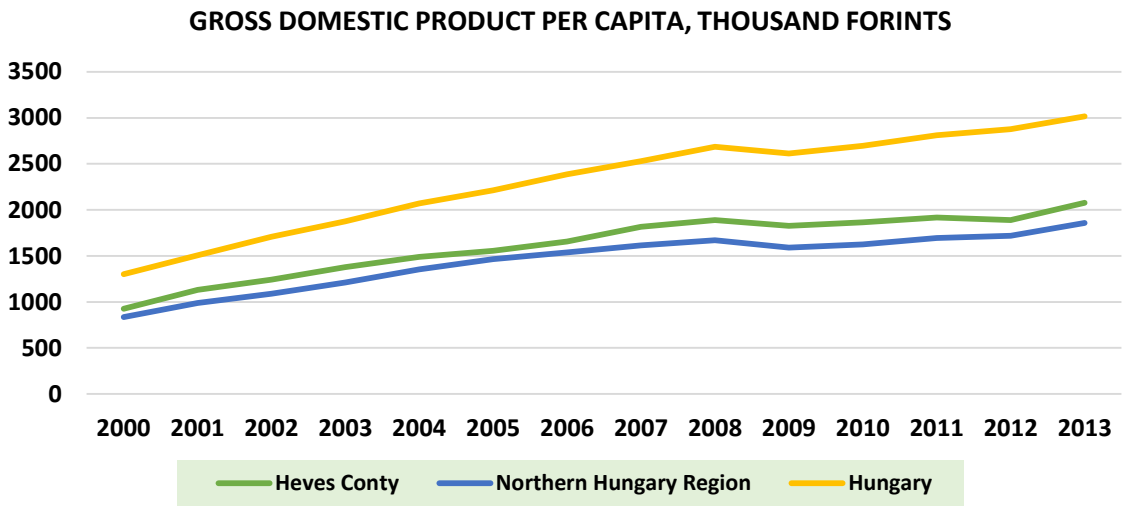


Figure 6-2. Gross domestic product per capita, thousand Forint. Source: HCSO (2014)

It is worth to compare the GDP to the percent of the national average. GDP per capita as a percentage of the national average shows the performance of a county compared to other ones. Thus, one can see the performance of Heves County is lagging behind the national average, but not significantly (next figure).

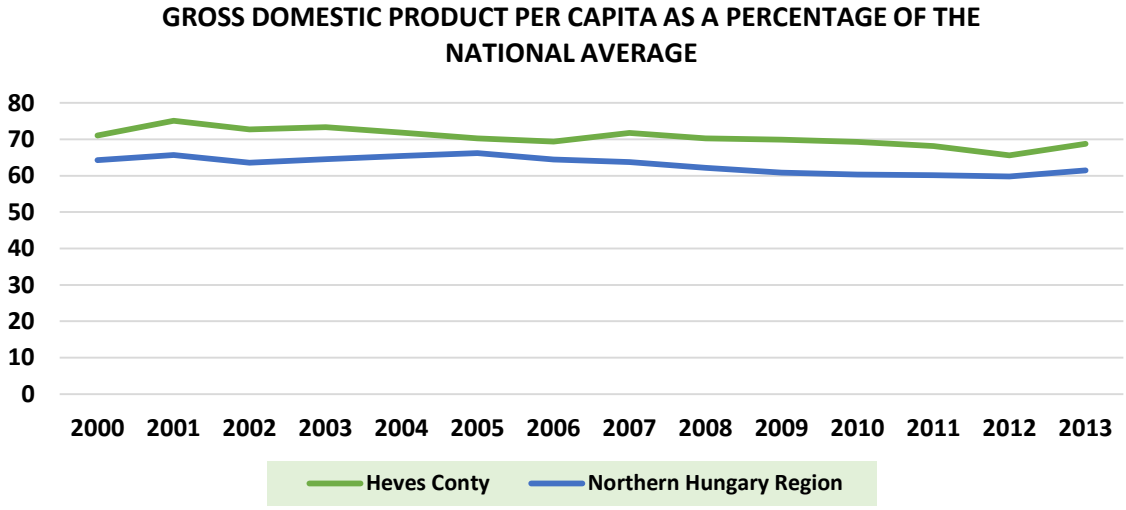


Figure6-3. Gross domestic product per capita as a percentage of the national average. Source: HCSO (2014)

The economic figures are expressed by added value, which is calculated from the data of corporation tax reports, since it does not include the accumulation of material and material-related costs (gross value added, at basic price: + output (at basic price) - intermediate consumption (at market price).

6.1.3. GEOGRAPHICAL AND DEMOGRAPHIC CONTEXT

Heves County lies in northern Hungary. It is located between the right bank of the River Tisza and the Mátra and Bükk Mountains. It shares borders with the Hungarian counties Pest, Nógrád, Borsod-Abaúj-Zemplén and Jász-Nagykun-Szolnok. Eger is the county seat. Heves County is a geographically diverse area; its northern part is mountainous (the Mátra and Bükk are the two highest mountain ranges in Hungary), while at south it includes a part of the Great Hungarian Plain. From south it is bordered by Lake Tisza, the largest artificial lake in Hungary (above figure).

Heves County has an extension that reaches 3.637,21 km^2 which is 3,9% of the Hungary total, and 27,08% of the Northern Hungary region (HCSO, 2014).

The Heves County has a population of 309.351 inhabitants, which represents the 25.49% of the population of the Northern Hungary (Észak-Magyarország) region, of which it is a part of, and the 3,07% of the Hungarian population.

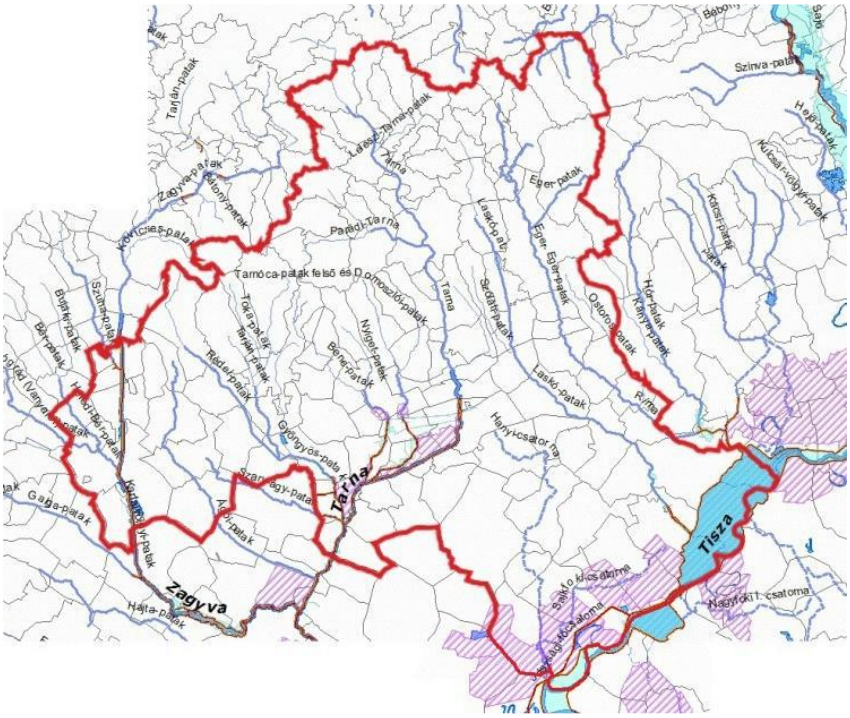


Figure 6-4. The location of Heves county. Source: HCSO (2014)

6.1.4. SOCIO-ECONOMIC DIAGNOSIS OF TERRITORY

In this section the socio-economic dimension of the territory is analysed, from the structure of the population and training, to the production structure (enterprises, economic activities and the labour market), infrastructure and equipment.

STRUCTURE OF THE POPULATION

The next figure shows how the population of Hungary, the region of Northern Hungary and Heves County was changing. A slight decrease can be observed in the flowchart.

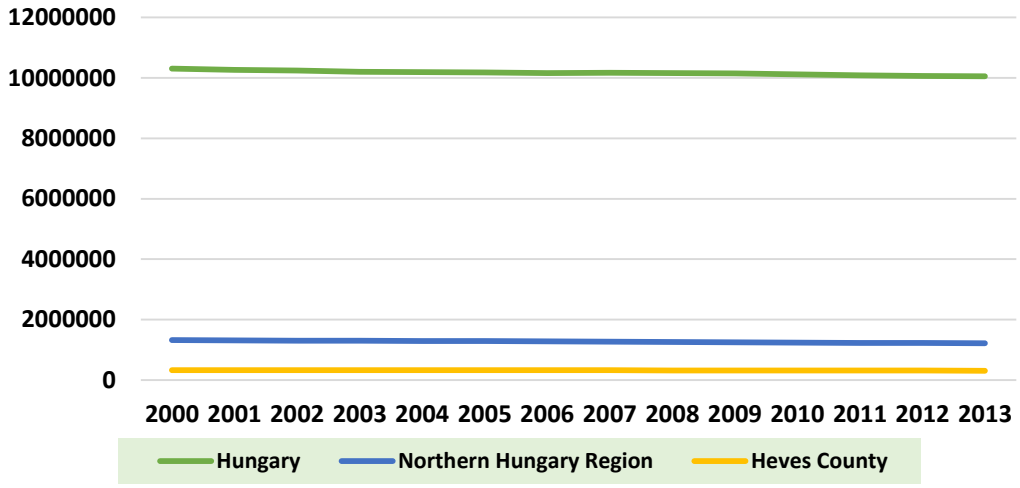
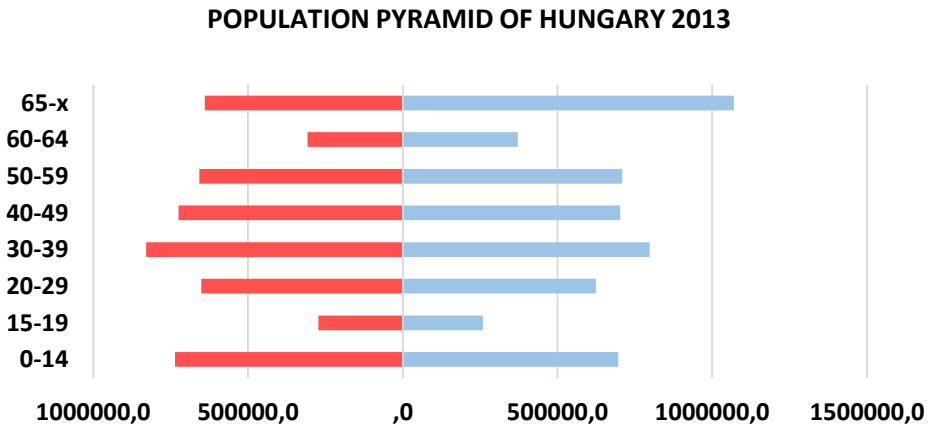
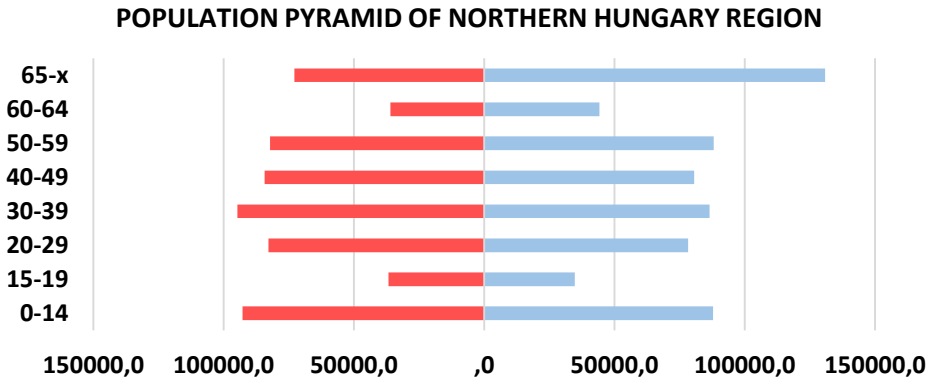


Figure 6-5. The dynamics of population of Hungary, Northern Hungary region and Heves County. Source: HCSO (2014)





The above figure shows the distribution by sex and age of the population of Hungary, the Northern Hungary region and Heves County in the year of 2013 based on the data of the Hungarian Central Statistical Office (2014).

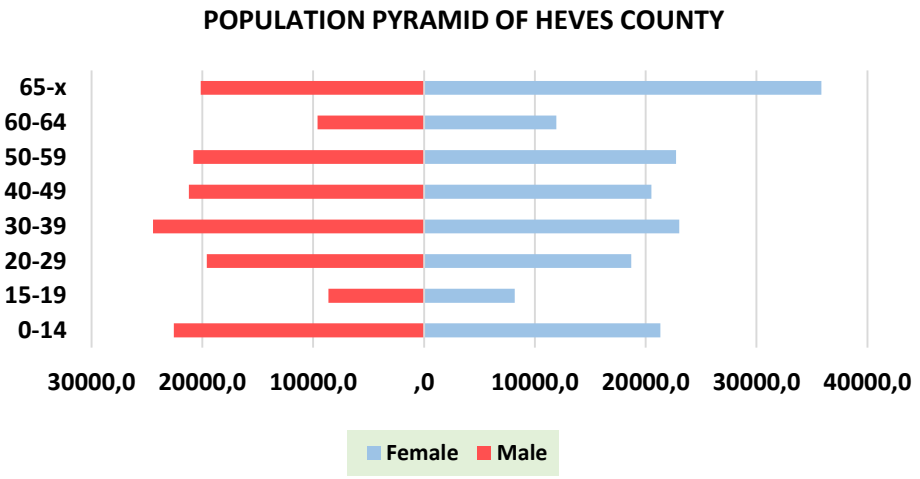


Figure 6-6. Population pyramid of Hungary, Northern Hungary region and Heves County in 2013. Source: HCSO (2014)

As you can see, the age pyramid shows a very similar trend. The young people in the Heves County are the same amount of numbers like 30-39's age group. It is also observed the aging society, as there are a greater number of older people than young people.

Training of the population

The following table shows the level of education of the population in the different analysed territories. It has been grouped by the level of education in the population between 24-64 years.

Table 6-4. Population between 24-64 years by educational attainment level. Source: Eurostat (2014)

AGE	SCOPE	LESS THAN SECONDARY EDUCATION (%)	SECONDARY EDUCATION (%)	HIGHER EDUCATION (%)
25 - 64 years	Hungary	16,90	59,70	23,40
	Northern Hungary	21,30	61,60	17,10

It is clearly observed that the training levels are unfavourable in case of Northern Hungary (including Heves County) compared with the national average. Especially in case of Higher Education lags behind the Northern Hungary region (Table 6-4).

PRODUCTION STRUCTURE

The number of companies in a territory and its size show interesting information on the economic dynamics of the region. In this section the production structure of the territories concerned is discussed. In particular data on the number of businesses as well as size, number of workers or economic activities they develop are presented.

The following tables show the role of Heves County with respect to the registered enterprises at a regional and national comparison level.

We can observe that the number of companies has increased in the period under review all of the territories (next table).

Table 6-5. Number of companies and variation before the crisis. Source: HCSO (n.d.)

	2008	2013	VARIATION (%)
Hungary	1.561.446	1.688.169	8,11
Northern Hungary Region	138.111	145.777	5,55
Heves County	44.672	47.789	6,97

It can be observed that the number of small and medium-sized enterprises is significantly higher compared to other sized businesses (next table). In all three cases, the number of small enterprises is significant. Heves County has one of the highest rates with 71,53 %.

Table 6-6. Number and percentage of companies depending on the size in 2013. Source: HCSO (n.d.).

	HUNGARY	(%)	NORTHERN HUNGARY REGION	(%)	HEVES COUNTY	(%)
0 people	51.7024	30,63%	39.957	27,41%	12.751	26,68%
1-9 people	1.134.336	67,19%	103.131	70,75%	34.187	71,53%
10-19 people	21.221	1,26%	1.530	1,05%	484	1,01%
20-49 people	10.005	0,59%	731	0,50%	241	0,50%
50-249 people	4.703	0,28%	366	0,25%	106	0,22%
>250 people	880	0,05%	62	0,04%	20	0,04%
Total	1.688.169	100,00%	145.777	100,00%	47.789	100,00%

Economic activities

This section shows the importance of economic activities in the various territories considered in this study.

Table 6-7. Contribution of the economic sectors to GDP in 2013. Source: HCSO (2014)

	HUNGARY (%)	NORTHERN HUNGARY REGION (%)	HEVES COUNTY (%)
Agriculture	3,84	5,03	5,21
Industry	8,07	8,70	21,61
Constructions	8,51	9,19	10,06
Services	79,58	77,08	63,12
Total	100,00	100	100,00

We can see that the service sector is the main key sector in Hungary as well as in the Northern Hungary region and Heves county. At present, agriculture is the least preferred sector. Compared with the data

of Hungary and the Northern Hungary region, Heves county is in unfavourable situation. While agriculture plays as important role as in the country and the region, industry (including construction) is overrepresented but the share of services is lower than in the country and the region (table above).

According to the Heves County Spatial Development Program 2014-2020 (HCSDP 2014-2020) the distribution of employment by economic activity in Heves Conty is the following (next table):

Table 6-8. Distribution of employment by economic activity in Heves 2013. Source: HCSDP 2014-2020 (n.d.).

	HEVES COUNTY 2013 (%)
Agriculture	5,45
Industry	26,65
Construction	14,30
Services	53,60

LABOUR MARKET

Activity rate: Proportion of population of working age (usually over 16 years old) working or actively seeking employment. This indicator gives an idea of the dynamics of the labour force available in a territory.

Employment rate: Proportion of the working-age population that has a job. It therefore is a direct indicator of employment.

