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How to Reduce Youth Unemployment by Fighting Climate Change

A Study in Greece and Southern Spain

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¹ It is the overarching goal of the EUKI to foster climate cooperation within the European Union in order to mitigate greenhouse gas emissions. It does so through strengthening cross-border dialogue and cooperation as well as exchange of knowledge and experience. The information and views set out in this report are those of the authors and do not necessarily reflect the official opinion of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

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1. Introduction

Youth unemployment in southern and eastern European countries is catastrophic and the resulting uncertainty and lack of prospects forms a heavy burden for young people. Its potential consequences might call into question the entire future of the European Union (EU).

To undertake serious steps to, at least, alleviate this scandalous situation, young people need to be trained and employed in vocational fields that are important for the sustainable development of the EU and thus offer a viable future for these young people and for the EU itself. One of these vocational fields is the development of a climate-friendly, modern and decentralized energy supply based on efficiency, economy, renewable resources and storage technology. This was once again underlined by the commitments entered by the EU at the Paris climate conference (COP21).

The feasibility study summarized in this paper investigated conditions for the energy transition and climate protection in selected regions of Spain (Cádiz) and Greece (Attica region) and analysed possibilities and obstacles for youngsters to be employed in tasks relevant to energy transition in these regions. It also tried to identify vocational qualifications required for harnessing this employment potential. The special “appeal” of our study is that by identifying much-needed qualifications for currently unemployed young people, new career prospects could open to them. This will not only enable them to earn a living on their own but will also provide valuable additional impetus for the expansion of renewable energy, energy-saving and energy-efficiency measures, ultimately combating energy poverty and facilitating the energy transition and climate protection in the target regions.

These findings can and should be used to initiate training projects to provide young people with necessary qualifications and utilise funding from both national and European programmes such as the European Youth Guarantee and the European structural funds. The European investment funds set up by the European Commission since 2015 would also appear to be a suitable source of funding. The necessary involvement and support of political actors has been assessed and prepared in the target regions as part of the feasibility study.

The study aimed to identify specific projects which can already be carried out, are suitable for implementation in the investigated target regions and could be transferred to other European regions facing similar issues².

For the feasibility study, we selected Greece and Spain as the two countries with the highest rates of youth unemployment in 2016. According to Eurostat³, in the group of unemployed persons aged between 15 and 24

- 47.3% are unemployed in Greece, of which 72% over a long period of time
- 44.4% are unemployed in Spain, of which 48.4% over a long period of time.

However, the Eurostat unemployment rate is only indicative when viewed as a comparison because it also classifies young people as being “unemployed” who are currently in training but are not working. The percentages of young people who are neither in employment nor in

² Cf. chapter 6 “Recommendations”.

³ Eurostat, news release, 72/2017 - 27 April 2017.

education and training are therefore helpful to gain a deeper understanding. For the year 2016, Eurostat lists the share of such young people in Greece at an alarming 37%, in Spain 26%.⁴

These two countries were selected furthermore because their climate offers particularly favourable conditions for solar and wind energy and, as well, in their present conditions they are offering a great scope to increase efficiency and reducing energy consumption.

For the study we selected

- the urban agglomeration of Athens in Greece and
- the southern Andalusian province of Cádiz in Spain.

The unemployment situation for young people in Athens is representative of the national average at 45.4%. In Andalusia the youth unemployment rate reached the peak value of 57.9% compared across all European regions in 2016. The Europe-wide mean average for the same year was 18.7%.

We decided to use regions with different demographics and settlement structures to compare vocational training relevant for climate protection both in an urban and in a more rural small-town milieu, enabling us to assess whether different approaches in targeted training programmes are necessary.

In Greece, one third of the population lives in the agglomeration of Athens. Particularly, the young generation is attracted from other Greek regions to the city in order to find a new place to base their lives.

In the province of Cádiz, we concentrated on comparatively small municipalities: The “La Janda”⁵ association of municipalities covers an area of 1,500 km² with eight municipalities and a total of 82,000 inhabitants. In the region which was predominantly agricultural, the property rights of land are extremely unequal and dominated by large estates, thus a large majority of the rural population does not own land. The diminishing importance of the agricultural sector for the economy and employment has not been compensated by developments in other sectors. As a result, since at the latest in 2007 and the beginning of the Spanish recession, the five small inland towns of La Janda have been among the municipalities with the country’s highest unemployment rates. Despite the limited economic upswing over the last years, according to official statistics, in these towns the general level of unemployment in January 2018 (the time of our field study) still ranged between 34% and 37%.

For La Janda, official data on the unemployment rate of inhabitants under the age of 25 in the last couple of years were not available. But it can be assumed that in this formerly rural region the rate is significantly higher than the average for the province, for which the rate was 46.3% for the age group 16-30 in 2016⁶. It should also be considered that a large number of

⁴ Eurostat, Share of young people (aged 20-34) neither in employment nor in education and training, 2016, URL: [http://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Share_of_young_people_\(aged_20%E2%80%9334\)_neither_in_employment_nor_in_education_and_training_by_sex_2016_\(%25\).png](http://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Share_of_young_people_(aged_20%E2%80%9334)_neither_in_employment_nor_in_education_and_training_by_sex_2016_(%25).png).

⁵ Named after a lake which was drained during the Franco dictatorship.

⁶ According to an analysis of the national statistics commissioned by the union Comisiones Obreras. La Voz de Cádiz, 21.10.2016.

young people are only employed on a temporary basis⁷ and often have to work under non-regular conditions or without contributing to the social security system.