Unemployment rate: Proportion of the labour force that doesn't work. So in this case unemployment is related to the workforce, not with the total population in working age. The collectives of students, people who are dedicated to the tasks of home or family care or other conditions of inactivity are not considered for this calculation.

The next table shows the quarterly data of the Labour Force Survey, since this is the most important statistical source for labour market data.

Table 6-9. Comparison of the rate of unemployment in Hungary, Northern Hungary region and Heves County in the first quarters of 2007, 2009 and 2015. Source: HCSO (n.d.)

	2007 1Q (%)	2009 1Q (%)	2015 1Q (%)	Variation 2007-2015 (%)
Hungary	7,5	9,8	7,8	4
Northern Hungary region	11,9	15,7	10,8	-9,24
Heves County	11,8	13,2	9,5	-19,49%

Table 6-10. Unemployment number by age, Northern Hungary region and Heves County, 2013. Source: HCSO (n.d.)

	NORTHERN HUNGARY REGION (PEOPLE)	%	HEVES COUNTY (PEOPLE)	%
0-18 years	902	1,22%	150	1,07%
19-20 years	2.909	3,93%	518	3,70%
21-25 years	10.302	13,92%	1.814	12,95%
26-30 years	8.558	11,56%	1.614	11,52%
31-35 years	8.178	11,05%	1.651	11,78%
36-40 years	9.107	12,31%	1.832	13,07%
41-45 years	8.509	11,50%	1.553	11,08%
46-50 years	8.178	11,05%	1.457	10,40%
51-55 years	8.357	11,29%	1.621	11,57%
56-60 years	8.098	10,94%	1.589	11,34%
61-X years	910	1,23%	214	1,53%
Total	74.008	100,00%	14.013	100,00%

The economic crisis brought a sensible change regarding unemployment rate (above tables). In the first quarter of 2009 the unemployment rate increased at every level (national, regional and county level). However, due to the employment policy of Hungary, the unemployment rate substantially decreased in Heves County in the first quarter of 2015. And what is more, compared to the state of 2007, it showed a declining value. By comparing the age groups, numerically the majority of the unemployed people can be found in the age group of 21-25 years old both in regional and national context. Furthermore, the age group of 36-40 years old can be highlighted since their number is the second highest in the table.

Table 6-11. Ratio of unemployment by level of education in Northern Hungary region and Heves County. Source: HCSO (2014)

	NORTHERN HUNGARY (%)	HEVES COUNTY (%)
TOTAL	7,8	9,5
Less than Secondary Education	69,00	70,12
Secondary Education	23,00	22,60
Higher Education	8,00	6,70

The previous tables showed that the unemployment is higher when the level of studies is lower. Also the number of primary school graduates registered jobseekers are highest in the county (above table).

INFRASTRUCTURE AND EQUIPMENT

The county's share of national road network is 4,1% exceeding its spatial weight (3,9%). Its length is 12.271 km, of which 6% is motorway and highway, and about 7% is primary route. The micro-regions of Heves, Bélapátfalva and Pétervására are only crossed by secondary routes. Within the road network, the M3 motorway crossing the central axis of the county has a significant importance. On the one hand, it provides a very favourable connection with capital (the county seat can be reached in one and a half hour), on the other hand it provides faster connection with the north-eastern and eastern cities of the country (Miskolc, Debrecen, Nyíregyháza) (HCSDP 2014-2020).

The availability of the settlements located in the northern and southern parts of the county is less favourable. In the case of the northern, small villages, generally the quality of the roads is inadequate, while in the south, typically approaching to the region of Lake Tisza, the lack of surface efficiency is present. The surface efficiency amongst the north-south axis is completely imperfect. The county's relation towards the counties of the Great Hungarian Plain and in the direction of Slovakia is limited, it is possible by using multi-digit roads. The quality of the road network in many places (especially in the northern and southern parts of the country) is below the desirable level, most of the roads need renovation and has bad condition.

6.2. RENEWABLE ENERGIES AND DEVELOPMENT

Renewable energies seem to be popular in recent years in science, public policy and in common opinion as well. EU and national goals aiming to decrease greenhouse gas emission triggered investments in these energy resources in many areas of the society and economy.

6.2.1. CURRENT ENERGY SITUATION

In Hungary the gross inland consumption in 2013 was 22,74 MTOE, which exceeds the final energy consumption (next table). The gross inland consumption in the country shared by the different enegy sources shows that just below 40% came from nuclear energy, 20-25% from natural gas an coal while renewable energy accounts for 13,3%. Northern Hungary region makes up a quite large part of it.

Table 6-12. Different data of the inland consumption in Hungary and in the Northern Hungarian Region in 2013
Source: Eurostat (n.d.).

YEAR 2013	GROSS INLAND CONSUMPTION (MTOE) 2013	FINAL ENERGY CONSUMPTION (MTOE) 2013
Hungary	22,74	14,75
Northern Hungarian Region	4,12	6,8

YEAR 2013	GROSS INLAND CONSUMPTION (%) HUNGARY
Coal	10,3
Gas	34,0
Nuclear	17,5
Petroleum	25,3
Renewable	8,3

YEAR 2013	FINAL ENERGY CONSUMPTION (%) HUNGARY	FINAL ENERGY CONSUMPTION (%) HEVES COUNTY
Industry	26,10	9
Transport	21,25	17
Agriculture	3,43	11
Services	16,45	12
Residential	32,69	51

Regarding the use of **renewable energy sources** in electricity sector overall (including also the above mentioned producers receiving Feed-in Trade System (FiT) support), the non-co-fired (clean) biomass, solar energy and utilization of biodegradable municipal waste increased significantly in 2013, considering both installed capacity and electricity production.

Renewable energy-based electricity sales in the framework of FiT from the 1,861.56 GWh of 2012, by minimally increasing (0.03%), has risen to 1,862.15 GWh to 2013. The largest decrease occurred in the case of coal and biomass co-fired power plants (approximately the sales dropped by half) and wind power plants. In the case of the aforementioned one the expiry of FiT entitlements, in the case of the latter the less favourable wind conditions of the last year are considered to be root causes. However, this decrease was offset by the growth of clean biomass firing (by more than 20%), primarily by the new power plant in Pécs of the Pannon-Hő Kft. In addition to that, the production of landfill gas power plants, particularly the production of solar power plants, has also increased, but overall they do not have a substantial role. The production of coal and biomass co-fired power plants has dropped due to the expiry of FiT quotas (although from 2014 the reversal of this trend is expected since these plants were returned to the framework of FiT during 2013), and because of weather reasons less green electricity was produced from wind and water energy. Nevertheless, the overall renewable electricity production has grown by 3,69%, so compared to 2,728 GWh in 2012 it reached 2,828 GWh in 2013 (next table).

Table 6-13. The share of renewable energy in Hungary from 2005 to 2013. Source: Eurostat (n.d.)

SHARE OF RENEWABLE ENERGY IN TRANSPORT									
RES_transport (%) Hungary	2005	2006	2007	2008	2009	2010	2011	2012	2013
	0,4	0,6	1,0	4,0	4,2	4,7	5,0	4,6	5,3
SHARE OF RENEWABLE ENERGY IN HEATING AND COOLING									
RES_heating & cooling (%) Hungary	2005	2006	2007	2008	2009	2010	2011	2012	2013
	6,0	7,5	8,9	8,3	10,5	11,0	12,3	13,4	13,5
SHARE OF RENEWABLE ENERGY IN ELECTRICITY									
RES_electricity (%) Hungary	2005	2006	2007	2008	2009	2010	2011	2012	2013
	4,4	3,5	4,2	5,3	7,0	7,1	6,4	6,1	6,6
SHARE OF RENEWABLE ENERGY IN GROSS FINAL ENERGY CONSUMPTION									
Share of RES in energy consumption (%) Hungary	2005	2006	2007	2008	2009	2010	2011	2012	2013
	4,5	5,1	5,9	6,5	8,0	8,6	9,1	9,5	9,8

As can be seen in the following figure, in 2013, the most significant share of renewable electricity production was put out by clear biomass-based production (30%). The second place was taken by wind energy-based production (25%), but the co-firing still represented a significant share (22%). The energy produced from the biodegradable part of municipal waste increased after a decline in 2012 (its share was 5% in the green electricity production in 2013). The increase of it was caused by the waste firing of Mátra Erőmű, which is eligible as a renewable form of energy (HEPURA, 2014).

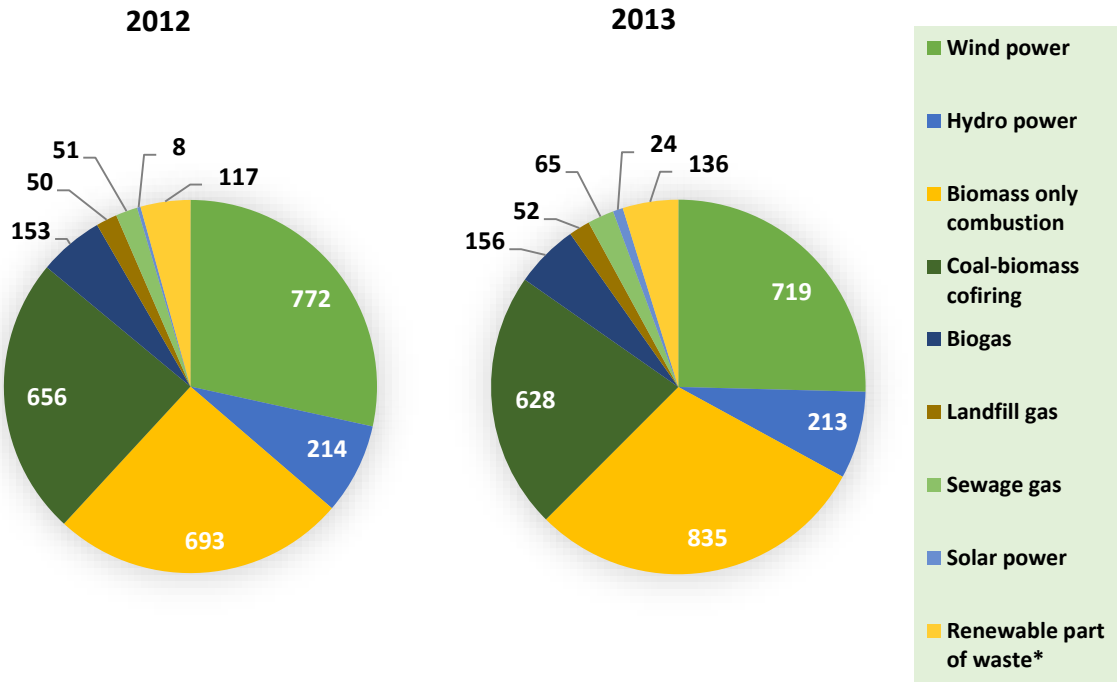


Figure 6-7. Renewable energy electricity production mix (GWh and rate). Source: HEPURA (2014)

The next table shows the Hungarian renewable energy divided by sources of energy and its change.

Table 6-14. Hungarian renewable energy divided by sources of energy. Source: HEPURA (2014)

POWER SOLD INTO THE FIT SYSTEM,	GWH 2013	GWH 2014	CHANGE (GWH)	CHANGE (%)
Wind power	687,12	623,64	-63,48	-9,24%
Hydro power	204,15	289,93	85,78	42,02%
Biomass only combustion	728,09	727,27	-0,82	-0,11%
Coal-biomass co-firing	74,50	561,76	487,26	654,04%
Biogas	118,25	128,60	10,36	8,76%
Landfill gas	47,71	54,23	6,52	13,67%
Sewage gas	0,98	0,00005	-0,98	-99,99%

Solar power	1,36	6,81	5,45	401,41%
Total renewable in FiT*:	**1.862,15**	**2.392,23**	**530,08**	**28,47%**
Waste	5,27	6,69	1,42	26,91%
Other fuel**	0,72	12,62	11,90	1.650,68%
Total (renewable, waste and other fuel):	**1.868,14**	**2411,54**	**543,40**	**29,09%**

** Does not contain biodegradable part of communal waste as there was no such power production selling into the FiT system in 2013 and 2014.*

*** Not renewable and not waste resources combusted in plants which use, among others, renewable or waste resources.*

In spatial context, the highest energy consumption is observed in the plain land areas of the county, i.e. in the micro-regions of Heves and Füzesabony while at the mountainous areas with more forest cover, and especially in the Micro-region of Eger, is significantly lower (next table).

According to the data of the Hungarian Central Statistical Office (HCSO), the energy consumption per capita value for the County of Heves is, compared to the national average, continuously increasing.

Table 6-15. The average energy consumption per one household per sub-region (kWh).
Source: HCSO (n.d.)

MICRO-REGION	KWH/HOUSEHOLD
Eger	1.824,1
Bélapátfalva	2.573
Füzesabony	2.699,1
Gyöngyös	2.358,5
Hatvan	2.579,4
Heves	2.669,2
Pétervására	2.537,7
The County of Heves average	2.337,9

Figure 6-8. The location of power plants in Hungary. Source: Sztaki (n.d.).

To meet the above-mentioned demands, electricity taken from the national grid is used. Power plants and electricity supplier companies in Hungary are mostly under private ownership. The domestic energy production units and the grid are illustrated by the figures above.

As well indicated, supply for the county is provided from the national grid, as none of the power plants generates electricity for regional supply. This fact forecasts or even actualises the establishment of several small-scale power plants and furnaces supplying the region's residents, the local markets by cheaper energy or electricity.

6.2.2. DEVELOPMENT OF RENEWABLE ENERGIES

The contribution of renewable energies to the energy system in Hungary has been increasing since 2007. As shown in the next table, in 2013 the share of RES in electricity was 6.6% and the share of renewable energy in gross final energy consumption was 9.8%.

To reach to objective of Hungarian National Renewable Energy Action Plan (HNREAP) (declared to the European Union the share of renewable energy within the electricity sector shall be 14,65% by 2020), 5.597 GWh of renewable production would be necessary in 2020 (which is 10,9% of the total planned gross final electricity consumption) (next figure). By 2013, more than the half of this objective has been accomplished (i.e. 2.820 GWh), which is 6,68% in the share of total gross final electricity consumption in 2013 (in 2012 the share was 6,29%).

In 2013, the main contributor to the gross inland consumption of renewable energy (next table) was biomass and renewable waste (just below 90%). The second source of renewable energy consumption was geothermal (6%) and the third wind in Hungary.

Table 6-16. National distribution of renewable energy consumption by source. Source: Eurostat (n.d.)

YEAR 2013	Consumption of RES (kTOE) 2005	Consumption of RES (kTOE) 2013	% of RES 2005	% of RES 2013
Hungary	1.189,1	1.888,6	4,5%	9,8%

YEAR 2013	RES consumption (%) HUNGARY
Hydro power	0,98
Wind power	3,31
Solar Thermal	0,32
Solar photovoltaic	0,11
Biomass and renewable waste	89,22
Geothermal energy	6,05

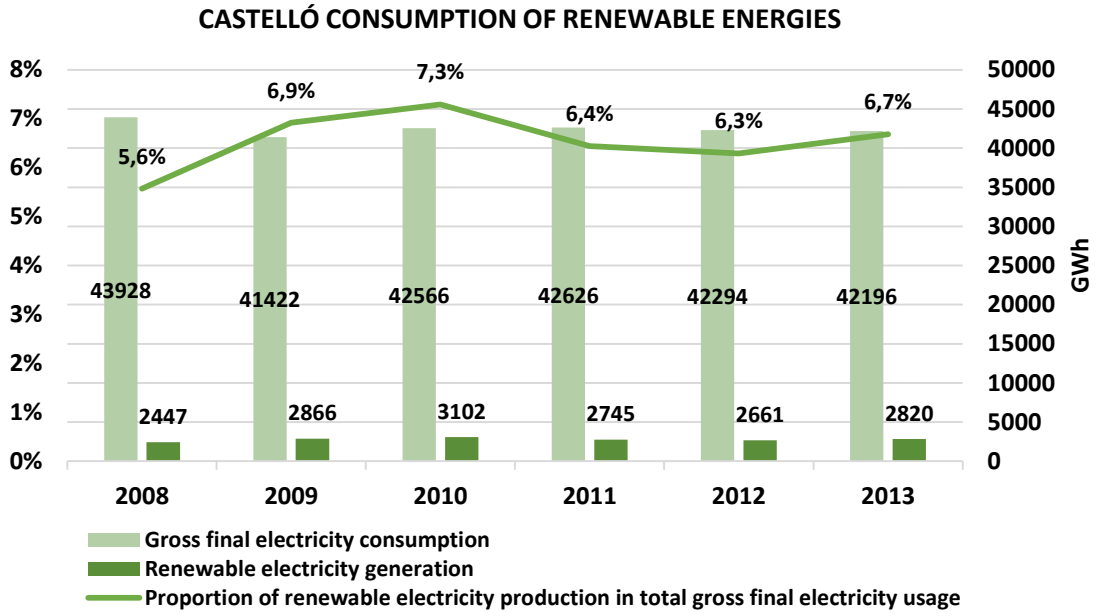


Figure 6-9.The amount of normalised renewable-based electricity production, gross final electricity consumption and the share of renewable energy within, between 2008 and 2013. (Dark Green - Renewable electricity generation (normalised); Light Green - Gross final electricity consumption; Medium Green - The proportion of renewable electricity production in total gross final electricity usage). Source: HEPURA (n.d.)

6.2.3. RENEWABLE ENERGY TARGETS AND TRAJECTORIES

The Renewable Energy Development of the European Parliament and the Council specified a legally binding obligation for Hungary to ensure a 13 percent minimum share of renewable energy in gross final energy consumption by 2020. Taking into account the importance of green economy development to the national economy, its effects on employment (the creation of at least 150–200 thousand jobs, including 70 thousand in the energy sector) (HEPURA, 2014), and its designated role in domestic value creation, the present document sets out, in accordance with national interests, the achievement of a realistic target of 14,65 percent by 2020, exceeding the obligatory minimum target.