The following questions guided the empirical part of our research:

- What are the current employment prospects and chances of young women and men who have completed relevant vocational training, particularly, in energy-relevant areas?
- What opportunities exist in the near future for young women and men from the region who receive targeted and professional training in activities and professions that are useful for combating climate protection in general and the energy transition in particular?
- What are current deficits in training and education and other factors relevant for later employment that make it difficult for trained young people to be taken on? How can such deficits be eliminated?
- Is it possible to improve their chances, if their professional education will be more narrowly linked to practical work in companies?
- How do young people perceive the impending climate catastrophe, energy transition and their own professional future?
- What is the level of interest and willingness among municipal politicians, local administration and companies in the investigated area to get involved in training and education projects in climate protection and the energy transition and to support such projects and, if so, in what ways?
- In view of all this, what proposals can be developed for targeted activities that are useful for combating climate change and at the same time reduce youth unemployment?

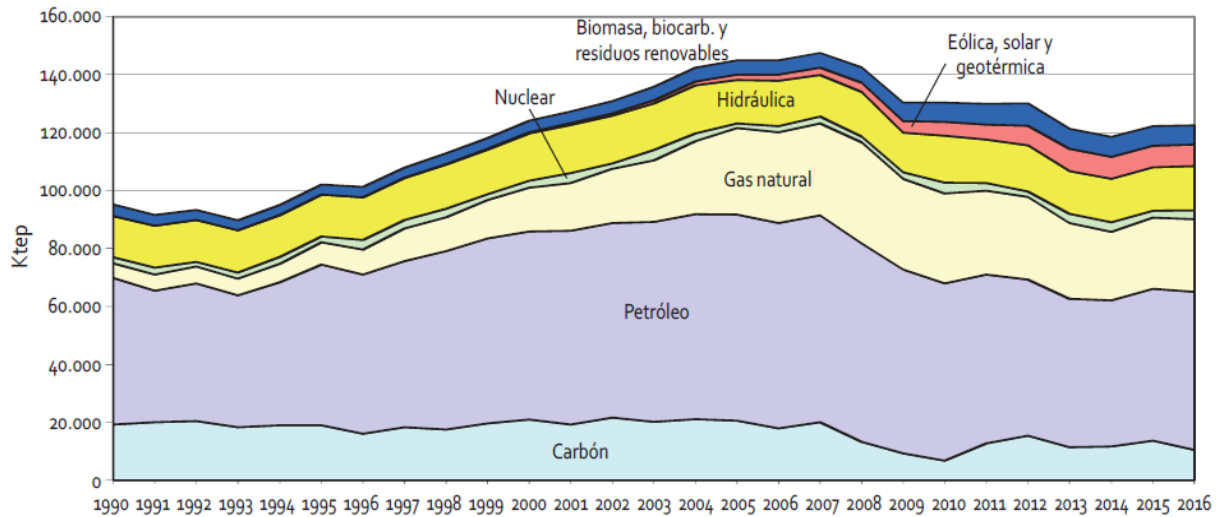
The empirical research for the study was mainly conducted at the beginning of 2018, with research groups in the province of Cádiz and the region of Athens; they were finished by two conferences with actors and stakeholders in Athens and Cádiz some weeks later. Because of different accesses and contacts in the field, not all activities and results of the research can be held strictly in parallel.

⁷According to the aforementioned study, this accounts to more than 50%. Bad working conditions for young people are analysed in Hartwig Berger, *Abgehängt in Europa*, URL: www.hartwig-berger.de.

2.1 Spain

2.1.1 National Level

Development of Primary Energy Consumption, 1990 - 2016 (ktep)⁸



In analyzing the figure, we state a steadily increase of energy consumption up to 2007, followed by a strong decline up to 2014, which can be explained as a consequence of the economic crisis. So, from a “climate protection” point of view, in the following years Spain needs an ambitious policy of energy efficiency, energy saving and putting in use renewable energies to fulfil the targets in the reduction of greenhouse gases.

Secondary energy consumption 2016 (ktep)⁹

Coal	1.340
Fuel	41.266
Gas	13.446
Electricity	20.115
Renewables	5.384
Total	81.550

In analyzing the distribution of energy consumption, primary as well as secondary, we state an extraordinarily high proportion of energy imports, because neither fuel nor gas is produced in the territory of Spain. During 2015 the importation of energy, mainly fuel, amounted to 73%, with financial costs of 26.000 million €¹⁰. We conclude, that there a also strong economic reasons, to develop the high potential of renewal energies in the country and in energy saving activities.

Energy consumption/sectors¹¹

Transport	40,4%
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⁸ C.f. Footnote 8: La Energía en España 2016, Ministerio de Energía 2017, p. 338.

⁹ La Energía en España 2016, Ministerio de Energía 2017.

¹⁰ <https://www.appa.es/la-energia-en-espana>

¹¹ La Energía en España 2015, Ministerio de Energía 2016.

Industry	25,1%
Residence	18,7%
Service	11,2%
Agriculture	3,5%
Rest	1,0%

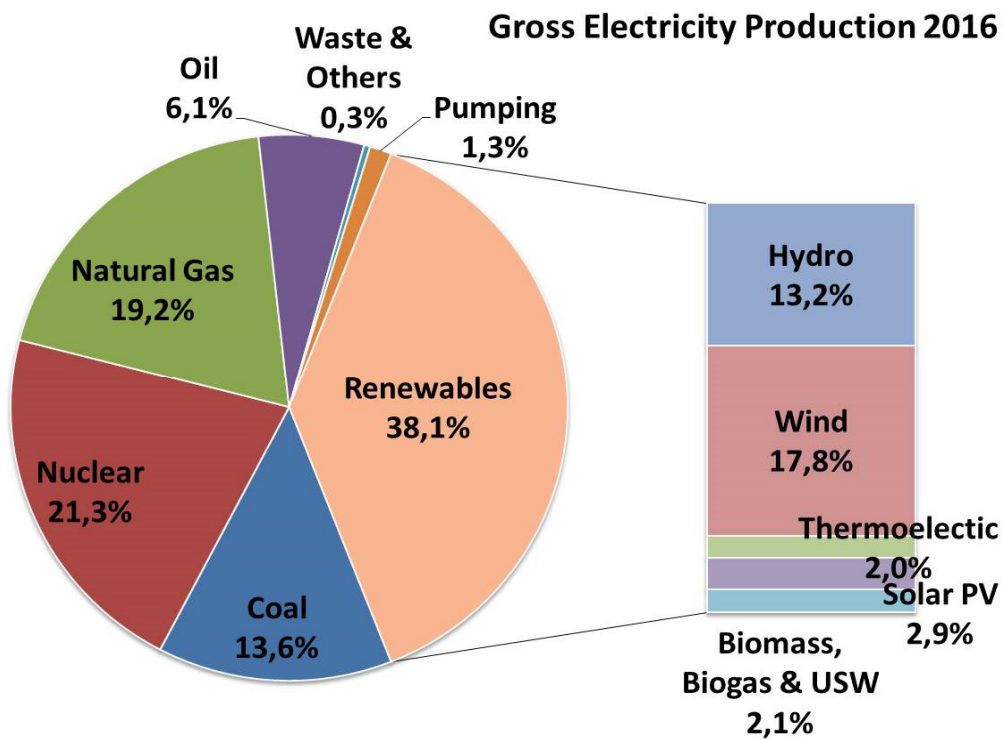
The proportion of the transport sector in the energy consumption is relatively high. So, it is urgently necessary to include the sector of transport and mobility in activities of energy transition aiming to reduce climate gases significantly.