As for the trajectory of RES in Hungary we can see that the importance of renewable energy has risen in case of the share from transport, heating and cooling and cross final energy consumption, however the share of RES in electricity declined from 2009 (next figure).

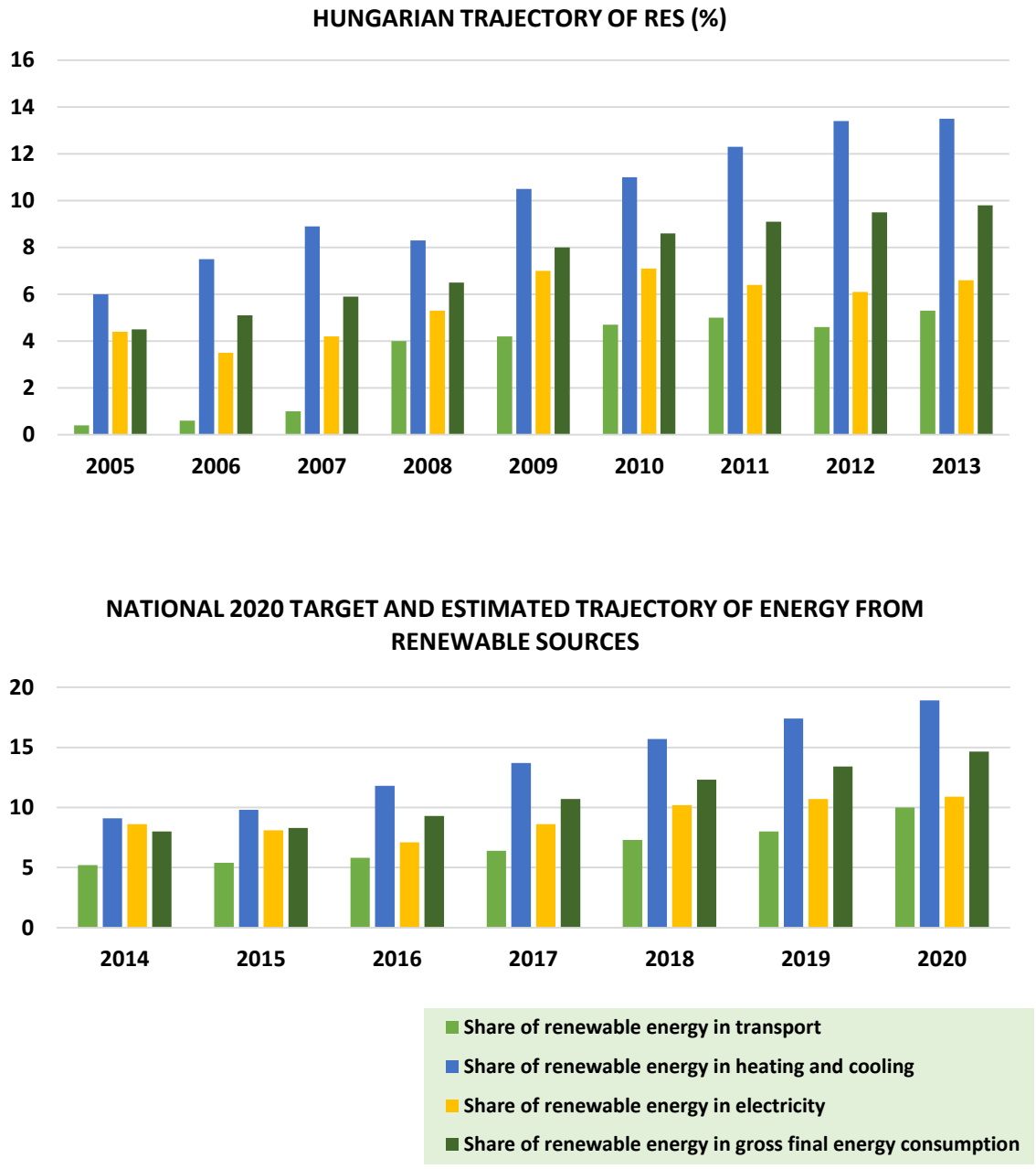


Figure 6-10. Current and estimated Hungarian trajectory of RES. Source: HEPURA (n.d.).

The Government's intention with this target is to emphasise once again, in accordance with the above, that it considers the production and utilisation of renewable energy sources one of the breakthrough directions for economic development.

Accordingly, the measures of the present National Action Plan concern the following public tasks:

- The drafting of a new act on sustainable energy management in 2011;

- Restructuring of the implementation of existing aid schemes and making it more efficient and more simple;
- Launching an independent energy support scheme (co-financed by the EU) between 2014 and 2020;
- A comprehensive adaptation of the mandatory off-take scheme for renewable electricity (hereinafter referred to as green electricity) (the relevant amendment of Act LXXXVI of 2007 on Electricity is currently being submitted for administrative consultations);
- Examination of the possibilities for subsidising green heat;
- Facilitating a more active participation in direct Community support and other support schemes;
- Review of the incentives incorporated into energy regulations for buildings (in accordance with Directive 2010/31/EC);
- Review of spatial plans, creation of regional energy concepts;
- Establishment of green forms and programmes of financing (green bank);
- Review and simplification of regulatory and authorisation systems and procedures;
- Drafting of awareness-raising programmes and information campaigns (integrated information programmes);
- Launching educational and training programmes based on renewable and alternative energy sources and energy efficiency;
- Launching employment programmes in the field of renewable energy sources;
- Launching development programmes for the purpose of developing the related industries;
- Encouraging research and development and innovation incentive programmes;
- Programmes and measures for spreading second generation bio- and alternative fuels;
- Drafting of an agricultural energy programme;
- Preparation of the administrative staff taking part in regulatory and authorisation procedures in relation to renewable energy and related fields.

The aim of the National Action Plan is to provide the greatest possible benefit to the entire society by drawing on Hungary's natural, economic, social, cultural and geopolitical assets. The main objective of the utilisation of renewable and alternative energy is to reduce dependency on gas and crude oil imports.

The objectives of Heves County between 2014 and 2020 are:

1. PRIORITY: The County's key industrial sectors of developing the business environment

1.1. MEASURE: Energy restructuring in order to reduce dependence on energy imports to climate protection and to createa stable energy management

One of the basic conditions of competitiveness is to improve the energy efficiency of the corporate sector (which coincides with the shifting to an environmentally friendly, resource-efficient, low-carbon economy). In addition to that, by increasing energy efficiency, energy costs of the economic sphere reduce as well, which improves the competitiveness of products and services. Improving competitiveness may contribute to the increase of export revenues. Furthermore, by the reduction of imported energy usage, the trade balance is getting into a more preferable state. From the aspect of solar, geothermal and biomass energy, Heves County has a significant untapped potential, therefore the absolute increase of use and share of renewable energies are both having exceptional importance. The Hungarian commitments concerning the topic are the following: the share of renewable energy sources shall increase to 14,65%, commitment of 10% total energy savings, the emission of greenhouse gases shall not increase by more than 10% percent compared to the level of 2005 in sectors which are not covered by the European Emissions Trading Scheme (EU ETS). The joint goals of the objectives are economic growth, efficient use of energy sources and the separation of the related environmental impacts. The aim of the measure is to promote the spread of renewable energies taking out fossil fuels and to support green economic developments to increase energy efficiency.

2. PRIORITY: Local risk based sustainable tourism development

2.1. MEASURE: Support of enterprises aiming developments of renewable energy utilization and energy efficiency improvement

The use of renewable energy is below the EU average, therefore, to increase the use of renewable energy and energy efficiency are matters of high importance for Hungary, and for Heves County, too. The primary goal of the utilization of renewable and alternative energy is to reduce the dependency on gas and oil imports. A more efficient utilization of the characteristics of the area can have a positive impact on economic development, basic services, and equal access to infrastructure and public goods, and on the conservation of natural and cultural treasures. In order to avoid depletion of fossil fuels, the sustainable environmental, economic and social development requires new, alternative and renewable energy to supply our needs. Renewable energy sources extensively contribute to the achievement of the objectives of the national economy (creating jobs, increasing GDP, security of supply, etc.), therefore it is a strategic goal to increase their utilization until the limit of possibilities. By the framework of this measure, we are intended to support the development plans of economic entities, where the installation of renewable energy and the use of renewable energy is related to the production.

Beneficiaries: Enterprises
Districts concerned: Eger, Füzesabony, Heves, Bélapátfalva, Gyöngyös, Hatvan and Pétervására

2.2. MEASURE: Establishment of small-scale power plants providing local energy supply

In the framework of this measure, we are intended to support the establishment of small-scale power plants that are able to provide energy to the local institutions. Based on the local renewable energy sources (solar power, wind power plant, biomass power plant, geothermal power plant), the objective is to support the establishment of small-scale power plants, by which the energy supply of the given settlement's municipal institutions is possible.

Beneficiaries: municipality and enterprises where the controlling owner is the municipality
Districts concerned: Eger, Füzesabony, Heves, Bélapátfalva, Gyöngyös, Hatvan and Pétervására

2.3. MEASURE: Creating stable energy base, supporting energy restructuring

In accordance with the Hungarian National Energy Strategy 2030 the aim is to create a stable power base in Heves County as well. To this end, the development of economic extraction of the county's fossil fuels and the county's determining developments of energy production are to be supported. Creating energy stability is a national interest. The reduction of energy imports and the extraction of Hungarian energy sources contribute to the stable energy base of Hungary, and by that contribute to the stable energy base of Heves County as well.

Beneficiaries: Enterprises and municipalities
Districts concerned: Gyöngyös, Eger and Heves

6.2.4. EMPLOYMENT AND RENEWABLE ENERGY

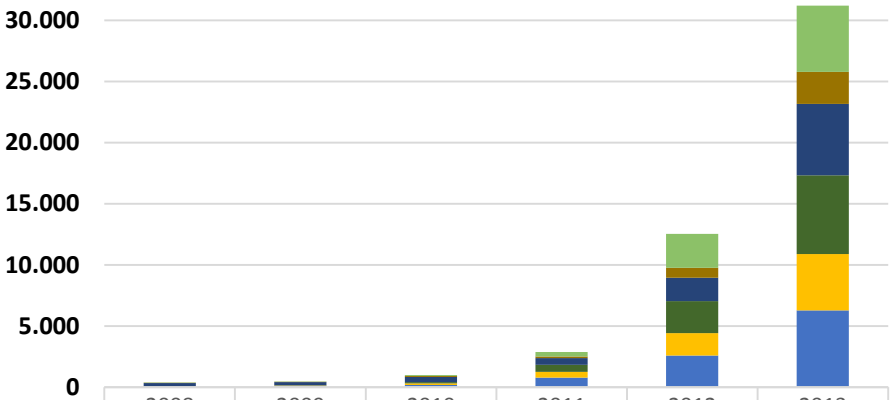
Direct sectoral employment data is not present in the renewable energy sector. The residential-scale energy use, which includes the industrial activities of small enterprises, is sold and regenerated to the grid by the main energy providers.

The impact in employment related to RES is quite low in Hungary (17.285). The most important RES sectors for employment are solid biomass and wind power in Hungary (next table).

Table 6-17. National employment related to RES. Source: Hungarian Central Statistics Office (n.d.)

YEAR 2012	Employment HUNGARY
Wind power	5.000
Solid biomass	10.410
Photovoltaic	<50
Biofuel	925
Solar Thermal	200
Small hydropower	450
Renewable urban waste	n.a.
Biogas	<50
Geothermal	200
TOTAL EMPLOYMENT	**17.285**

The below figure clearly shows that in the recent years, the demand for renewable energy has increased significantly, for which the assistance through tenders and the willingness to invest has had a significant contribution.



	2008	2009	2010	2011	2012	2013
EDF-DÉMÁSZ	10	24	97	375	2 761	5 421
ÉMÁSZ	19	39	72	149	810	2 624
ELMŰ	282	245	418	535	1 919	5 844
E.ON Tiszántúl (East Hungary)	11	49	92	567	2 619	6 426
E.ON South-Transdanubia	20	39	142	495	1 841	4 620
E.ON North-Transdanubia	21	71	170	762	2 575	6 275

Figure 6-11 Total installed capacity of household sized power plants in different DSO operation areas. Source: HEPURA (n.d.)

Hungary's Renewable Energy Utilisation Action Plan set many comments between renewable energy and employment. Some of these comments are the following:

- Job creation and the preservation of jobs will have an impact primarily in agriculture and in rural areas; the collection of biomass and energy crop farming can offer employment for a significant number of unskilled workers.

- Surpluses in the green industry, environmental industry, agriculture, rural development, the SME sector and employment can be promoted through the utilisation of renewable energy sources

- Collecting logging waste is labour-intensive and can therefore provide seasonal employment locally at smaller rural settlements.

- The areas and means of green employment are the following:

    - The launch of a complex programme for the combination of the energy modernisation of buildings and renewable energy sources;
    - Employment support for newly founded green enterprises or enterprises that have become green by changing their activities;
    - Support for the creation of jobs related to green investments;
    - The launch of a green public employment programme;
    - Support for jobs created within the framework of and as a result of the establishment of an energy consultancy and mentoring network

6.2.5. RENEWABLE ENERGY LEGISLATION

Hungary supports renewable and waste-to-energy production in order to contribute to climate protection, diversify energy resources, improve energy efficiency, reduce energy import dependency and benefit from local economic development (e.g. creation of green jobs and rural development).

Operational support for renewable and waste based electricity production is granted in the framework of the feed-in tariff system ("FiT") which guarantees feed-in tariffs higher than the actual market price. Detailed rules of the feed-in tariff system can be found in the following regulations:

- Act LXXXVI of 2007 on Electricity (Electricity Act)

- Government Decree No. 389/2007 (XII. 23.) on the feed-in obligation and feed-in tariffs of electricity produced from renewable energy resources or from waste and electricity generated in co-generation facilities (KÁT Decree)

- Decree No. 63/2013. (X. 29.) NFM on the distribution of electricity subject to feed-in obligation by the transmission system operator and on the methodology of determining prices to be applied in the course of distribution (Distribution Decree)

According to the Electricity Act, the Hungarian Energy and Public Utility Regulatory Authority determines in its decision the feed-in quantity and feed-in period for each eligible electricity producer. The producers can sell in the KÁT system until the feed-in period expires or until the feed-in quantity is used up. The determination of the KÁT period and quantity is to ensure that the producer does not get more support than needed for his investment to be returned.

6.3. MAP OF ACTORS

In Hungary electricity produced from renewable energy sources is managed through a central network and delivered to the customer by the service providers.

In the following section we present the Hungarian actors of renewable energy in Heves County. The Hungarian system is very centralized so we present the system firstly.

According to the Electricity Act, the power plants which produce electricity eligible for FiT support form a separate balance group, whose responsible party is the transmission system operator (MAVIR Ltd). This so called FiT balance group is the basis of the operation of the FiT system and works since January 2008. The Electricity Act, the FiT Decree and the Distribution Decree regulate the operation of the FiT balance group.

Electricity producers eligible for FiT support have to join the FiT balance group and contract with the responsible party (MAVIR). The MAVIR is the recipient of the electricity sold in the FiT system and pays the feed-in tariffs to the generators.

The part of the received FiT electricity which is more or less constant in time (so called base load) is distributed among the obliged balance group operators in proportion to the consumption in their balance group which is not entitled to universal service. The consumption entitled to universal service but supplied by traders (i.e. not universal service suppliers) is exempted from allocation only if:

- The tariff elements are not higher than that of the local universal service (and at least one tariff element is lower) and
- Costumer services listed in the government decree on the implementation of certain provisions of the electricity act are ensured.

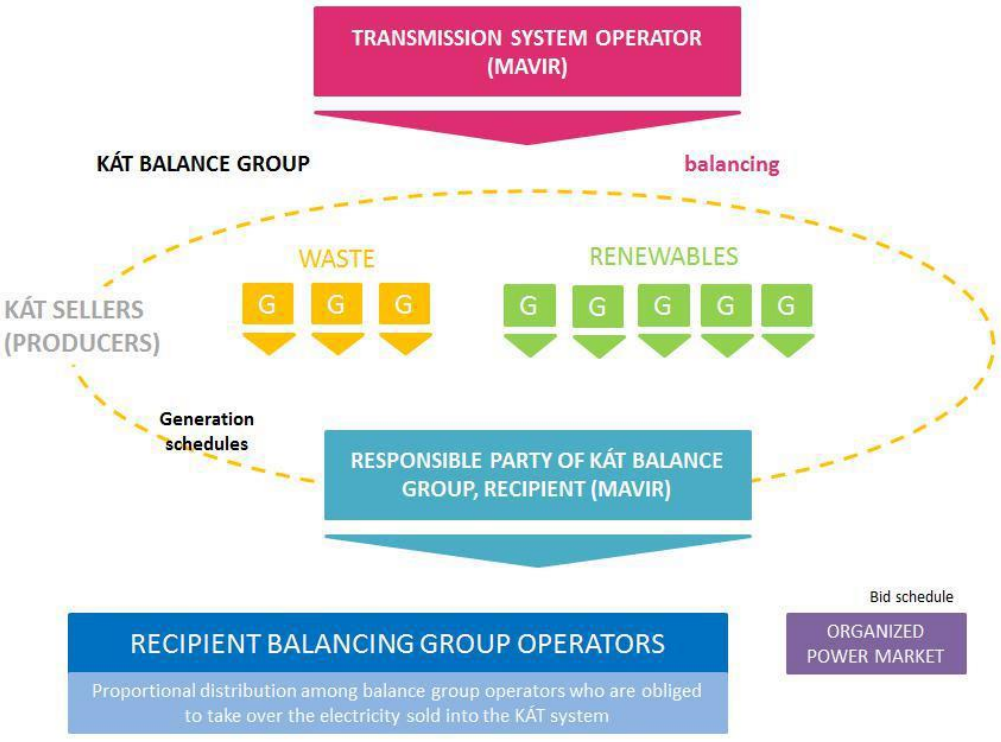


Figure 6-12. The Hungarian operation of the system. Source: HEPURA (n.d.).