Greenhouse gas emissions (milliontons)¹²

2005	439
2008	407,7 ¹³
2013	322,9
2014	324,2
2015	335,7
2016	338,8

The figures presented do corroborate the conclusion given above, that the reduction of greenhouse gases since 2001 were mainly, if not exclusively, a consequence of the economic crisis; and secondly, that there must be expected an increase of greenhouse gases in the following years, being disastrous for a policy of climate protection, if there aren't significant and successful activities of climate protection in Spain, just in the coming years.

Sectors of Gross Electricity Production 2016:



¹² Ministerio para la Transición Ecológica 2018. www.mapama.gob.es.

¹³ The diminishing of greenhouse gases between 2007 and 20014 is caused mainly by the economic crisis.

The total capacity of wind energy was 23.047 MW, PV solar energy 4.675 MW and solar thermal energy 2.250 MW at the end of 2016. The total share of renewables in final energy consumption was 6.6% in 2016.

However, this snapshot should not obscure the fact that the development of renewable energies in Spain has been stagnant since 2011 in particular, as a result of new legal and financial rules braking its further development. But recently, in 2017, the government opened a public auction offering 8.000 MW new capacities for companies to construct large-scale wind and solar plants.

Spain, particularly in the southern regions, offers very favourable climatic conditions for solar power generation and consumption. Due to high levels of sunlight and frequent cloud-free days, the yield of a solar energy system in the province of Cádiz is 60-70% higher than for comparable systems in Berlin. Furthermore, in the coastal and mountainous parts of Spain and southern Spain there are excellent conditions for using wind power.

The clearly emerging effects of climate change in Spain will inevitably force the country to take far more action towards an effective energy transition than it has done to date. The periods of drought in the last few years are a clear signal. The capacity of the water reservoirs which are used to supply drinking water and to generate power dropped by 51% from January to July 2017. The electricity generated by hydropower was replaced by energy from coal and natural gas. As a result, the CO₂ emissions produced by coal-fired power generation rose by 72% and from natural gas by 30%¹⁴.

In summer 2017, the government presented its draft bill for climate change and energy transition (Ley de Cambio Climático y Transición Energética) and called for social participation which was not described in further detail. It is expected that the law will be passed by parliament in 2018. By implementing this act, the government wants the country to take a leading position in the use of renewable energy and give greater weight to the promotion of energy efficiency. The targets proposed for 2030 are:

- By 2030 greenhouse gas emissions in the sector outside of the Emission Trade System (such as buildings, transport, agriculture and small industry) are to be reduced by 26% compared to the reference year 2005. It should be noted that the financial and economic crisis in Spain from 2007 to 2014 resulted in an approximately 20% reduction of CO₂ emissions, which means de facto that the country would only have to impose minimal reduction obligations. The total emission of greenhouse gasses was 336 million tonnes in 2015, with a significantly rising tendency since.¹⁵
- With regard to increasing energy efficiency, the EU target of a 30% increase in efficiency compared to 2010 is only to be used as orientation and is not binding. *“Spain (still) has to define its contribution to the EU target.”*¹⁶
- The 27% target for renewables in the total energy mix is likewise stated as a goal but is not binding.

¹⁴ El País, 17.8.2017.

¹⁵ Generalitat de Catalunya 2017, Emission Inventory for Spain; URL, http://canvclimatic.gencat.cat/en/politiques/inventaris_d_emissions_de_geh/emissions_de_geh_a_espanya/.

¹⁶ See European Commission 2018, EU target info, URL: <https://ec.europa.eu/energy/en/topics/energy-efficiency>.

The new government in Spain, entering 1 June 2018, declared to strengthen these targets significantly. The ministry for Ecology and Energy Transition, Teresa Ribera, counts it necessary to reduce CO₂ emissions until 2030, compared with 1990, by 45% and to close all carbon centrals already before 2030.¹⁷ In the decision of the European climate goal in the European Council, June 2030, Spain was engaged to decide the more ambitious goal of 32% renewable energies until 2030.

The purpose of the National Action Plan for Energy Efficiency 2017-2020 in Spain is to respond to the requirement of article 24.2 of Directive 2012/27 / EU of the European Parliament and of the Council, of October 25, 2012. The action plan contains several activities related to energy efficiency in the building sector, combined with financial funds for realising it e.g. the yearly renewed “Aid Program for Energy Rehabilitation of Existing Buildings (PAREER-CRECE)” the Investment Fund for Diversification and Energy Saving (F.I.D.A.E.) and the JESSICA portfolio fund (Joint European Support for Sustainable Investment in City Areas).