We can see that the producers sell the electricity for the Transmission system operator (TSO) and then passed onto consumers (above figure). It is possible for small-scale power plants miss out the "TSO" and the power company to sign a contract.

6.3.1 LOCAL GOVERNMENT

The Covenant of Mayors is the mainstream European movement involving local and regional authorities in the fight against climate change. It is based on a voluntary commitment by signatories to meet and exceed the EU 20% CO_2 reduction objective through increased energy efficiency and development of renewable energy sources.

A Sustainable Energy Action Plan (SEAP) is the key document in which the Covenant signatory outlines how it intends to reach its CO_2 reduction target by 2020. It defines the activities and measures set up to achieve the targets, together with time frames and assigned responsibilities. Covenant signatories are free to choose the format of their SEAP, as long as it is in line with the general principles set out in the Covenant SEAP guidelines. In Heves county there are three settlements with a Sustainable Energy Action Plan (Felsőtárkány, Hatvan, Eger) (next table).

Table 6-18. Settlements which have SEAP 2013. Source: Covenant of Mayors (2015)

SIGNATORIES	COUNCIL DELIBERATION	CO_2 TARGET	ANALYSIS STATUS
Felsőtárkány, HU	11 Apr 2013	100%	Accepted
Hatvan, HU	13 Jun 2013	20%	Submitted
Eger, HU	28 Mar 2013	24%	Submitted

6.3.2 MANAGERIAL SECTOR

The entrepreneurial sector related with the renewable industry is scattered. Many businesses operate power plants across Hungary. In Heves County four business belonging to the category of renewable energy power plants are located. There is no data on small and household-sized enterprises, because it is directly recorded by the above mentioned providers and due to privacy they are not allowed to publish it.

Table 6-19. Renewable energy producers companies of FiT in Heves County 2013. Source: HEPURA (n.d.)

OPERATOR OF POWER PLANT	RES	SITE	INSTALLED POWER CAPACITY, END OF 2013, MW
Tiszavíz Vízerőmű Energetikai Kft.	WATER	Kisköre	28,00
Mátrai Erőmű Zrt.	COAL-BIOMASS COFIRING POWER	Visonta	13,08
Heves Megyei Vízmű Zrt.	SEWAGE GAS POWER	Gyöngyös	0,22
PACZIGA Fuvarozási Szállítmányozó, Kereskedelmi és Szolgáltató Kft.	WIND	Erk	0,80

In the Mátrai Erőmű there is a unit which is operated with biomass, but the power plant itself previously produced carbon based energy. The Kiskörei Vízerőmű has been producing hydroelectric power since 1975. There is a wind farm operating in Erk, which is the only wind power plant in Heves County, and the third of the region. The newest power plant of the county based on sewage gas can be found in Gyöngyös. Considering the number of resources, further growth is expected (Table 7-19).

6.3.3 FORMATIVE CENTERS AND RESEARCH

The ENERGIAKLUB and the other projects partners are supporting the participating municipalities by creating micro-regional Sustainable Energy Action Plan, providing professional consultancy, organising free events and study trips abroad and by providing international exchange of experience. The project activity goes beyond the level of strategic planning. The action plans in the designated target areas are put into practice by specific actions and by the implementation of investments.

There are two higher education institutions in Heves County, and the renewable energy research is present in both institutions.

Agria-Innoregion Knowledge Centre is a service centre of the Eszterházy University aiming to fulfil research, training and expert tasks. It fits well into the objectives of the University on regional development, basic and applied R&D activities and education in the field of sciences. Its primary task is to help developing tasks of regional enterprises, institutions and settlements. One main objective is to provide professional background in the development of low carbon economy based on local resources. The Centre wants to help students gaining their professional experiences as well.

Sustainable Innovation Technologies Centre (SITC) operating at Károly Róbert University College is a central organisation unit under the authority of the Vice-Rector of Sciences. While bringing into effect its tasks, it is relying on its broadening existing network connections. By technology-transfer, the College can develop close relationship with the private sector and can further strengthen the consortium and cluster relations. In addition to networking, SITC assists the internal research work, and by the knowledge library it collects and registers development, innovation and technological results.

6.3.4 OTHER STAKEHOLDERS LOCALLY REPRESENTED

Contemporarily, there are a few non-governmental organisation engaged with the major impacts regarding renewable energy. In Eger four NGOs can be found, which have been strengthening their commitments to renewable energy at project level in the last three years. The first such organisation is the Terragora Rural Development Community (Terragora Vidékfejlesztési Közösség), which implemented a youth project. In the framework of Youth in Action 1.2 Project, Terragora carried out the construction of alternative energy plants with the age group of 18-25 years old. The technology to be used has been identified at individual, community and regional level, so the topic definitely requires attention. Currently, the initiative intends to target the profitable technology, since several videos deal with alternative solutions (http://www.terragora.hu).

The second NGO is Kárpátikum Public Benefit Foundation (Kárpátikum Közhasznú Alapítvány), which has reached significant impacts by the young people of Eger and cross-border partner organisations. The projects included a number of elements regarding training and best practice visits and their success in also expanded by the transferred knowledge (http://www.karpatikum.hu).

The third NGO is Agria Geography Foundation (Agria Geográfia Foundation), which operates in conjunction with the Department of Geography of Eszterházy University. Several studies, lectures and camps are related to them in the subject of renewable energy (http://www.agriageografia.hu).

The forth NGO is H-Union Association (H-Union Szövetség), which was established by the merge of ten non-governmental organisations. The Association has carried out many projects related to sustainability, which are for example community gardening movement, sustainable water management, bio-cultural dissemination, exchange of seeds and an international project for the promotion of renewable energy use amongst the 18-25 year olds (http://www.hunion.hu).

6.4 TRAINING, RENEWABLE ENERGIES AND RURAL DEVELOPMENT

This chapter is to introduce the training system related to renewable energy and rural development in Hungary and with special regard to the Northern Hungarian region.

6.4.1 EDUCATION AND TRAINING ABOUT RENEWABLE ENERGIES IN HEVES COUNTY

Training through public or private entities located in the county includes Professional Certificates, Vocational Training cycles and university education.

The contents of **Professional Certificates** are held in adult education training centre in Károly Róbert College.

Certificates offered in the county directly related to RES with a regular basis, are focussed on biomass energy, specifically:

- Expert in Renewable energy (Gyöngyös)

As for **Vocational Training certificates,** certificates that are most closely related to the field of study and its location are listed below:

- Intermediate Vocational Training
  - Technician in Forestry *(Gyöngyös-Mátrafüred)*

- Advanced Vocational Training
  - Senior Technician in Forestry *(Gyöngyös-Mátrafüred)*

In these studies, learning basic skills related to forest biomass and the use of RES are covered.

University education related to RES is provided at the *Károly Róbert College in Gyöngyös*. While there is not specific degrees on this subject, there are degrees and masters in which fundamentals and applications are taught.

The main ones being:

- Degree
  - Degree in Rural Development
  - Degree in Environmental engineering

- Graduate
  - Master in Rural Development

Note that, with the subjects that include content on RES, the student has the possibility of doing their Degree Thesis or Master thesis on this subject. That produces universities and companies working together to enable students to apply their theoretical knowledge in solving specific and real problems. Noted that, in recent years, several students have made their final work on the development of RES in rural areas.

6.4.2 ACCREDITATION FOR FACILITIES IMPLEMENTATION AND CERTIFICATION

The accreditation process for implementation of a new degree is regulated by the Hungarian Accreditation Committee. This entity is responsible for the quality of the different courses. The university has to file an accreditation document with the curricula and how to meet the requirements and the HAC will decide about the accreditation.

As for Vocational Training certificates, the owner of the secondary school (in this case the Ministry for Rural development) decide about the implementation of new courses.

The easiest way to accreditate and implement a course is the Professional Certificates. The institution who would like to implement a new course has to have a well detailed curricula and relevant teachers and experts.

6.5 EMPIRICAL STUDY. PERCEPTION OF THE ACTORS ABOUT THE TRAINING NEEDS ON RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

6.5.1 SAMPLE

Taking into consideration that this is an empirical study, we selected a sample integrated by thirteen persons closely linked to RES from different approaches. In the following paragraph we describe their experience and knowledge and their role in the organisation they represented.

Due to their special role and proximity to the local actors (SMEs, educational centres, citizenship…), the local governments can contribute to promote RES in rural environment (boost local actors, strengthen their interest, etc.). For these reasons, one representative from local government has been interviewed:

- Environmental rapporteur-general of the Municipality of Gyöngyös

As business sector also operate in the fields of RES we tried to involve more SMEs working in RES (mainly biomass). All these SMEs have long experience in RES in the rural areas of the Heves County. Thanks to this reason, four professionals have participated in the interviews and/or focus group:

- KPMG Counselling Ltd. (tackles energy projects for national and regional governments)
- Egererdő Plc (official company in charge of forestry in Heves county)
- GYÖNGY ENERGETIKAI ÜGYNÖKSÉG Kft. (an agency developing project linked to renewable energies)
- Vidék Profit Ltd. (with a wide knowledge on projects linked to rural areas)
- Hi-Tech Sport base (former student of KRC, expert in project management and rural activities in Gyöngyös region)

In the field of social economy, associations and foundations are operating in the field of RES. This sector is highly interested in the use of RES in order to be more competitive. In the study, the points of view of this person has been collected:

- Chairman of Association Ugar with a wide experience in the use of RES for farming and rural development and also research activities

The participation of HEIs and research centres are essential to present the links of the educational offer on RES and to reveal the possible needs and offers. Four professionals have participated in the interviews and/or focus group:

- Director of Sustainable Research Centre in which RES are taught in different subjects.
- Former student of Károly Róbert College with experience in linking technologies and local contexts.
- Lecturer of RES (Szent István University in Gödöllő)
- Lecturer of University of Debrecen that teaches contents related to the use of biomass for agrarian facilities.

The following table shows the main characteristics of the participant persons and organisations.

Table 6-20. Persons and organisations that have participated in the interviews and/or the focus group. Source: Own elaboration

ORGANISATION		PERSON		PARTICIPATION IN	
NAME	TYPE	LOCATION	POSITION	INTERVIEW	FOCUS GROUP
KPMG Counselling Ltd.	SME	Budapest	Trainee	x	
Károly Róbert College	HEI	Gyöngyös	Former student	x	x
Assocatios Ugar	Association	Eger	Chairman	x	x
Egererdő Plc	Plc	Mátra	Deputy CEO	x	x
Sustainable Innovation Centre	Research centre	Gyöngyös	Research professor	x	x
Municipality of Gyöngyös	Municipality	Gyöngyös	Environmental rapporteur-general	x	
Gyöngy Energetikai Ügynökség Ltd	SME	Gyöngyös/ Mátra	CEO	x	
Szent István University	HEI	Gödöllő	Ass.prof	x	
Károly Róbert College	HEI	Gyöngyös	Professor	x	x
Vidék Profit Ltd	SME	Gyöngyös microregion	Research assistant	x	
Department of Social Geography and Regional Development University of Debrecen	HEI	Debrecen	Lecturer		x
MÁTRA Secondary School (Forestry)	Secondary School	Mátrafüred	Lecturer		x
Hi-Tech Sport base	SME	Mátrafüred	Director		x

85% of the persons involved in the interview were man. As far as the age of the sample is concerned two third of the respondents were among 35 and 45 years and one third more than 45 year old.

Regarding the studies, with the exception of 3 respondents all the respondents were graduated at a university and 3 of them have PhD. Among those people who have university degree, 50% have graduated as an engineer, the other part have background in economic sciences.

6.5.2 ANALYSIS OF THE INTERVIEWS AND THE FOCUS GROUP

RURAL CONTEXT

Current situation of rural areas in Heves county

The area of Gyöngyös and its surrounding smaller settlement mainly live on agriculture and job opportunities provided by the city. The situation of rural areas of Gyöngyös micro region is quite reasonable, and it could be improving in the medium and the long term. The situation of the micro region also depends on how they can use government and EU funding. Today, the Gyöngyös micro region is situated in one of the poorest regions of the EU.

Regarding the infrastructure of the region, it is in a good situation (M3 motorway), its agricultural conditions and touristic facilities can also be considered to be reasonable on a national scale. The biggest employees (ME Rt, Bosch, etc.) of the region and the closeness of the capital city both have a positive influence on the labour market. Unfortunately not enough large/international companies settled down in the region, but the Apollo tyres company is about to start production.

The population is steadily declining, as no new jobs are available which triggers migration. About 300.000 people live in Heves county.

The problem is that the situation of the middle classes is not improving, the population is divided into the rich and the poor and the two Roma districts show circumstances of the middle ages. The age dispersion of the population is trending towards the older generation. The reason for that is twofold:

One, the general unemployment rate in the region is very high, the region is sitting among the worst 10 regions of the EU GDP per capita rankings.

Two, the younger people can not find jobs in connection with their education, the unemployment rate is very high in the region, and as they are seeking jobs matching their expectations, most of them are eager to try their luck at the country's capital, Budapest.

In the past few years there is a development to counter the exodus of the young workforce and to cut down the unemployment rate to a maintainable level.

The number of people with higher education degree is favourable in Gyöngyös region, but the exploitation of potential originating from their education is not sufficient – a lot of people commute to other micro regions for work. The settlements' population is ageing, the demographic tendencies are unfavourable. No positive changes can be expected in the near future. Migration might be positive owing to industrialisation. Employment might improve slightly after a bottoming out (after the closure of food processing plants).

One of the largest employers in private-sector companies is Mátrai Erőmű Plc in the neighbourhood. Apollo Tyres Ltd (among the largest tyre companies) is going to establish a new manufacturing unit in Gyöngyöshalász within two years, and it will definitely increase the economic potential and importance of the area.

The dominance of agriculture in economic activity is declining, instead the tertiary industry is growing somewhat. This situation can only be changed at the earliest in the medium term with the development of new factories and the renewal of former industrial sectors related to agriculture.

Grape wine cultivation and winemaking both have a long tradition in the region, and the intention for a quality-oriented production within this field and to connect viniculture with tourism is highly emphasised.

Services are acceptable. Big companies have built a small number of factories on the outskirts of Gyöngyös, near the main road. A few more premises are under construction, which will be completed in the coming year.

To sum it up we can say that population in Heves county is slowly decreasing while labour market can be characterised by stagnant employment and medium scale unemployment. Economic activities in the region are stagnant and threats to competitiveness. In the social fabric are distortion of demographic composition and slipping away middle-class.

Evolution of the current rural areas situation in Heves county

The region is characterised by unfavourable phenomena, population will move towards the large cities (mainly to Budapest) and the aging of citizens will be a dominant phenomenon.

As for labour market, most of the job opportunities are provided by the big cities, as well, the importance of Budapest is very high in this point of view.

In the region there are only a small number of jobs and businesses in towns and people mostly go to work in the neighbouring cities. The public transportation and road networks leave a lot to be desired, M3 motorway is an axis of the region but more speed highways are required.

Nevertheless the region will be developed and is still developing robustly over the next 10 years as the main focus of the development is the social-economic-natural sustainability.

Short term goal in the region is to boost economic activities, midterm target is to improve the labour market and the longterm aim is to maintain the population in the region. It would be important to keep the intellectual potential in the region, particularly with employment creation. In one year, there will be more factories built outside of the city of Gyöngyös, minor positive changes in the trends considering the population and the age dispersion. In ten years, the population will be on the rise, age dispersion will be more diverse. In fifty years the population will be doubled, there will be no pension so every single person outside of the education system would be considered either unemployed or employed, hard to predict how this will affect the unemployment rate and age dispersion

As far as communication and services are concerned, the potential opportunities are favourable, but the degree of utilization should be increased. The marketing of intellectual capital in connection with RES is very important.

Due to the above mentioned facts, the economic development of the sector, the recovery of the labour market, the demand and differentiation for qualified labour force can be expected in the near future.

As a result of all, a slight decrease can be observed in the population of the county, the invigoration of the economic activities, the increase of purchasing power, the shifting of social structure and the development of the ratio regarding educated and qualified employees can all be speculated.

Initiatives that exist or could exist to reverse the current situation

There are some micro-regional rural development strategies, seeking ways with varying degrees of success in settlements and in micro-regions.

The most important factor is to create new job opportunities in the settlements that are located further from the city (e.g.: to support supplier SMEs). It should be a priority to improve the roads and public transportation so it is easier for people to commute. The spread of renewable energy would definitely be a good option for the region and can create new jobs. The ratio of RES use and the energy efficiency both could be increased. The intellectual potential regarding RES is sufficient, but their socialisation is essential. Furthermore job creation, job protection and shaping a livable environment initiatives

From the micro region's point of view, Mátra will be considered to have a leading role as a touristic destination. It is also important to develop the production and services network, for which there already are positive examples (viticulture and wine making, bicycle tourism, local products, etc.). The development of the food industry may be an additional step beside the development of tourism. Horticultural firms, tourism (festivals, wineries, geothermal baths, hotels), geothermal factories which could provide energy and heat for the horticultural firms also should be promoted.

Intensive social communication and mobilization (intensification of bottom-up proposals) could be also important in order to involve local actors to development.

Higher education and vocational training both play an essential role in providing local labour force with sufficient qualification, among the involvement of local governments and businesses in supporting the development of preferential processes. Provide aids (lower local tax rates for a short-medium period) to companies who are willing to invest in new premises and factories in the vicinity of Gyöngyös.

In order to improve the living standard of the Roma population suitable work must be created for them (pig-farm, slaughter house, dairy industry, fruit-vegetable processing etc.).