The expected implementation of the efficiency standards for buildings certainly has a strong impact on the economic demand and employment (cf. ch.4.1). Undisputed is a far higher demand for qualified workers and therefore for related training. However, such a development has yet to be observed in Spain. The main reasons for this are

- that the efficiency standards have not yet been stipulated by law and
- that there is an inadequate or complete lack of checks for upcoming new build and renovation projects.
- That it would be necessary to monitor and evaluate the effects of efficiency increases over the course of time and correct them as necessary.

It is essential that not only building projects are supervised by specially trained “gestores de energía” (energy consultants and energy managers) but also any work carried out by companies of all types and public institutions.

2.1.2 Regional Level: Andalusia

The regional government of Andalusia presented its own strategy for a climate-friendly energy transition for the period 2014-2020¹⁸:

- Use of primary energy to be reduced by 25% over the period 2007-2020
- By 2020 renewable energy should account for 25% of final energy consumption
- 5% self-consumption of generated solar energy
- Decarbonisation of 30% in relation to 2007 as the reference year,
- Qualitative improvement in the supply of energy of 15%, in particular with regard to geographically marginalised small towns and settlements.

It is envisaged that the energy transition will play a key role in the economic and labour market development of this high-unemployment region.

However, the draft climate change bill presented for debate by the government in autumn 2017¹⁹ only sets out limited reductions in emissions, which from an international perspective

¹⁷ E.g. El País 2.7.2018, interview with the ministry.

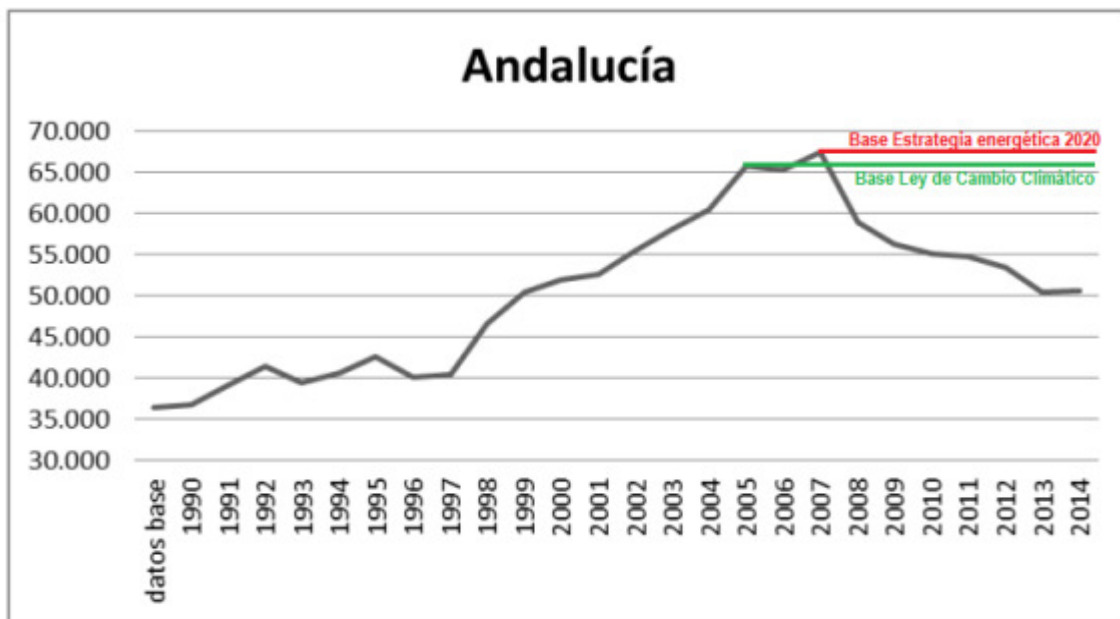
¹⁸ Estrategía Energética de Andalucía 2014-2020, published by the Junta de Andalucía, Sevilla 2013.

will barely contribute towards reducing the impact on the climate. The target set for Andalusia until now is merely an 18% reduction in “diffuse” CO₂ emissions (emissions not covered by European emissions trading²⁰) calculated on a per capita basis by 2030. This would mean that the region would even fall below the national government’s target of minus 26% for 2007-2030 actually. This is justified on the basis of Andalusia’s low GNP compared to the rest of the country. As CO₂ emissions decreased by around 20% due to the economic recession from 2007 to 2012, this would result in an effectively unchanged level of 4.1t CO₂ per person and year.

Until now, the plan makes no provision agricultural measures beyond the scope of usual practice, despite the fact that agriculture is an important source of greenhouse gas emissions in Andalusia and is particularly vulnerable to the effects of climate change in the region (extreme weather events, increased erosion and the first signs of desertification).

The following graph charting the development of greenhouse gas emissions in Andalusia²¹ from 1990-2014 clearly shows how climate protection ambitions have declined when 2005 is taken as the reference year instead of 1990.

Figure 1: Total GHG emissions in Andalusia, 1990-2014
Emisiones totales de GEI (en miles de Tm de CO₂ equivalentes) entre 1990 y 2014 en Andalucía



Fuente: OS 2016 a partir de datos del MAGRAMA

Of particular interest for our feasibility study is the chapter on the planning instruments of municipalities. It requires all communities with more than 50,000 inhabitants to draw up “municipal plans to combat climate change”. Municipalities with under 50,000 inhabitants and municipal associations have the option of developing climate plans at their own initiative. Mandatory activities in both cases include:

¹⁹ Boletín Oficial del Parlamento de Andalucía, 10.10.2017

²⁰ As well the definition in the annex of the climate plan.

²¹ <https://calentamientoglobalclima.org/2017/05/10/cambio-climatico-en-andalucia-aqui-y-ahora/>.

- Balancing and evaluating greenhouse gas emissions from and by the municipality
- Concrete estimates of the vulnerability of the entire municipality area due to climate change
- Targets and strategies for reducing emissions and climate adaptation
- In particular also emission-reducing measures in transport to improve air quality

The plan must be presented for discussion within the community of residents.

2.1.3 Municipal Level in the Province of Cádiz

In the viability study, interviews were held with four mayors and six councillors in six towns of “La Janda”, as well as with the president of the intercommunal association “La Janda”. Furthermore, there were held interviews with the councillor for environment and energy in the city of Puerto Real, with experts of the town hall in the cities of Cádiz and Rota and, already last summer, with the mayor of Cádiz. Topics of the interviews were activities and experiences of the municipality concerning “energy”, as well their assessment of projects to qualify unemployed youngsters in this field.

All mayors and councillors assessed such project plans positively. They are ready to act as intermediaries to local companies, to provide premises and other necessary infrastructures, in addition to collaborate in the selection of students for a possible project to train unemployed youngsters as energy experts. Regarding the financial contributions of the municipality, they are more cautious. However, they guarantee, if requested, participation in project applications at EU level with competent institutions such as universities.

In the communities of larger size – Cádiz (119.000 inhabitants), Puerto Real (41.000) and Rota (29.000) – the town halls are focused on realizing a sustainable energy transition. E.g. they ordered energy audits for the public buildings to learn where saving energy seems to be urgent and effective. They started a narrow cooperation with the local public/private electric companies for common activities, e.g. in Cádiz for energy advisories and for fighting against energy poverty. They aim to reach as soon as possible 100% renewables in public use of electricity. In the schools, which are administrated by the municipality, they initiated so called “fifty-fifty” projects: the school pupils, together with the teachers are engaged to reduce energy, receiving 50% of the monetary result for their own and sustainable use. The town hall of Cádiz is arranging each year a whole week for energy efficiency and renewables, with many public activities. Furthermore, the community is cooperating with the university in exemplary energy renovating projects. They offer free energy advice courses for inhabitants of the city and they decided a free basic-energy provision for the households in a highly precarious condition (about 2.000).

Autumn 2017, together with a local NGO engaged against energy poverty, the town hall started a campaign giving advices to poor families how to save money in managing better energy. The advices were given by eight persons who were formerly unemployed. Until July 2018 there were given advices in 264 households and advisory courses for 1,274 participants. The amount of financial saving is estimated between 50.000 and 100.000 €. ²²

²² Diario de Cadiz, 19.07. 2018.

The smaller town halls of La Janda interviewed (4.400 – 12.000 inhabitants) are in a more difficult situation, because of lacking funds and, more important, qualified personnel in energy tasks. So, they depend from the advices of the public Energy Agency Cádiz, which is responsible for the more than 30 towns with less than 20.000 inhabitants in the province. Nevertheless, they were and are engaged in putting solar panels on public roofs and presently in installing energy-saving LED-systems in the public illumination of the whole community. The schools, mainly in the smaller towns, are in a bad state from an energetic point of view, suffering of too much heat in summer and too much cold in winter, so it is urgent for them to start climate-friendly renovation.

In general, the need and possibilities for energy saving measures as well as for the use of solar energy are great and urgent in these communities, due to bad insulation in their public as well as private buildings, and with favourable plain roofs for installing solar panels. The climate conditions are favourable too: 3,000 hours sunshine each year and a solar intensity 67% higher than e.g. in Berlin. In addition, this region is, besides the region of Gibraltar, the provincial centre for wind power plants, 1,500 MW in the whole province. So, the regional government will set up a “Wind Innovation Centre” in one of the towns (Alcalá de los Gazules), co-financed by European funds. In the surrounding of another town (San José del Valle) a large thermo-electric power plant was installed. They intended to amplify these installations in the last years just here, but decided to relocate these plants to Morocco, for not receiving the necessary permissions from the Spanish government.

Provided with good traffic connection (harbours in the bay of Cádiz, airport and highway in the neighbourhood) the communities of La Janda could be a promising site for energy companies, thus offering qualified work for the youth in this region, which suffer from high unemployment.

2.2 Greece

2.2.1 Energy – Key Data

The country’s energy, electricity and renewable energy (RES) markets are changing rapidly. The Greek energy market is currently reformed according to the 3rd Energy Package of the European Commission. The Greek Ministry of Environment and Energy (MEEN) has prepared, and the Parliament has passed, laws that provide an umbrella framework for the necessary reforms. These reforms include increasing competition in the electricity and gas wholesale and retail sectors.²³ It is estimated that between 2016 and 2023 about 20-30 billion € will be invested in energy projects in Greece, of which 9 billion € will be invested in the expansion of renewable energy sources.²⁴ In the following, a brief description of the energy mix in Greece will be delivered with the aim to allow for a glance into the energy future of the country:

The energy mix of Greece is still dominated by fossil fuels although there is an improvement from 94.4% (1990) to 85.1% (2015) in fossil fuel consumption. Lignite, until now, is practically the only domestic fossil fuel available. Greece imports 100 % of the

²³ CNN Greece, Chancen und Herausforderungen im Energiesektor in Griechenland, URL: <http://www.cnn.gr/oikonomia/insights/story/51441/oi-eykairies-kai-oi-prokliseis-gia-tin-energeia-stin-ellada>.

²⁴ IENE study 2017, South East Europe Energy Outlook 2016/2017, Athens.

natural gas and 98 % of the oil consumed in the country, with an energy dependency rate as high as 73.6 % (2015) as opposed to an average 53.6 % for the EU-28 according to Eurostat. Greece spends more than 30 billion € annually for the import of fossil fuel. The leading import product in Greece is crude oil making up about 21.9% of the total imports at \$ 13.8 billion, followed by refined oil which accounts for \$ 4.24 billion and petroleum gas at \$ 1.19 billion. Among Greece's export products are refined petroleum at \$ 10.5 billion which contributes to 31.5% of the total exports. International oil prices have experienced a sharp fall for some years, which is considered to be highly supportive for oil-dependent economies such as Greece. However, this dependence on fossil fuel cannot support the Greek economy in the long term as it is very vulnerable to rising oil prices.