What would be necessary to achieve this is the realisation of cooperation between the owners and the state.

RENEWABLE ENERGY AND RURAL DEVELOPMENT

Knowledge of the renewable energy sector

Some of the respondents work at an energy provider company that recently started to open towards the promotion and distribution of photovoltaic energy equipment and devices. Many of them have experience in the field of forest biomass and are familiar with the sector on theoretical level without any direct contact, but they have been keeping track with great interest for the user-orientated opportunities, the technical details and environmental effects of new developments.

Further responders work with solar panels, solar collectors, heat pumps and gasification boilers, some of them have managed solar, biomass, biogas energy projects and tenders. The vast majority of them have practical experience in their works.

Current role of renewable energy for rural development

Many responders think that it plays only a minor role currently. They think that there are more arguments than counterarguments for using of renewable energy. But the requirement of rationale local decision is the insertion to the wider economic, social and physical environment.

They listed different aspects in favour and against which are the followings:

- It could provide enormous assistance to the region especially in the northeast region of Hungary.
- It can create a lot of jobs and reduce energy costs for the people.
- Supported preferences and the local physical resources decreased compared to the past.

- There is no perfect „best practise", only integrated to the local criteria.
- There is a lack of local knowledge, skills and supporting knowledge network for realization best practises.
- RES could largely contribute to the increased competitiveness of rural areas, but the existing opportunities are very scarce
- There is no significant improvement. Low crude oil prices block development possibilities. The state should have a more substantial role in this respect owing to climate change.
- There are not enough funds and governmental aids in the RES sector.

To summarize, the role of renewable energy today is much less than its real potentials, so its role and utilisation level should be increased.

Role of RES in short, medium and long-term rural development

A dynamic strengthening of the RES sector is envisaged in the near future. It is in production and services sector. Generally responders think that RES sector will be highly appreciated in the future.

From their point of view, in the short term it will continue to be minimal in the long term, however powerful change and the industry will evolve. RES should play an advanced role in the short term, and they should represent an increasing proportion in energy production both in the medium and the long term because of environmental and economic reasons. In the short and medium term our EU commitments (14,65%) are feasible but in the long term their role should be increased. Renewable energy sources cannot satisfy national demand, nuclear power stations are a must.

The role of renewable energy resources (similar to other social and economic decision) needs multifocal awarding considering the short, medium and long-term conditions.

Lack of long-term adopted vision (regional or country level), the short and also the medium role are problematic. The role of renewable energy in the future will inevitably increase because fossil fuels will be available in smaller quantities and at higher and increasing prices.

Actually, they should have a central role; political interests should not be allowed to divert them into unwanted directions. There is a definite interest in investments but the implementation of agreements is rarely realised.

Factors or initiatives that could boost renewable energy in rural areas

Responders and local actors during the focus group listed a lot of factors or initiatives that could boost renewable energy in rural areas. In this part we summarize the most important ones:

Legal factors

- It is clearly more favorable legal regulation of renewable energy and the introduction of METÁR (supporting system for energy transport from renewable and alternative energy).
- Changes in regulation.

Support factors

- A predictable and reliable support system is needed; social inclusion and development are also key factors just as the implementation and management of a knowledge service network.
- Proper financial support would play a key role in the development of the sector.
- The role of support is of utter importance, which significantly contributes to reduce the payback period. The awareness of opportunities for potential users are also vital
- More governmental aids, funds and education from very young age (eg. kindergarten)

- More state involvement in these projects, as well as agreement among players in the background.
- Support actions, increased level of well-being.
- The transmission of existing knowledge and experience, with an efficiently working funding system.

Technology factors

- Cheaper RES technologies. Programs for improving the energy efficiency of housing. Incentives for corporations to buy or generate energy from green sources.
- Biomass, sun, wind and geothermal using and producing initiatives.
- RES should play an advanced role in the short term, and they should represent an increasing proportion in energy production both in the medium and the long term because of environmental and economic reasons.
- In rural areas the extension of the green economy and new jobs would be of highest importance (e.g. house insulation, solar panels, etc.).

Education factors

- A broader understanding and realization of the opportunities in the sector, along with prospective funding and professional training possibilities.
- The era of initiatives has already passed; based on the knowledge we have, a series of governmental decisions has been made – most of them unfavourable for the sector of RES.

Current demand for renewable energy in rural areas

By all means there is demand since fossil fuels are finite. In the whole country there is definite demand for renewable energy sources; Hungary can be most successful in geothermal energy utilisation. There are several different motivation factors that exist in the background like decreased energy prices, unexploited local energy potential, independence from the central grid, environmental awareness, need for local employment, etc.

As for wind energy no real improvement can be expected. The fact the hydro energy is being neglected causes serious hindrances for our country. The utilisation of solar energy depends on financing possibilities (application). Biomass will remain vital. Their role must be increased in order to improve the state of the environment.

With the current higher gas prices there seems to be more people buying wood (or coal) for heating. This could come from energy plants. Also, if house isolation, solar collectors and other green technologies would be cheaper or there would be better financing for them a lot of people would install them. Furthermore local government needs to reduce energy costs, anyway rural population are already significant users of RES (e.g. firewood), but the efficiency of use could be enhanced.

To sum it up, there is demand for RES. Primarily the spread of solar energy use is typical. On the other hand, economical biomass utilization also has perspectives in the future. Unfortunately rural regions are in a highly disadvantageous position; RES could generate high number of jobs. Furthermore there is an existing demand for cost effective energy resources not only in rural areas but in all sectors and regions to enhance competitiveness.

Knowledge of renewable energy facilities in rural areas

Global trends forecast a dynamic growth in the RES sector (10-15% annual), which can be realized in this region of Hungary, too. However, the effective exploitation of the opportunities is questionable if

the above mentioned obstacles are not removed. In the western part of the country it is wind energy, while in other areas primarily the use of solar power is beginning to spread, while in the southern part of the country geothermal energy utilisation dates back to a relatively long period of time. Biomass utilisation, which represents the greatest potential, is still low.

According to the responders, in Heves County he most dominant is solar energy, followed by wind energy, geothermal energy and biomass. The less dominant RES in Hungary is water energy. Responders expect the most significant increase in the fields of solar energy and biomass. The local power plant plans a solar collector array. Solar energy utilization is the most popular and most rapidly prevailing RES facility. Mátrai Erőmű Plc in Visonta has just started the installation process of the biggest solar energy plant in Central Europe. Károly Róbert College also installed photovoltaic energy system.

Local governments install biomass power plants at public institutions using project funds, but in some cases specific factors related to operation (e.g. calorific value, necessary amount, noise caused by transport) are not taken into consideration. The merging of agricultural by-products (biomass) into the energy sector would provide extra incomes for the producers. In the case of forest biomass (firewood), the increase of regional utilization would be favourable for foresters because of decreasing transportation costs.

Responders think that it would create jobs and companies in RES installation and maintenance. Also there could be local companies created, that employ the local population who would grow and sell energy woods or crops. By decreasing the overhead expenses, extra financing could be kept by economic operators, providing a good base for further developments.

The keywords are: job creation, infrastructure development, shaping social values, local economy development, increasing self-sustenance. An example: four-star hotels in the Mátra region get the necessary electric and thermal energy produced from biomass.

The utilisation of wind energy is improving quickly (in Erk near Gyöngyös).

Geothermal energy could provide an energy source and provide hot mineral water for thermal baths which boost tourism.

To summarize, energy generation that is suitable for local endowments must be treated in a complex way. It might have a role in social services, the development of the green industry, in public work and local energy production (individual farms). Building insulation is also important and it creates jobs.

Success case in the contribution of renewable energy to rural development

Near Gyöngyös, one of the best examples is Felsőtárkány, where the community house and the primary school use solar panels. Another fine practice is the initiative of Bükk Leader Térsége Egyesület – "1 villages = 1 Megawatt" program. All settlements of area promote the using and plant RES user machines (wind, sun energy assets)

Also is well known the use of geothermal energy in greenhouse plant productions, setting up public biomass energy plants, establishing energy crops (both herbaceous and ligneous) plantations.

AAM Consulting Ltd. presents investments in RES in rural areas. For example: energy supply to local governments; off-grid supply to farms; biogas and bio diesel production plants.

The OM Solar house in Nagyréde is a good example for an energy efficient solution.

Known actors linked to renewable energy in rural areas

There are examples for almost all actors linked to RES. In case of building renovations, local governments, business companies and also citizens give preference to the instalment and use of RES (e.g. solar collector systems).

Governmental authorities, municipalities (regulation, legislation, authorisation), business ventures (production, sales, maintenance, operation) and education institutions (R&D).

For Hungarian colleges, the research can be a new opportunity in rural areas. Companies create jobs in RES sector and K+F+I actors (universities, colleges, academic institutions) as well.

Under ideal circumstances, all economic organisations (micro businesses, SMEs, large enterprises, public entities, NGOs) are linked to RES in some way, covering both the input (production, distribution) and output (consumers) sections.

In rural areas local governments, schools, swimming pools and spas, vegetable growing enterprises, house insulating businesses, etc. can be connected to RES. Furthermore Bioenergy Innovation Cluster, Károly Róbert College, Egererdő Zrt. and different projects of Mátrai Erőmű Zrt.

Generation of employment and business opportunities related to renewable energy in rural areas

The legislative structure of the business ventures is not relevant from this point of view, but the sectorial classification is important, mostly because RES and their associated business operations are related to all sectors. With regards to the economic benefits, besides the direct and targeted (intern) effects of RES, the additional (extern) factors also need to be taken into account. This requires new business models, of which there are some examples abroad, but none in Hungary so far.

To tell what types of jobs are needed, we need to look into the sectorial classification of the organisations in question. Beyond white (intellectual worker)- and blue collar (manual worker) jobs, a new type of “green collar” jobs have been created at international level, with a dramatic growth potential of 8-10% annually (in comparison with the 1-2% growth potential of ordinary jobs). The allocation or specification of specific job types is impossible: based on the results of a recent research, the 10 most popular jobs of 2015 did not even exist in 2010.

According to the responses, small businesses could form for installation and maintenance of RES installations. There could be also small local energy generation companies. There could be also co-ops, or companies owned or helped by local government that employ minorities, unemployed who for example grow energy woods or could be trained to maintain RES installations.

Produce and service for the mechanical, social and researcher work. Furthermore there could surely be opportunities from both the investment (e.g. construction industry), and the output side (e.g. energy plantation) as well.

Some of responders think that without proper “lobby force” it is hard to achieve success in the sector, unfortunately.

TRAINING IN RENEWABLE ENERGY FOR RURAL DEVELOPMENT

There were training courses at Károly Róbert College and there are courses at other higher education institutions such as Budapest University of Technology and Economics. There are short cycle specialized technician trainings that cover the knowledge of employees working in the field of RES. But

it would be useful to integrate a more academic training structure into different engineering courses at undergraduate level.

Knowledge about the training / educational situation of renewable energies in Heves county

In Gyöngyös-Mátrafüred the VM ÁSZK Mátrafüred (secondary school for forestry) provides basic courses for pupils (some topics in curricula).

Rural development courses are available at Károly Róbert College at BSc and MSc levels which also deal with RES as part of the curricula.

Knowledge of specific training offer on renewable energy and rural development

RES are part of the curricula in many HEIs, but they mainly deal with the topic from technical perspective. It could be organised a targeted training with specialized topics, after a survey of demand for competitive qualifications

Rating of this training offer

Károly Robert College has generated a vast amount of knowledge in the field of RES, and there are a lot to do regarding socialisation and marketing activities. The supply is very scarce, but the situation also depends on the existing demand. Without a proper level of demand, there is no point of developing the supply. And without suitable prospective job opportunities, the demand for such trainings is missing.

On the other hand, skilled professionals in both fields of RES and rural development are not available in the region.

The field needs a proper amount of knowledge, a knowledge transfer network, suitable social values, infrastructure, information channels and a transparent and predictable supporting system.

The supply in this respect is not enough; on the other hand, short training courses would prove to be more effective for potential future users as well.

More courses should be offered as the currently available courses cannot satisfy demand by companies operating in RES. The available grants can contribute only to a minimal extent.

Unmet training needs and possible improvements to be made

The main concern is that the courses are rather methodological than technical. Entrepreneurship and the fundraising technic are also needs. Supply and practical training modules are missing, as well.

Probably only at a “hidden” level; if there was a real demand in the region for such training, they would be known by the respective organisations and such trainings would have been set up already.

The courses should be implemented after an extremely thorough market research and by the development of multilevel, practice-oriented trainings. However, the first step should be to explore the aforementioned “hidden” demands in order to develop the suitable trainings. Proper and constant communication with governmental and municipal bodies is also of key importance, especially given that they are the primary financial supporters of such trainings.

After precise assessment of the needs, government support is inevitable for new courses and their accreditation.

COMPETENCES OF RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

Following table shows the highest valued competences of renewable energies for rural development mentioned during the interviews and focus group. The often mentioned basic competences were the ability to analyze and synthetize, project management skills, ICT skills and Technical English skills, while specific competences like research or measure were also mentioned.

Table 6-21. Highest valued competences of renewable energies for rural development.
Source: Own elaboration

POSITION OF IMPORTANCE	BASIC COMPETENCES	SPECIFIC COMPETENCES
1.	1. Capacity for analysis and synthesis	2. Ability to research and develop technologies in the field of renewable energies
2.	18. Others (Ability to manage work and projects)	4. Know how to calculate, measure and evaluate small installations (eg electric power plants up to 100 KW) for export and / or self-consumption of renewable energy
3.	7. Use of ICT (Information and Communication Technologies)	8. Apply legal and tax issues affecting the renewable energy sector
4.	8. Knowledge of English	6. Analyze the environmental problems related to energy and relate them to global warming
5.	14. Ability to apply knowledge in practice	21. Others (Problem solving ability related to specific matters)

7. COMPARISON OF CASE STUDIES

7.1. CONTEXT

7.1.1. DELIMITATION OF THE TERRITORY

All the three territories (Castellón in Spain, Bacău in Romania and Heves in Hungary) are considered rural regions as per the (local or OECD) definitions. From a comparative point of view, it is interesting that in Spain the definition is based on the total number of inhabitants (less than 5.000 inhabitants), in Hungary on the density of the population (85 inhabitants/km^2), while in Romania it is defined by the conditions (such as economy, society, culture, geography and demography).

In Spain, the Valencian Region is one of the 17 autonomous communities, and Castellón is one of the 50 provinces. In Romania, the North-East Development Region is one of the 8 development regions and Bacău County is one of the national 41 counties. The Northern Hungarian Region is one of the 7 regions and Heves County is one of the 19 counties of Hungary. The territorial delimitation of regions and countries in the study is shown in the following figure.

Regarding the territory of the regions in question, Castellón and Bacău (with more than 6.600 km^2 area) are more or less twice bigger than Heves County (more than 3.600 km^2). A comparison of relevant data of the three territories is shown in the table blelow.

Table 7-1. Extension, population and population density, relative and absolute, for the analysed territories. Source: Eurostat (n.d.)

	AREA (KM2)	NATIONAL AREA (%)	POPULATION	NATIONAL POPULATION (%)	POP. DENSITY (PEOPLE/KM2)
Castellón province (2014)	6.632	1,3	587.508	1,26	88,56
Bacau County (2012)	6.621	2,8	616.168	2,84	93,04
Heves County (2013)	3.637	3,9	309.351	3,1	85,05

Figure 7-1. Territorial delimitation of regions and countries in the study. Source: Own elaboration

7.1.2. ECONOMIC CONTEXT

Our commonly shared reality in Europe is the repeatedly mentioned economic crisis, since 2007-2008. This caused the decrease in the economic growth and high unemployment rates in every country. The following tables show the national Gross Domestic Product (GDP) together with the GDP per capita and the economic contribution of the three studied regions with respect to their national GDP.

Table 7-2. GDP data of the three countries, year 2013. Source: Eurostat (n.d.)

YEAR 2013	NATIONAL GDP (M€)	GDP PER CAPITA (€/PERSON)
Spain	1.049.181	22.453
Romania	144.282	7.207
Hungary	100.536	10.146

Table 7-3. Economic contribution that each province and territory has to their national GDP, year 2011. Source: Eurostat (n.d.)

YEAR 2011	NATIONAL GDP (%)
Valencian Region ES52 (Spain)	9,50
North-East Development Region RO21 (Romania)	10,24
Northern Hungary Region HU31 (Hungary)	7,09
Castellón province	1,27
Bacau County	2,10
Heves County	2,08

7.1.3. GEOGRAPHICAL AND DEMOGRAPHIC CONTEXT

In the three counties in question, it can be stated that all of them are fairly diverse geographically: in each of them there can be found mountainous and plain or valley areas, divided by rivers, lakes and bordered by the sea in case of Castellón.

Castellón and Bacău have approximately double population (587.508 and 616.000 people respectively) compared to Heves county (309.351 people), while the population density is similar among the counties (Castellón: 88 people/km^2, Bacău: 93 people/km^2, Heves: 85 people/km^2).

7.1.4. SOCIO-ECONOMIC DIAGNOSIS OF TERRITORY

In this section the socio-economic dimension of the territory is analysed, from various points of view: the structure of the population and its training, the production structure (enterprises, economic activities and the labour market), infrastructure and equipment.

STRUCTURE OF THE POPULATION

In all the three areas there is an ageing population, as it is a general trend in Europe. We can define a similarity in the share of sex: more women live in our societies. More specific data can be seen in the figure for the three studied territories.