Key data

Figure 2: Total Primary Energy Supply (TPES)²⁵

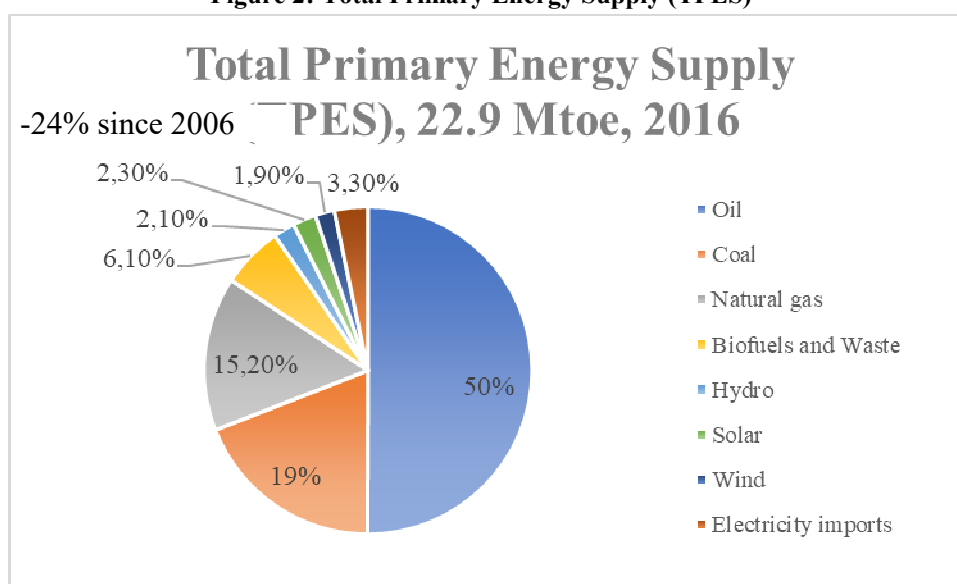
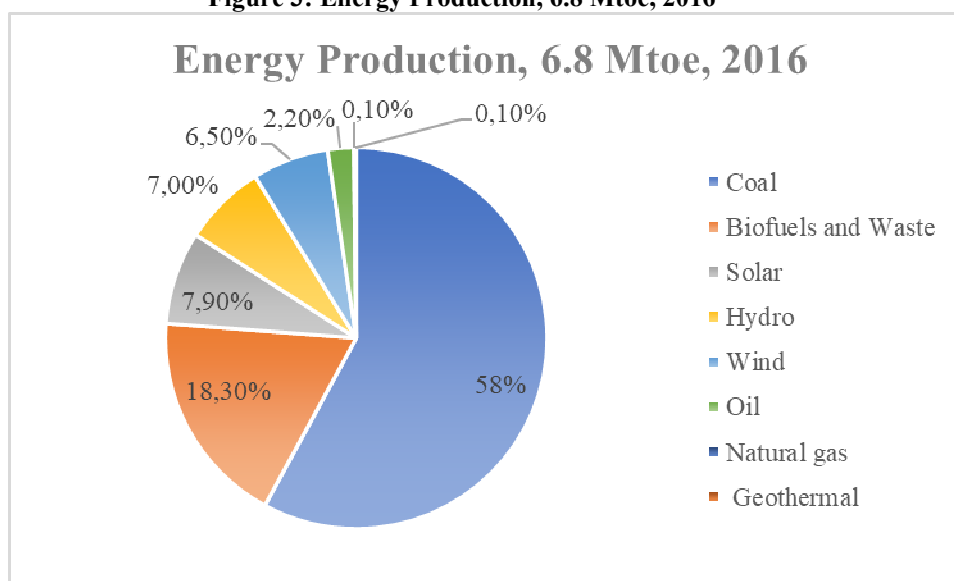


Figure 3: Energy Production, 6.8 Mtoe, 2016²⁵

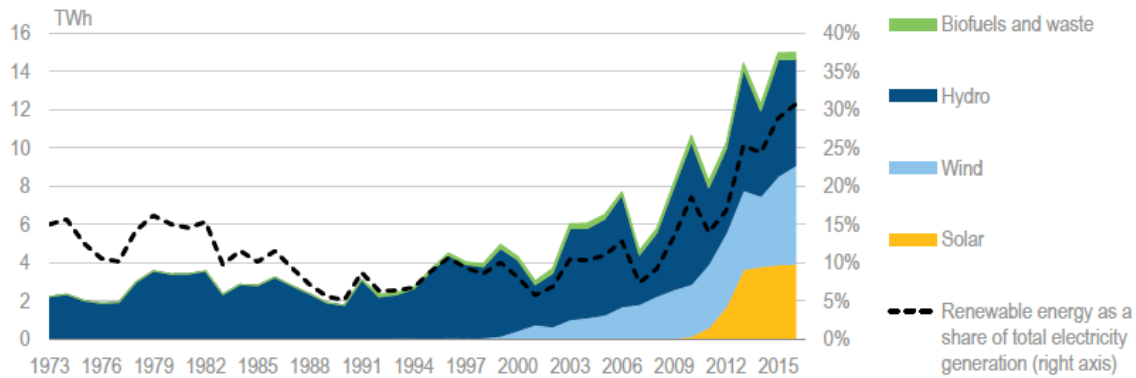


²⁵ IEA World Energy Balances 2017, URL:

<https://www.iea.org/publications/freepublications/publication/EnergyPoliciesofIEACountriesGreeceReview2017.pdf>.

The transport sector is the largest energy consumer, accounting for 35% of total final consumption, followed by the residential (27%), industry (23%), and commercial (15%) sectors.

Figure 4: Renewable energy share of electricity generation, 1973-2016²⁶
Renewable energy share of electricity generation, 1973-2016



Note: Data are provisional for 2016.

Source: IEA (2017a), *World Energy Balances 2017*, www.iea.org/statistics/.

The share of renewables in the total primary energy supply (TPES) has increased substantially in recent years, to a new peak level of 12.5 % in 2016. Solar energy has increased nearly five-fold since 2006 and accounted for 19 % of renewables in TPES in 2016. Wind power has also increased rapidly and more than tripled over the last decade.

- New renewable energy law provides feed-in premiums and introduces tender schemes for PV
- Greece records second best year in Wind Power installations in 2016
- New RES projects calculated to total 1.2 to 1.5 billion € between the 2018-2020 period. The proposals include tenders and licensing of wind farms and photovoltaic panels totaling 1,300 MW.²⁷

The energy production of island communities is still heavily based on fossil fuels. Electricity demand is met by oil-fired plants (approximately 85 %) and to a smaller extent by RES installations (approx. 15 %). Therefore, increasing the interconnection between these numerous islands is identified to be a vital task in the coming years in Greece. In consequence, this would allow to decrease the share of oil consumed in favor of tapping the potential of RES available in the Aegean Sea.

The planning and implementation of future large-scale energy projects is heavily focussed on utilising fossil fuels such as the Trans Adriatic Pipeline that shall tap the natural gas deposits in Azerbaijan for European consumers as well as the extension and the construction of two new lignite-fired plants, Ptolemaida V (660MW) and Meliti II (450MW) (for more

²⁶ © OECD/IEA 2017, *World Energy Balances 2017*, IEA Publishing. Licence: www.iea.org/t&c.

²⁷ IENE study 2017, *South East Europe Energy Outlook 2016/2017*, Athens.

information please see Annex), hence, extending the structural dependency on fossil fuels due to new infrastructure.

2.2.2 Potentials and Strategies in the Field of Renewable Energies

Climate and energy policy are both anchored institutionally in the Ministry of Environment & Energy (MEEN). It is responsible for coordinating actions for climate protection and works towards both mitigation and adaptation to the implications of climate change as well as the enhancement of mechanisms and institutions for environmental governance. In this capacity, MEEN is responsible for the identification of climate change impacts, the planning and coordination of adaptation measures and policies and the establishment and preparation of a national adaptation strategy.

MEEN, the Athens Academy and the Bank of Greece signed a memorandum of cooperation in 2016 for the development of the "National Strategy for Adapting to Climate Change", which has been adopted by Law 4414/2016²⁸.

2016, the National Renewable Energy Action Plan was drawn up at implementation of the European Energy Policy in relation to the penetration of RES, energy savings and limiting greenhouse gas emissions, to which all Member States of the European Union are committed to implement until 2020:

- (a) 20 % reduction in greenhouse gas emissions compared to 1990 levels according to Directive 2009/29/EC,
- b) 20 % penetration of RES (with the national target of 18% for Greece) in gross final energy consumption in accordance with Directive 2009/28/EC and
- (c) 20 % primary energy savings.

In the context of the adoption of specific development and environmental policies, the Greek government has increased the national target of RES share in final energy consumption at 20 %; specifically, this target is differentiated in 40 % participation of RES in power generation, 20 % in heating and cooling needs and 10 % in transport. The virtual net metering provision were signed into the law by the Greek government in May 2017.

Total greenhouse gas emissions in Greece (including international aviation, indirect and excluding LULUCF²⁹ started from 150,6 Million tons(t) of CO₂ equivalents for 1990 and 98,6 Million t of CO₂ equivalents in 2015 (that is 2,2 % of the total EU emissions in 2015).

The national installation targets for solar PV are already exceeded, reaching 2.600 MW contrasting the targeted 2.200 MW for 2020.

Greece's renewable energy share in Gross Final Electricity Consumption reached 24.5 % in 2015 compared to the National Renewable Energy Action Plan (NREAP) target of 26 %, according to data from the NREAP third progress report (2016)³⁰. Greece has added over 2 GW of PV capacity to the grid since 2011, making it the country with the third-highest share of solar PVs among EU Member States in 2016. The current variable renewable energy

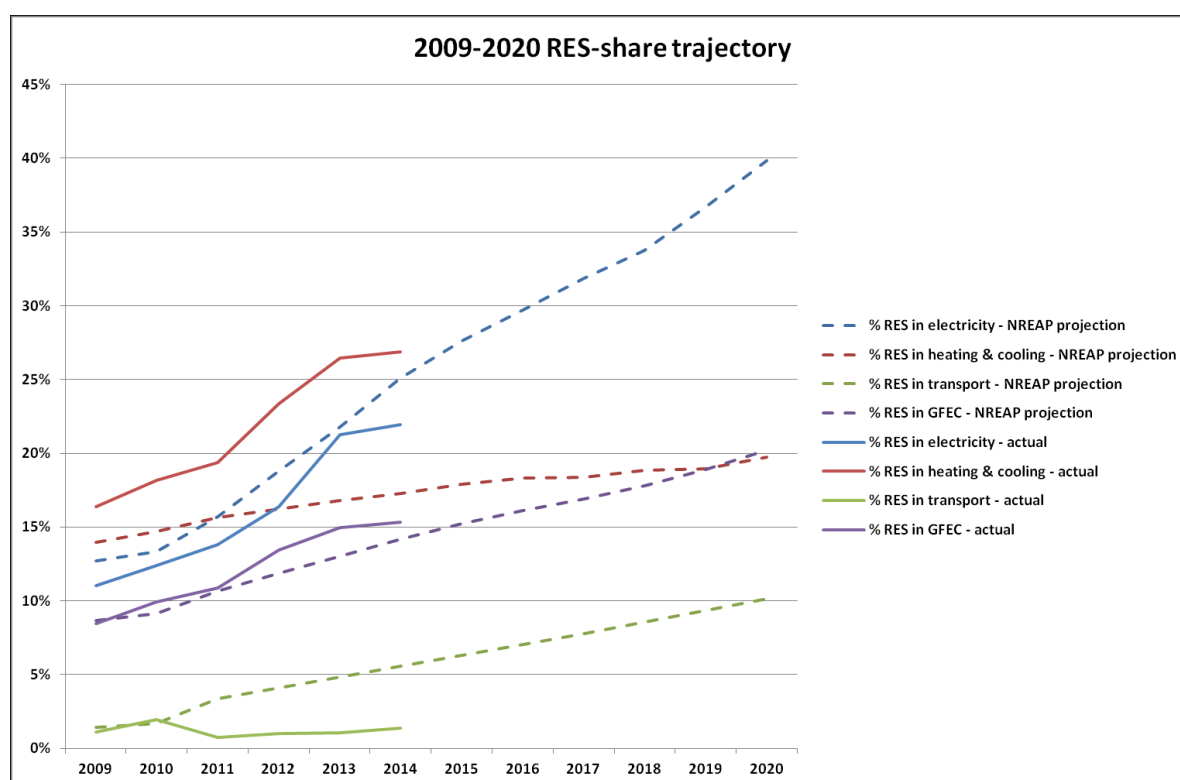
²⁸ RES Legal, 2017, Law No.4414/2016, URL: <http://www.res-legal.eu/search-by-country/greece/sources/t/source/src/law-no44142016/>.