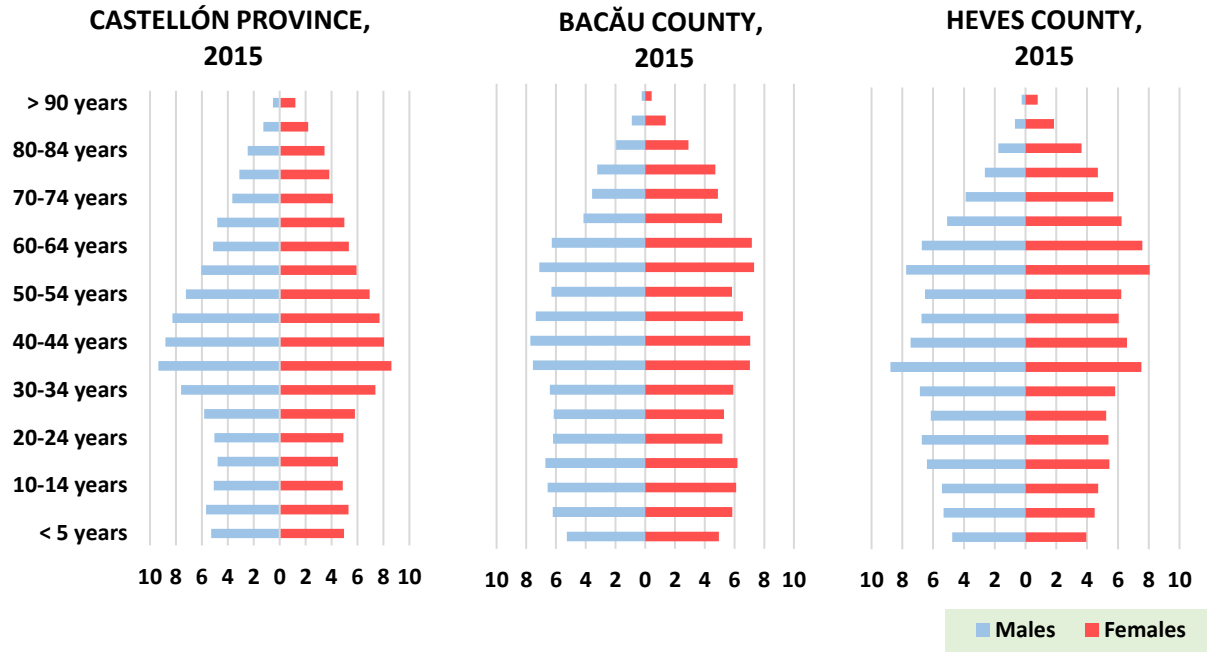


Figure 7-2. Population pyramids of Castellón, Bacău and Heves.
Source: Eurostat (n.d.)

Training of the population

The data on the population aged between 24 and 64 years by educational attainment level (year 2014), and also the students in 2012 by level of education in the three countries and their corresponding regions is presented in the following tables.

The attainment level in the three regions follows similar percentage as their corresponding countries. The maximum percentage, in the case of Spain, is found for the lowest level of education, while in the case of Hungary and Romania this maximum is reached for secondary education.

To have a more updated vision of the level of education in the last years, the information of the number of students enrolled at each level is shown for the last available year (2012) in the next table. In all three countries, a similar percentage of students in higher education is found, although this data for the Valencian Region (around 21%) is much higher than for the other two regions (around 12.5%).

Table 7-4. Population between 24-64 years by educational attainment level, 2014. Source: Eurostat (n.d.)

YEAR 2014	LESS THAN SECONDARY EDUCATION (%)	SECONDARY EDUCATION (%)	HIGHER EDUCATION (%)
Spain	43,40	21,90	34,70
Romania	27,20	56,90	15,90
Hungary	16,90	59,70	23,40
Valencian Region ES52 (Spain)	44,70	23,30	32,00
North-East Development Region RO21 (Romania)	32,70	55,30	12,00
Northern Hungary Region HU31 (Hungary)	21,30	61,60	17,10

Table 7-5. Number of students by level of education, 2012. Source: Eurostat (n.d.)

YEAR 2012	TOTAL NUMBER	LESS THAN SECONDARY EDUCATION (%)	SECONDARY EDUCATION (%)	HIGHER EDUCATION (%)
Spain	10.091.969	47,86	32,66	19,48
Romania	3.988.996	37,20	45,12	17,68
Hungary	2.102.930	34,54	47,36	18,11
Valencian Region ES52 (Spain)	1.070.021	47,77	31,47	20,76
North-East Development Region RO21 (Romania)	706.626	40,13	47,61	12,26
Northern Hungary Region HU31 (Hungary)	251.034	36,56	50,30	13,14

PRODUCTION STRUCTURE

In this section, the production structure of the territories concerned is discussed. In particular, data on the number of businesses, as well as their size, number of workers or economic activities they develop are presented.

Companies

Regarding the number of registered companies before the crisis (2007 or 2008) compared to nowadays (2013 or 2014), we can see differences between the three countries (next table). At national and at local level as well, there is a significant decrease in the number of registered companies in Spain (6% and 10% respectively), and a slight decrease in Romania (around 1% at each level). The only exception is Hungary, where we can observe an 8% increase at national and 7% at local level.

Table 7-6. Number of companies and variation before the crisis. Source: Own elaboration

	BEFORE THE CRISIS (2007, 2008)	NOWADAYS (2013, 2014)	VARIATION (%)
Spain	3.336.657	3.119.310	-6,51
Romania	520.032	485.082	-1,07
Hungary	1.561.446	1.688.169	8,11
Castellón Province	42.476	38.084	-10,34
Bacău County	11.630	10.577	-1,09
Heves County	44.672	47.789	6,97

The size of the companies in the three regions is shown in the following table. In each country, most of the enterprises are micro (less than 10 people), ranging from 89% in Bacău to 98% in Heves. The maximum percentage of Small and Medium enterprises (between 10 and 250) is found in Bacău (10,72%) and the minimum in Heves (1,74%).

Table 7-7. Percentage of companies depending on the size, 2013. Source: Own elaboration

	CASTELLÓN PROVINCE (%)	BACĂU COUNTY (%)	HEVES COUNTY (%)
0- 9 people (micro)	95,82	88,99	98,22
10-49 people (small)	3,32	9,18	1,52
50-250 people (medium)	0,64	1,54	0,22
>250 people	0,22	0,28	0,04

Economic activities

This section shows the importance of economic activities in the various territories considered in this study.

Table 7-8. Contribution of the economic sectors to GDP. Source: Own elaboration

	CASTELLÓN PROVINCE 2011 (%)	BACĂU COUNTY 2014 (%)	HEVES COUNTY 2013 (%)
Agriculture	2,69	0,63	5,21
Industry	27,55	14,92	21,61
Construction	10,09	41,07	10,06
Services	59,67	20,40	63,12
Other	-	22,98	-

Regarding the contribution of the economic sectors to GDP (above table), the service sector is the economic activity with a maximum contribution to the wealth in the territories of Heves (63,12%) and Castellón (59,67%), although construction is the sector with higher economic impact in Bacău (41,07%). Agriculture is the sector of least importance, reaching its maximum percentage in Heves with 5,21%.

The distribution of employment presents important percentages in the service sector in the three territories, from 53.6% in Heves to 76.13% in Bacău. The second sector with more impact in the employment in the three cases is industry, ranging from 10,77% to 26.65%. Agriculture is the sector with lower percentages of employment in the case of Heves and Bacău, in contrast with construction which is the sector with lower employment impact in Castellón.

Table 7-9. Distribution of employment by economic activity. Source: Own elaboration

	CASTELLÓN PROVINCE 2013 (%)	BACĂU COUNTY 2013 (%)	HEVES COUNTY 2013 (%)
Agriculture	9,30	3,05	5,45
Industry	19,30	10,77	26,65
Construction	5,46	10,06	14,30
Services	65,94	76,13	53,60

LABOUR MARKET

The next section covers the main indicators of employment in the territories considered in this study, along with their evolution before and during the economic crisis.

Most of the tables below show the quarterly data of the Labour Force Survey, since this is the most important statistical source for the labour market data.

Table 7-10. Comparison of the rate of unemployment in the studied territories in the first quarters (1Q) of 2007 and 2015. Source: Own elaboration

	BEFORE THE CRISIS (1Q 2007) (%)	NOWADAYS (1Q 2015) (%)	VARIATION (%)
Spain	8,42	23,78	182,42
Romania	4,00	5,37	34,25
Hungary	7,50	7,80	4,00
Castellón Province	6,59	25,69	289,83
Bacău County	4,40	6,63	50,68
Heves County	11,8	9,50	-19,49

The most significant difference among the three countries is the impact of the crisis on the labour market. Spain suffered its worst increase in the unemployment rate, almost tripling this rate and achieving 24% of unemployment. The crisis had a softer impact in Hungary and Romania.

The highest level of increase of unemployment can be detected in case of Castellón: the number of unemployed people was almost multiplied by four since 2007 in the province reaching 25,7%. The rates are nowadays lower in Heves (9,5%) and Bacău (6,6%). During the time period of this analysis, the unemployment decreased by almost 20% in Heves county. The level of unemployment is strongly related to the level of education in each country and it is significantly higher in case of illiterate or less educated people. Population with higher education in the three territories is more protected against unemployment.

Table 7-11. Normalized unemployment rate by level of education, 1Q 2015. Source: Own elaboration

	CASTELLÓN PROVINCE (%)	BACĂU COUNTY (%)	HEVES COUNTY (%)
TOTAL	**25,69**	**6,63**	**9,50**
Less than Secondary Education	62,00	70,85	70,12
Secondary Education	22,32	19,94	22,60
Higher Education	15,69	9,21	6,70

7.2. RENEWABLE ENERGIES AND DEVELOPMENT

This section presents a set of statistical data that enables the analysis of the energy structure of the current status of renewable energy, as well as its future targets.

Seeing the temporal coverage, data from the last decade (starting with year 2005) has been included to show its evolution. In most cases, the available and consolidated data to show the current situation was from 2013. For the future targets and due to its relevance at European level, 2020 has been selected.

7.2.1. CURRENT ENERGY SITUATION

The geographical situation determines the three counties' interconnections with the rest of Europe. Given the fact that Spain has an isolated situation in the Iberian Peninsula, its situation significantly differs from the East-Central European positioned Hungary and Romania that are electrically well-connected with the neighbouring countries.

Regarding the primary energy, in 2013 the gross inland consumption was much higher in Spain (118,8 MTOE) than in Romania (32,34 MTOE) and Hungary (22,74 MTOE) (next table).

The primary energy consumption structure reveals the high relevance of fossil fuels (petroleum, gas, coal) for the three countries (Romania 74,1%, Spain 73,5 % and Hungary 69,6%). The different presence of renewable energies in these three countries is also shown in the table below.

Table 7-12. Gross inland and final energy consumption, 2013. Source: Eurostat (n.d.)

YEAR 2013	GROSS INLAND CONSUMPTION (MTOE) 2013	FINAL ENERGY CONSUMPTION (MTOE) 2013
Spain	118,80	80,79
Romania	32,34	21,83
Hungary	22,74	14,75
Valencian Region ES52 (Spain)	9,9	7,45
North-East Development Region RO21 (Romania)	3,43	7,5
Northern Hungary Region HU31 (Hungary)	4,12	6,8

Table 7-13. Structure of gross inland consumption, 2013. Source: Eurostat (n.d.)

YEAR 2013	GROSS INLAND CONSUMPTION (%) SPAIN	GROSS INLAND CONSUMPTION (%) ROMANIA	GROSS INLAND CONSUMPTION (%) HUNGARY
Coal	9,1	17,8	10,3
Gas	22,0	30,3	34,0
Nuclear	12,3	9,3	17,5
Petroleum	42,4	25,9	25,3
Renewable	14,7	17,2	8,3

In 2013, at national level (next table), the most energy consuming sector in Spain was the transport (almost 40%) while in Hungary and Romania was the residential sector.

Table 7-14. Structure of national final energy consumption by sector, 2013. Source: Eurostat (n.d.)

YEAR 2013	FINAL ENERGY CONSUMPTION (%) SPAIN	FINAL ENERGY CONSUMPTION (%) ROMANIA	FINAL ENERGY CONSUMPTION (%) HUNGARY
Industry	25,7	28,90	26,10
Transport	39,4	24,52	21,25
Agriculture	3,3	2,15	3,43
Services	11,8	8,18	16,45
Residential	18,6	35,37	32,69
Others	1,2	0,89	0,07

The biggest final energy consumer al local level (table below) is the industry (68%) in Castellón, while in Bacău and Heves is the residential sector (50%). The second most important consumer in the three countries is the transportation.

Table 7-15. Structure of local final energy consumption by sector, 2013. Source: Own elaboration

YEAR 2013	FINAL ENERGY CONSUMPTION (%) CASTELLON	FINAL ENERGY CONSUMPTION (%) BACAU	FINAL ENERGY CONSUMPTION (%) HEVES
Industry	68	5	9
Transport	18	16	17
Agriculture	2	13	11
Services	5	16	12
Residential	7	50	51

According to the data of the Hungarian Central Statistical Office (KSH), the energy consumption per capita value, compared to the national average, is continuously increasing in Heves County. To meet this demand, electricity taken from the national grid is used. Power plants and electricity supplier companies in Hungary are mostly under private ownership. As well indicated, supply for the county is provided from the national grid, as none of the power plants generates electricity for regional supply. This fact forecasts or even actualises the establishment of several small-scale power plants and furnaces supplying the region's residents, the local markets by cheaper energy or electricity.

7.2.2. DEVELOPMENT OF RENEWABLE ENERGIES

The contribution of renewable energies to the energy system in all the three countries increased between 2005 and 2013. In Hungary, the share of RES has been constantly increasing. In Spain and Romania the share of RES reached a peak point in 2010, then after a decline, it started growing again. In 2013, Romania presented the highest share of RES (23,9%), followed by Spain (15,4%) and Hungary (9,8%).

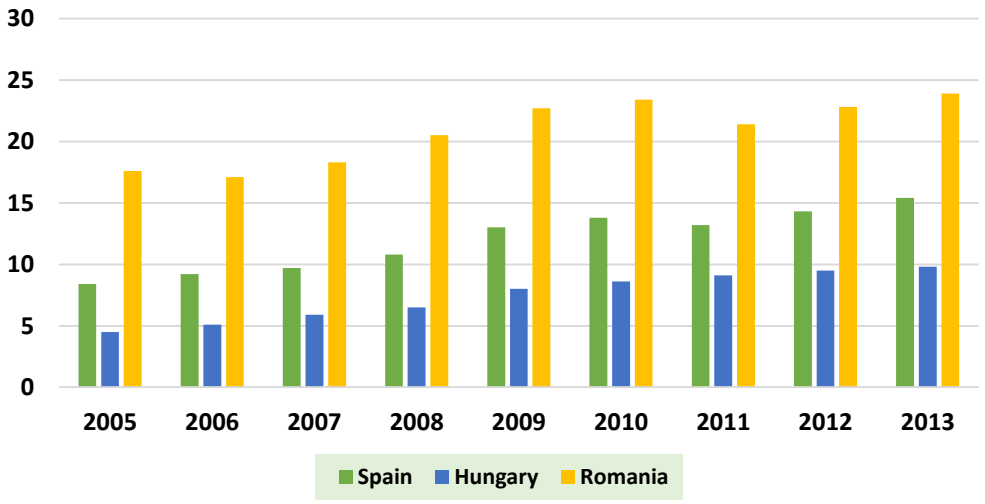


Figure 7-3. Evolution of renewable energy share in the three countries. Source: Eurostat (n.d.)

In 2013, the main contributor to the gross inland consumption of renewable energy (table below) was biomass and renewable waste (ranging from almost 40% in Spain to 90% in Hungary). In Spain, wind and hydro power were the second and the third most used sources, changing their order of importance

in Romania. The second source of renewable energy consumption was geothermal (6%) in the case of Hungary.

Table 7-16. National distribution of renewable energy consumption by source, 2013. Source: Eurostat (n.d.)

YEAR 2013	RES consumption (%) SPAIN	RES consumption (%) ROMANIA	RES consumption (%) HUNGARY
Hydro power	17,86	23,17	0,98
Wind power	26,97	7,00	3,31
Solar Thermal	11,9	0,00	0,32
Solar photovoltaic	4,04	0,65	0,11
Biomass and renewable waste	39,13	68,71	89,22
Geothermal energy	0,10	0,47	6,05

7.2.3. RENEWABLE ENERGY TARGETS AND TRAJECTORIES

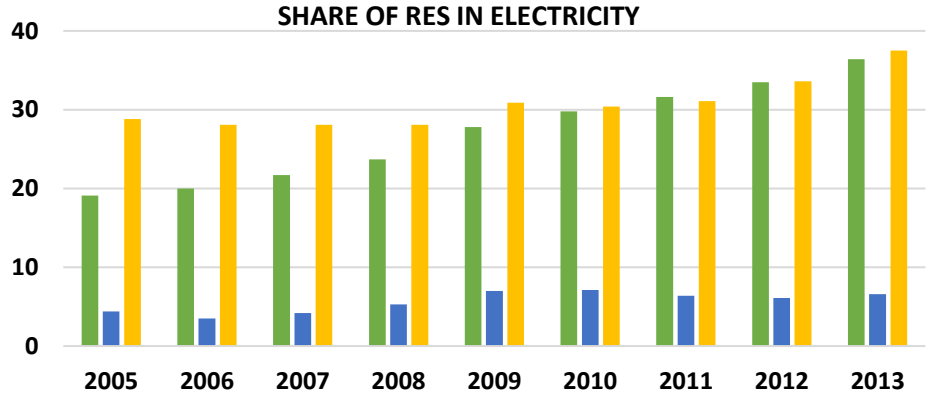
The European Renewable energy directive (Directive 2009/28/EC) of the European Parliament and of the Council of 23rd April 2009 sets a binding global target of 20% final energy consumption from renewable sources by 2020 in the European Union and a target of at least 10% of transport fuels coming from renewable sources to be achieved by all Member States in the field of transport by that year. Spain has its targets according to the mentioned EU directive, while Hungary's target is 13% and Romania's target is 24% by 2020.

Table 7-17. National renewable energy targets for 2020. Source: Eurostat (n.d.)

2020 TARGETS	FINAL ENERGY CONSUMPTION OF RES (%)	TRANSPORT FUEL COMING FROM RES (%)
Spain	20	10
Romania	24	10
Hungary	13	10

To achieve this, each European country has elaborated a National Renewable Energy Action Plan (NREAP), which shows its national renewable energy target and defines the actions to be taken in order to meet the renewable energy targets.

Regarding the national RES trajectories up to 2013 (next figure), Romania and Spain have reached percentage in electricity (around 37%). Romania has also achieved important share of RES in heating and cooling (26%). Regarding the use of RES in transport, Hungary and Romania reached higher values (around 5%) than in the case of Spanish (less than 0.5%).



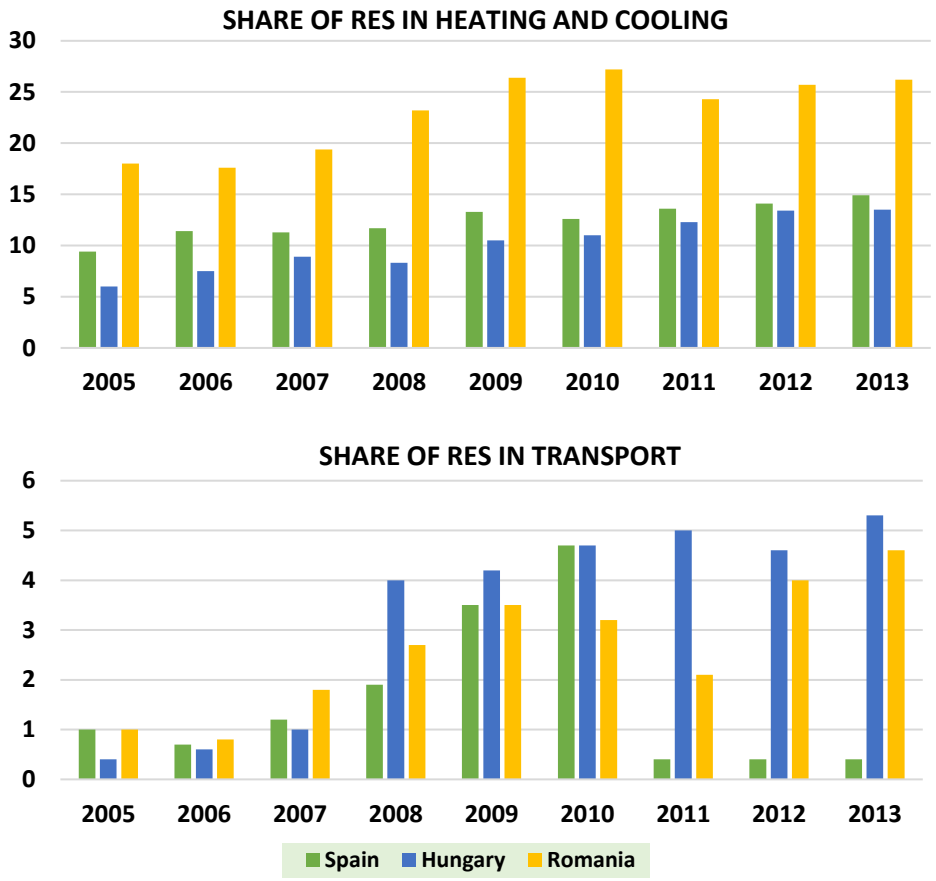


Figure 7-4. Evolution of the share of RES electricity (up), heating and cooling (middle) and transport (down) in the three countries. Source: Eurostat (n.d.)

7.2.4. EMPLOYMENT AND RENEWABLE ENERGY

The data on employment and RES has been obtained from EurObserve'ER Report (2013). The report warns that the method used to obtain the data may differ widely among countries. It also indicates that "employment figures do not express job creation in the sectors concerned but a expression of Full Time Equivalent of economic activity of each sector" and also that "employment covers both direct and indirect jobs". A summary of the employment data for year 2012 is presented in the following table.

Table 7-18. National employment related to RES, 2012. Source: EurObserve'ER (2013)

YEAR 2012	EMPLOYMENT SPAIN	EMPLOYMENT ROMANIA	EMPLOYMENT HUNGARY
Wind power	30.000	150	5.000
Solid biomass	14.500	4.300	10.410
Photovoltaic	12.000	750	<50
Biofuel	9.435	4.230	925
Solar Thermal	4.500	200	200
Small hydropower	1.500	400	450
Renewable urban waste	855	50	n.a.
Biogas	520	130	<50
Geothermal	<100	850	200
TOTAL EMPLOYMENT	**73.410**	**11.060**	**17.285**

The RES-related impact on employment is significantly higher in Spain (73.410) than in the other two countries (around 11 to 17 thousand). The most important RES sectors for employment are wind power and solid biomass in Spain and Hungary, and solid biomass and biofuels in Romania.

7.2.5. RENEWABLE ENERGY LEGISLATION

Since 1980, Spain has had its renewable energy regulation, starting by the encouragement of small hydropower usage and renewable energy production. From 2006, it has been compulsory for certain buildings to incorporate solar thermal and photovoltaic panels. The legal and economic regime of electricity production and the connected compensation system has been being regulated. Since 2013, the economic incentives have been suspended for projects to install new production from RES.

In Romania, the first renewable energy related legislation dates back to 2003. Four years later, after joining the European Union, the legislation was adjusted to the EU rules. Since 2008, energies from renewable sources have been promoted through green certificates related to a mandatory annual quota system. The National Action Plan for Renewable Energy, containing targets and political principles, has been adopted. The cost of the green certificates is paid by the end consumers. Romania achieved its 2020 targets in 2014, 24% of the consumed energy comes from RES. In 2013, a new modification has been introduced stating that the new photovoltaic parks and small hydropower stations will receive less green certificates per MWh.

Hungary supports renewable and waste-to-energy production through the feed-in tariff system, called KÁT. The KÁT system guarantees the feed-in-tariffs higher than the actual market price.

7.3. MAP OF ACTORS

In all the three countries a local development plan exists, which is in correlation with the EU directives and aims to serve as a strategy for the regional and local actors. In Hungary, apart from the Sustainable Energy Action Plan (SEAP), the Electricity Act, the so called KAT Decree (feed-in tariff system) and the Distribution Decree define the legal background of electricity market, services and trade.

During the development of the strategies, the multiplicity of actors is expressed, among the others, by the diversity of actors: local and regional development agencies, SMEs, vocational educational centres, civil society, etc.

7.3.1. LOCAL GOVERNMENT

The local government is elected in all the three countries by the citizens. The local authorities are connected to the regional authorities and finally to the governmental bodies.

In Castellón province, in case of small towns, the responsible person for the Renewable Energy Strategies can be the Mayor, the Local Development Agent or the municipal technician. Above the municipal structure, the Provincial Council of Castellón coordinates and manages the strategic plans. ERDF funds are involved to CEDES training centres development.

In Romania, the North-East Regional Development Agency develops and promotes strategies and implements financial programmes for a sustainable economic growth. Bacău Local Development Agency represents an interface between the local administration and the private sector and is a

partner in several European projects on energy efficiency, sustainable transport, etc. Beside the local authorities, non-governmental organisations and local action groups are on the map of actors.

In Hungary, many of the Mayors take part of the Covenant of Mayors that is the mainstream European movement involving local actors in the fight against climate change. In Heves County, three settlements possess SEAP: Felsőtárkány, Hatvan and Eger.

7.3.2. MANAGERIAL SECTOR

The connection between the managerial sector and the renewable industry shows a significant difference among the three countries and counties.

In all of them there are companies working as energy producers, the most common are wind farms, biomass producers and photovoltaic industry. There is a considerable potential in biogas use in Castellón, while in Gyöngyös we can find the newest sewage gas plant of the country. The Hungarian legislation raises some difficulties in our comparison, as the SMEs' energy capacity is recorded by the big power plants operating in the region and they are not allowed to publish it due to privacy reasons. In Spain, on the contrary, a large number of autonomous, micro and small enterprises are registered and listed.

In Heves the hydroelectric plant of Kisköre has been working since 1975. In Bacău, there is an opportunity to ameliorate the connection between the RES industry and the managerial sector.

7.3.3. FORMATIVE CENTERS AND RESEARCH

Regarding the educational centres and research, in all the three countries courses related to renewable energies can be found. Universitat Jaume I de Castellón provides trainings and research related to RES, the Faculty of Engineering of Vasile Alecsandri University of Bacău offers individual study programmes, master's degree and postgraduate programmes in Power and Environmental Engineering. In Heves County, there are two universities dealing with RES subjects. At Eszterházy University, it works the Agria-Innoregion Knowledge Centre, and at Károly Róbert University College it operates the Sustainable Innovation Technologies Centre.

The county council or the local authority organises courses in Castellón and Bacău. In Gyöngyös, the municipality collaborates with Energiaklub, not only on strategic planning, but they support the training of public servants and provide consultancy in the matter.

However, no specific training linking renewable energies and rural development could be found in any of the three territories.

7.3.4. OTHER STAKEHOLDERS LOCALLY REPRESENTED

In each of the three countries, we find NGOs, associations and foundations working in the same area. It is welcome news that many of them are led by or organised with the participation of young people that shows an interest on behalf of the resident population.

In Spain additionally, it could be highlighted the presence of the Natural Parks, which are professional organisations with expertise in agriculture, business or dissemination. Valencia Region is involved in the EIT (European Institute of Innovation and Technology) based Climate-KIC (Knowledge, Innovation

and Community) programme, one of the biggest initiatives bringing together the different level of actors in the fight against climate change.

7.4. TRAINING, RENEWABLE ENERGIES AND RURAL DEVELOPMENT

7.4.1. EDUCATION AND TRAINING ABOUT RENEWABLE ENERGIES

In general, in each country there can be found three levels of RES education: Professional Certificates, Vocational Training Certificates (intermediate and advanced level) and university degrees (bachelor, master and doctorate). Both, private and public institutions are involved in the different levels.

The biggest part of the trainings is constituted of energy engineering and technical maintenance, but, for instance, forestry technicians are trained in Gyöngyös and Castellón, Environmental protection is taught in Bacău and Castellón, and Technical architecture in Castellón. A positive development is that in all of the countries, more and more students choose RES as their topic of the final thesis.

In Bacău, the University has a laboratory of unconventional energies that helps teachers and students in their research. In addition, Vasile Alecsandri University of Bacău is very active in participation and organisation of national and international conferences related to renewable energies.

Castellón offers a wide range of distance learning opportunities, but it has to be noted that their costs are considerably high. Self-training is supported by professional exhibitions, publications and conferences.

7.4.2. ACCREDITATION FOR FACILITIES IMPLEMENTATION AND CERTIFICATION

In Spain, the companies in the relevant field are required to employ workers holding the Specialist Installer in Low Voltage Generating Facilities card (IBTE) or Regulation of Thermal Installations in Buildings (RITE), both issued by the Competent Territorial Agency (OTC).

In Hungary, the Hungarian Accreditation Committee is responsible for the implementation of a new degree, or the Ministry of Rural development in case of Vocational Training certificates.

In Romania, to our current knowledge, at the moment there is no accreditation or certification process dedicated exclusively to perform RES installations. Notions regarding this issue are included in general terms in various other specializations.

7.5. EMPIRICAL STUDY. PERCEPTION OF THE ACTORS ABOUT THE TRAINING NEEDS ON RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

7.5.1. SAMPLE

In order to give an overview of the actors and their roles concerning the renewable energy sector and the related trainings, people from each sector was interviewed. 18 people from Spain, 18 from Romania, and 13 from Hungary participated in the poll. Most of the interviewed persons hold a university degree and are male aged between 25 and 45 years.

7.5.2. ANALYSIS OF THE INTERVIEWS AND THE FOCUS GROUP

RURAL CONTEXT

Current situation and its evolution of rural areas in the three regions

The most commonly mentioned factors are the aging population in the rural areas and the lack of job opportunities, moreover all the three regions are struggling with poor infrastructure conditions. Dependence on EU funds is highlighted in each region. We can mention as a best practice in Bacău region that the computer and internet literacy is increasing, due to the fact that many young people often travelling abroad are able to teach their parents in their turn. In Castellón, an opinion was pronounced from the university teaching sector, that there is a tendency among young and more open minded, modern couples and families, namely that escaping from the big cities' hustle-and-bustle, they often choose a calm, isolated rural region to settle down and live a more healthy and balanced life.

Initiatives that exist or could exist to reverse the current situation

All the three regions agree, that the young population's return to the rural areas, the increasing number of jobs, non-returnable funds and applicable policies could reverse the trends. They also mention the increasing conditions of infrastructure, bottom-up initiatives, community life and its multiplying effect in dissemination, also the level of education and trainings, incentives from the local authorities (with effective communication) and decentralization. Rural tourism and proximity consumption are getting trendy, as well as cultural festivities are often interlinked with. Given the unique situation of Hungary in the Carpathian Basin (high level of geothermal gradient) the further involvement of geothermal energy to the renewable energy sector would be beneficial and a great opportunity.

RENEWABLE ENERGY AND RURAL DEVELOPMENT

Knowledge of the renewable energy sector

Among the respondents, we find those with theoretical and/or practical experience in the subject. The respondents showed, in general, a good level of knowledge about the renewable energies, but less about general sustainability and climate change issues. It might be explained by the direct impact on the population through the charges and bills to be paid (they are more likely looking for other solutions). Although, some scepticism was observed from Gyöngyös and Bacău regions regarding the feasibility, efficiency mainly because of the length of payback period of renewable energy systems. To be noticed as well that the energy efficient investments are often carried out at individual level (family houses – Green House Programme), thus it does not have a significant impact on the whole consumption, therefore, there is no demand for exploitation systems in rural areas.

Current role of renewable energy for rural development

On the other hand, the renewable energies have always been taking part in the rural life (for example firewood usage for heating). Criticism on the solar energy based grid feed-in systems is an important issue currently in Spain and clearly shows the municipalities and the state's role and responsibility in the renewable energy sector. In Gyöngyös region, many respondents think that renewable energies play a minor role for the moment and there are still more arguments than counterarguments.

Role of RES in short, medium and long-term rural development

Hungarian respondents agree that the role of renewable energies will increase in the future, even though no long term adopted vision can be found nor at regional, neither at country level - the country's energy demand is supposed to be covered by a new nuclear plant. In Castellón, in medium term, the interviewees see feasible the self-consumption and the net energy balance, and they speak about the widespread introduction of electric vehicles.

Factors or initiatives that could boost renewable energy in rural areas

Installation of renewable energy systems on/in public buildings would serve as good example to the public. Institutional awareness campaigns and dissemination actions would lead to a better general knowledge and avoid the mistrust towards renewables. Legal and support factors would be the implementation of the mentioned national and regional funds and incentives, not to forget the deeper introduction of RES at every level of education. Technology factor would be the cheaper RES technologies and the energy efficiency of housing.

Current demand for renewable energy in rural areas

In Hungary, we can state that there is a demand for renewable energies. The country could be very successful in geothermal energy usage. In Bacău, no specific demand is expressed for renewables because, unfortunately, no success stories exist in the region, what makes the issue more theoretical than real. In Castellón, it has been highlighted that the population does not have the financial culture and/or they find hard to calculate the payback period of the investment.

Knowledge of renewable energy facilities in rural areas

Many renewable energy projects are identified in rural areas of Castellón, such as solar farms, large wind farms, generation and consumption of biomass, biogas generators, biomass district heating, etc. In Bacău the only highlighted RES facilities are based on biomass for isolated households. No example of good practice of RES with a real impact in the rural community was identified.

In Heves County the most dominant RES facilities are based on solar energy, followed by wind, geothermal and biomass. Solar installations are also seen as the most popular and most rapidly spreading RES technology.

Success cases in the contribution of renewable energy to rural development

In Castellón and Gyöngyös, a few success cases were listed by the respondents (1 village – 1 megawatt program, OM Solar House in Nagyréde, pellet factories joint with wood industry for ex. in Vilafranca). In Bacău, no such success stories can be found as it was mentioned before, but some best practice idea would lead to a better acceptance and trust towards to renewables among the population.

Known actors linked to renewable energy in rural areas

The known actors are the well known ones in each region: local authorities, universities/knowledge centres and businesses. The role of NGOs is not very clearly pronounced, neither their influence on the renewable energy sector in rural areas.

Generation of employment and business opportunities related to renewable energy in rural areas

It is important to notice the existence of so-called “green collar jobs” in the environmental sector, where at the international level a growth of 8-10% is detected anually. Predictions say that further growing is foreseen, which it is considered fortunate for the renewable energy systems.

TRAINING IN RENEWABLE ENERGY FOR RURAL DEVELOPMENT

Knowledge about the training /educational situation of renewable energies in the three regions

In Castellón a relatively wide range of educational/training courses are listed, one respondent raise the attention to the importance of starting the sustainability teaching at the very early ages (in the kindergarden). Besides KRF, a secondary school provides RES-related training in the region. Bacău concludes that the offer in the county is weak and the relevant requirements do not meet in the area.

Knowledge of specific training offer on renewable energy and rural development and rating of this training offer

Some interesting information was added by a Hungarian respondent: skilled professionals who are experts in both fields (RES and rural development) are missing from the region. The field needs a proper knowledge, knowledge transfer network, suitable social values, infrastructure and information channels and transparent and predictable supporting system.

COMPETENCES OF RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

After collecting the information from the interviewed people, the five basic and specific competences of renewable energies for rural development, considered as the most important in the three countries, are presented in the following tables respectively.

Table 7-19. Basic competences of RES for rural development selected as most important Source: Own elaboration

POSITION OF IMPORTANCE	BASIC COMPETENCES SPAIN	BASIC COMPETENCES ROMANIA	BASIC COMPETENCES HUNGARY
1	2. Troubleshooting	13. Ability to learn	1. Capacity for analysis and synthesis
2	14. Ability to apply knowledge in practice	15. Ability to adapt to new situations	18. Others (Ability to manage work and projects)
3	13. Ability to learn	14. Ability to apply knowledge in practice	7. Use of ICT (Information and Communication Technologies)
4	11. Networking (ability to work with different entities)	2. Troubleshooting	8. Knowledge of English
5	16. Priority for quality	11. Networking (ability to work with different entities)	14. Ability to apply knowledge in practice

Table 7-20. Specific competences of RES for rural development selected as most important Source: Own elaboration

POSITION OF IMPORTANCE	SPECIFIC COMPETENCES SPAIN	SPECIFIC COMPETENCES ROMANIA	SPECIFIC COMPETENCES HUNGARY
1	4. Know how to calculate, measure and evaluate small installations (eg electric power plants up to 100 KW) for export and / or self-consumption of renewable energy	4. Know how to calculate, measure and evaluate small installations for export and/or self-consumption of renewable energy	2. Ability to research and develop technologies in the field of renewable energies
2	16. Provide ongoing information about innovations in the field of energy efficiency and savings	1. Know the scientific-technical language and the theoretical foundation of the technologies for the application of renewable energy	4. Know how to calculate, measure and evaluate small installations (eg electric power plants up to 100 KW) for export and / or self-consumption of renewable energy

3	15. Provide ongoing information about innovations in the field of renewable energy for rural development	20. Have abilities and specific skills for installation and maintenance of small installations using renewable energy	8. Apply legal and tax issues affecting the renewable energy sector
4	1. Know the scientific-technical language and the theoretical foundation of the technologies for the application of renewable energy	3. Be able to evaluate the advantages and disadvantages of the various primary and/or final sources of renewable energy, including hybrid systems	6. Analyze the environmental problems related to energy and relate them to global warming
5	20. Have abilities and specific skills for installation and maintenance of small installations using renewable energy	14. Know to apply the Technical Building Code as far as energy efficiency is concerned	21. Others (Problem solving ability related to specific matters)

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ANNEXES

ANNEX I:

LIST OF PARTICIPANTS IN THE STUDY

ORGANISATION		PERSON		PARTICIPATION IN	
NAME	TYPE	LOCATION	POSITION	INTERVIEW	FOCUS GROUP
HUNGARY					
KPMG Counselling Ltd.	SME	Budapest	Trainee	X	
Károly Róbert College	HEI	Gyöngyös	Former student	X	X
Assocatios Ugar	Association	Eger	Chairman	X	X
Egererdő Plc	Plc	Mátra	Deputy CEO	X	X
Sustainable Innovation Centre	Research centre	Gyöngyös	Research professor	X	X
Municipality of Gyöngyös	Municipality	Gyöngyös	Environmental rapporteur-general	X	
Gyöngy Energetikai Ügynökség Ltd	SME	Gyöngyös/ Mátra	CEO	X	
Szent István University	HEI	Gödöllő	Ass.prof	X	
Károly Róbert College	HEI	Gyöngyös	Professor	X	X
Vidék Profit Ltd	SME	Gyöngyös microregion	Research assistant	X	
Dept. of Social Geography and Regional Development University of Debrecen	HEI	Debrecen	Lecturer		X
MÁTRA Secondary School (Forestry)	Secondary School	Mátrafüred	Lecturer		X
Hi-Tech Sport base	SME	Mátrafüred	Director		X
SPAIN					
Municipality of Benlloch	Local government	Benlloch	Local Development Agent	X	
Municipality of Todolella	Local government	Todolella	Mayor	X	
Forestal del Maestrazgo	SME	Todolella	Technician	X	
Heliotec	SME	Vall d'Uixó	Technical Director	X	X
Implica-T	SME	Castellón	Sales representative	X	
NETPLC	SME	Castellón	Manager	X	
Cooperative of Viver	Cooperative	Viver	Manager	X	
Som Energia	Cooperative	Burriana	Local representative		X
Farmers Union	Association	Vall d'Uixó	Local representative	X	
Master in Energy Efficiency - Universitat Jaume I	University	Castellón	Lecturer	X	
Rural Development area – Universitat Jaume I	University	Castellón	Lecturer		X
RES area – Universitat Jaume I	University	Castellón	Lecturer		X
RES area – Universitat Jaume I	University	Castellón	User		X
Secondary School Alto Palancia (Forestry)	Secondary School	Segorbe	Lecturer	X	
Secondary School Alto Palancia (Electricity)	Secondary School	Segorbe	Lecturer	X	
Espadán Centre of Studies	Private vocational training centre	Vall d'Uixó	Sales representative	X	
Natural Park Sierra Espadán	Natural Park	Eslida	Director	X	
Natural Park Sierra Espadán	Natural Park	Eslida	Technician	X	

ROMANIA					
Băcau County Council	Administration	Bacău	Adviser		X
Local Development Agency, Băcau	Administration	Bacău	Manager	X	X
Bacău Chamber for Commerce and Industry	Association	Bacău	Manager	X	
General Electric	SME	Bacău	Head office	X	X
Electrotehno	SME	Bacău	Head office	X	
DTV Proiect	SME	Onești	Head office	X	
Electro Standard	SME	Bacău	Manager	X	
URBIOLED	SME	București	Head of service	X	
Fruit Trees Association, Itesti	Association	Iteşti	Administrator	X	
"Vasile Alecsandri" University, SER domain	University	Bacău	University professor	X	X
„Gheorghe Asachi" University, Iasi	University	Bacău	University professor	X	
"N.V. Karpen" Technical High-school	High-school	Bacău	Deputy director	X	
„Ion Ghica" Economic College, Bacău	High-school	Bacău	Teacher	X	
Technology High School, Darmanesti	High-school	Darmanesti	Teacher	X	
"Ion Borcea" Technical High-school	High-school	Bacău	Head of the department	X	
The National Agency for Environmental Protection	Government agency	Bucuresti	Counsellor	X	
The Local Agency for Environmental Protection, Bacău	Government agency	Bacău	Counsellor	X	
Vasile Alecsandri University of Bacău	University	Bacău	Assoc. Prof. PhD		X

ANNEX II:

OPEN QUESTIONNAIRE ON TRAINING NEEDS IN THE FIELD OF RENEWABLE ENERGIES FOR RURAL DEVELOPMENT

The information that you provide in the interview will be very useful for carrying out a study on training needs in the field of renewable energy for rural development, developed in the framework of the European project Erasmus + "IN2RURAL. Innovative Practices in Renewable Energies to Improve Rural Employability" (http://www.in2rural.ub.ro/). This project began on 1 September 2014 and is scheduled for completion on 30 August 2017, with the collaboration of various local stakeholders such as municipalities, educational centres, SMEs and cooperatives.

The study, coordinated by Universitat Jaume I of Castellón, is being developed between April and July 2015 in the interior of the provinces of Castellón (Spain), Heves (Hungary) and Bacău (Romania) and aims to contribute to a better understanding of the specific situation of renewable energies in municipalities with less than 5.000 inhabitants. This, to set out throughout the project specific courses and awareness activities that address these demands.

This questionnaire is for reference only and it is not necessary to answer all the questions, but you can focus on those that you consider appropriate to your profile and experience. Next to the questionnaire a series of basic and specific skills can be found, which you can assess according to their importance for the professional performance in the field of renewable energies in rural contexts.

The data that you provide us will be strictly confidential[2] and once the study is completed, you will receive its results.

THANK YOU FOR YOUR COLLABORATION

Date:

DETAILS OF THE INTERVIEWED PERSON:	
Entity	
Town where the entity is located	
Position in the entity	
Name	
Age and sex	
Academic and complementary training	
INTERVIEWER QUESTIONS:	TOPICS TO COVER:
Brief introduction by the interviewer	
PART 1: RURAL CONTEXT	
1. Nowadays, what do you think is the–situation of rural areas in the province of Castellón/Bacău/Heves? And, which could be its possible evolution in the short, medium and long term?	Eg. One, ten, fifty years Population Labour market Economic activities Communications and services Social fabric
2. What initiatives do you think are there (or could be there) in rural areas to enhance / maintain / reverse the situation just described? How to evaluate them?	What do you think about them? What would you do? (as an expert, as a citizen, etc. according to your profile)

[2] *IN2RURAL project will not use the personal data for any other purposes, according to the Spanish Organic Law 15/1999 on Protection of Personal Data.*

What would you do? (as an expert, as a citizen, etc. to the profile)	
PART 2: RENEWABLE ENERGY SOURCES (RES) AND RURAL DEVELOPMENT	
3. Do you know the RES sector?	What is your relationship? Business, technical, user, etc.
4. Which do you think is the role currently played by RES in rural development?	Situation Aspects for and against
5. What do you think could be their role in the short, medium and long term?	
6. What factors / initiatives could promote RES in rural areas?	
7. Do you think there is a demand for RES in rural areas? If yes, why?	
8. Do you know any RES facilities in rural areas? What type?	The most common, the fastest growing lately ... Situation, growth potential ...
9. How do you think that RES could contribute to activate rural development? Do you know any example(s)?	
10. Do you know any successful case in which the use of RES has contributed to rural development? If yes, could you describe it?	
11. In rural areas, what actors (governments, companies, cooperatives, associations, schools, etc.) linked to RES do you know?	
12. Do you consider that there could be generated business opportunities and / or employment related to RES in rural areas? What type?	Legal form of business (commercial, self-employment, cooperative ...) What job profiles may be needed?
PART 3: RES TRAINING FOR RURAL DEVELOPMENT	
13. Do you know the training / educational situation of RES in the province of Castellón/Bacău/Heves? If yes, specify which training offer you know	Why do you know it? What is your connection?
14. Do you know if there is specific training offer on RES and rural development? If yes, please specify	
15. How do you rate this offer? Do you consider that does it meet the needs of companies working in the field of RES in rural areas?	Whether positive or negative, why do you consider it? Does training in the field of renewable energies fit the reality of rural territory? Are the amount of supply and the contents adequate to support growth / development of renewable energies in rural areas? What profiles does this training offer require?
16. Do you consider that there are unmet training needs?	
17. How could you improve the training offer?	
CLOSING QUESTIONS	
18. Do you know of other people or institutions that could provide relevant information?	Detect other key informants
19. Would you be willing to participate in the focus group?	Explain the focus group
20. Other comments:	

ANNEX III:

CLOSED QUESTIONNAIRE ABOUT COMPETENCES IN THE FIELD OF RENEWABLE ENERGY FOR RURAL DEVELOPMENT

PART 1: BASIC COMPETENCES

Rate on a scale of 1-5 the importance of each of these basic competences for professional performance in the field of renewable energies in rural contexts.

1	2	3	4	5
Not important at all	**Unimportant**	**Neutral**	**Important**	**Very important**

BASIC COMPETENCES	1	2	3	4	5
Capacity for analysis and synthesis					
Troubleshooting					
Information management skills					
Interpersonal skills					
Planning and time management					
Oral and written communication					
Use of ICT (Information and Communication Technologies)					
Knowledge of English					
Knowledge of local language					
Teamwork					
Networking (ability to work with different entities)					
Ability to work in an international context					
Ability to learn					
Ability to apply knowledge in practice					
Ability to adapt to new situations					
Priority for quality					
Ability to generate new ideas (creativity)					
Other:					

PART 2: SPECIFIC COMPETENCES

Rate on a scale of 1-5 the importance of each of these specific competences for professional performance in the field of renewable energies in rural contexts.

1	2	3	4	5
Not important at all	Unimportant	Neutral	Important	Very important

SPECIFIC COMPETENCES	1	2	3	4	5
Know the scientific-technical language and the theoretical foundation of the technologies for the application of renewable energy					
Ability to research and develop technologies in the field of renewable energies					
Be able to evaluate the advantages and disadvantages of the various primary and / or final sources of renewable energy, including hybrid systems					
Know how to calculate, measure and evaluate small installations (eg electric power plants up to 100 KW) for export and / or self-consumption of renewable energy					
Perform environmental impact studies of the various renewable energy technologies					
Analyze the environmental problems related to energy and relate them to global warming					
Analyze the role of energy as a production factor in the economic system					
Apply legal and tax issues affecting the renewable energy sector					
Understand the fundamentals of transport and distribution of electricity through the public nets of low and high voltage					
Know the interconnection systems between public networks and small production and / or consumption plants of electricity from renewable energy sources and current charging systems in the EU					
Identify the technical characteristics of the reception facilities of electricity in low voltage, consumer devices and its protection systems					
Analyse the potential for exploitation of energy crops and local processing plants for biofuels					
To be permanently informed about innovations in the field of bioclimatic architecture					
How to apply the Technical Building Code as far as energy efficiency is concerned					
Provide ongoing information about innovations in the field of renewable energy for rural development					
Provide ongoing information about innovations in the field of energy efficiency and savings					
Know the basics of accounting and financial analysis applied to the renewable energy sector and energy efficiency and savings					
Promote the automation and monitoring of production processes and / or final energy consumption from renewable energies					
Understand and relate renewable energy to rural development from a social, economic and environmental perspective					
Have abilities and specific skills for installation and maintenance of small installations using renewable energy					
Other:					

ANNEX IV: GUIDE FOR THE FOCUS GROUP

A. INTRODUCTION

The following guide is an open document that raises general guidelines for conducting the focus groups. It proposes at least one group by country, with a composition of 5 to 8 people. It is expected that a wide spectrum of actors, areas and sensitivities are represented on the information collected in the discussion group.

B. PHASES TO DEVELOP

The following describes and details the phases of preparation and realization of focus group:

1. Identification of relevant actors.
The potential stakeholders of the topic should be identified in the first phase of the project.

2. To decide and prepare the venue and materials
The place chosen must combine characteristics such as easy access for participants, comfort (space and furniture to locate all, temperature, noise...) and have all the appropriate technical and material resources.

The material resources must consider a recorder, the consent documents to authorize the recording, computer and projector, photocopies, paper, pens... and any other equipment considered to be necessary.

3. Selection and invitation of participants, as representatives of the group actors
As mentioned earlier, it is proposed to count with 5 to 8 actors. It can be seen up to 10 people, as there is chance that at the last moment any person can have problems to participate.

They must be informed on the general objective of the project and the specific objective of the focus group (information collection). It is also very important to inform that the session will be recorded in order to prevent future reticence.

4. To elaborate the moderator's guide
The moderator's guide is a tool to assist in the development of the focus group. It also facilitates the monitoring of a common methodology to collect the information from the stakeholders involved in the project.

5. To carry out the discussion group
It is proposed that besided the moderator there is a reporter, part of the research team, who writes the information that is considered to be the most relevant. In this way it will be easier to analyse the recorded information and also to avoid losing information in the case of any technical problem. It also releases the moderator to take notes, allowing him/her to be more attentive to guide the focus group.

6. To develop conclusions
From the recordings and the notes of the rapporteur the views collected are analysed.

C. MODERATOR'S GUIDE

PHASE OF THE FOCUS GROUP	ASPECTS TO BE DEVELOPED
1) Description of the dynamic	- Appreciation for participation. - Explanation of the development of the session (phases). - Presentation of the group of interviewers (roles, notes, recording) and participants.
2) Introductory explanation	- Brief explanation of the objectives of IN2RURAL project (phases to develop and where we are)
3) Explanation of the results of the interviews	- Summary of the results of the interviews: conclusions with consensus, conclusions without consensus, themes to go in depth.

4) Development of the dynamic	- Brief description of the objectives of the meeting: opinions on the previous findings.
	- Respect the opinions and anonymity in the conclusions. There are no good or bad ideas. Freedom to speak but order and respect in interventions. Create a friendly and understanding environment.
	- Review the findings by theme:
	- **Part 1: Rural context**
	  - Current situation of the rural areas in the regions of Castellón/Bacău/Heves
	  - Evolution of the current situation in rural areas in the regions of Castellón/Bacău/Heves
	  - Existent or potential initiatives to reverse the current situation
	- **Part 2: Renewable energies and rural development**
	  - Knowledge of the renewable energy sector
	  - Current role of renewable energy for rural development
	  - Role or renewable energies in the short, medium and long term for the rural development
	  - Factors or initiatives that could boost renewable energy in rural areas
	  - Current demand for renewable energy in rural areas
	  - Knowledge of renewable energy facilities in rural areas
	  - Success stories of contribution of renewable energy to rural development
	  - Stakeholders related to renewable energies in rural areas
	  - Generation of employment and business opportunities related to renewable energy in rural areas
	- **Part 3: Training in renewable energy for rural development**
	  - Knowledge of training / educational situation of renewable energy in Castellón/Bacău/Heves
	  - Knowledge of specific training offer on renewable energy and rural development
	  - Evaluation of this training offer
	  - Unmet training needs and possible improvements to be made

5) Conclusions and acknowledgments	- The session will be closed with the perception of the participants and the appreciation for their contributions. - Expose the opportunity to benefit from the university services to companies. - Leave the door open for future contacts (recognition of the participation in the project, public presentations of the project results, etc.).

Renewable Energies (RES) are seen as one of the future local development sectors. In fact, the 2020 targets for European Union include obtaining 20% of energy from renewable sources. Jobs in this sector cover a wide range of occupations and it is foreseen that new possibilities will be created in rural areas, where there are fewer industrial alternatives.

This study provides information about the current and expected situation of the RES labor market, taking into account social, economic and environmental aspects.

In addition, the research identifies the training needs for future workers in the renewable energy market and compares the specific demands and potentials in three study cases: Bacău (Romania), Castellón (Spain) and Gyöngyös (Hungary).

In the frame of the Erasmus+ project IN2RURAL (Key Action 2), the document intends to provide useful information not only for universities and educational centers, but also for governmental agencies, business sector and civil society organizations involved in improving employability in rural areas.

IN2RURAL

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