²⁹ LULUCF stands for Land Use, Land Use Change and Forestry. It is one of the sectors under the United Nations Framework on Climate Change that measures and accounts for emissions and removals of CO₂ from land and forests.

³⁰ Greek Ministry of the Environment and Energy 2016, Third Progress report on the promotion and use of energy from renewable sources in Greece; URL: <https://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports>.

penetration levels place Greece within the top five countries among EU member states. This highlights Greece's enormous potential for the deployment of RES and especially solar power. Thus, it can be expected that significant employment effects correspond to job profiles relating to the installation and maintenance of renewable energy plants, which will be highlighted briefly in the following subchapter. According to the NREAP third progress report (2016)³¹, RES share trajectory from 2009 to 2020 is shown in the following diagram, depicting this high growth potential especially for RES in actual electricity production.

Figure 5: Renewable Energy Sources-share trajectory, 2009-2020



Source: Greek Ministry of Environment and Energy, 2016, Third Progress Report on the Promotion and Use of Energy from Renewable Sources in Greece

The current installed capacity of RES (excluding large-scale hydro power plants) in Greece is more than 5.3 GW, with 2.6 GW being PVs, 2.4 GW wind, and the rest mainly small hydro and biomass. The interconnection of islands with the mainland will help to avoid the curtailment of wind and solar generation. Future grid development is likely to start with fresh capital and ambitions based on recent reforms in the power sector, notably the unbundling of network operation and ownership in accordance with the 3rd Energy Package. Interconnections and options for storage and hybrid plants can further enable Greece to maximize the benefits of renewable power, if renewable energy is produced on islands and is exported to the mainland.

The participation of actors from civil society concerning climate and energy policy saw a sharp increase in the last few years. Notable contributions come from actors attempting to promote the green energy transition, simultaneously taking into account the social hardships connected to energy such as energy poverty.

³¹ Greek Ministry of the Environment and Energy 2016, Third Progress report on the promotion and use of energy from renewable sources in Greece; URL: <https://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports>.

3. Industry in the Energy Sector

3.1 Spain

3.1.1 Sun and Wind Power in the Province of Cádiz

Due to its climate (lots of sun, lots of wind), the province of Cádiz offers favourable conditions for a solar energy transition. A quarter (24%) of Andalusia's present wind and solar capacity is installed there (figures as at mid-2017), in particular 1,500 MW of wind farms, which are largely located just in the target area of our feasibility study, as well as in the region near the Strait of Gibraltar. Around 100 companies in the province are involved in the production, installation and development of renewable energy, employing an estimated 3,000 direct and indirect employees³². The climatic conditions for generating solar energy are excellent. The average yield solar panels in the Cádiz region, with 1.630 kWh per kW is 68% higher than, e.g. in Berlin, with a relatively constant medium yield (minimum 96kWh in December, maximum 161 kWh in July)³³. Only some Greek islands, Sicily and Cyprus have comparable climatic conditions. Therefore, under legal conditions more favourable than presently, one has to expect a strong boom in generating and using solar energy.

The same applies to solar thermal power, already implanted in many buildings in the region. In the end of 2016, Andalusia, with 810.984 m² solar heat in function, was the first region in Spain³⁴. In the next years, under the climatic conditions it seems possible to use solar heat rentable for warming and cooling, too.

Also of note is the engagement of the Navantia shipyard in the Bay of Cádiz. In addition to traditional shipbuilding, it now specializes in producing platforms for offshore wind turbines. The company was involved in the 350MW "Wikinger" wind farm on the island of Rügen which was commissioned at the end of 2017³⁵. However, in 2014 efforts to erect offshore wind turbines at two suitable points on Cape Trafalgar and near the Guadalquivir estuary which would generate substantial employment effects through their construction by shipyards in the province failed due to resistance from the tourism sector and the fishing industry.

3.1.2 Industrial Companies in a Rural Region

For the region "La Janda" we have analyzed possible new work in the energy sector for the following years. The economy of this previously rural region may be characterized as being now in transition. The investigation in the study was based on the following indicators³⁶:

³² La Voz, 15.6.2017.

³³ European Commission, Photovoltaic Geographical Information System, URL: <http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php>.

³⁴ Helionoticias, Andalucía, líder en termosolar y encabeza el ranking nacional en solar térmica, <http://helionoticias.es/andalucia-lider-en-termsolar-y-encabeza-el-ranking-nacion>.

³⁵ www.elspañol.com, 30.12.2017. For "Wikinger" and the wind farm "East Anglia One" Navantia employed 2,600 persons (mainly on contract work) at its three locations, including Cádiz.

³⁶ All dates are from the national institute for statistics in Spain: www.ine.es.

- Number of companies per capita:
This indicator has an average value in La Janda of 4.8 for every 100 registered inhabitants, with a minimum of 3.7 and a maximum of 6.9.
- Distribution of companies between the sectors Industrial, Construction, Commerce, Transportation and Hotel and Services, with the following results:

Figure 6: Distribution of Employment in La Janda, 2016

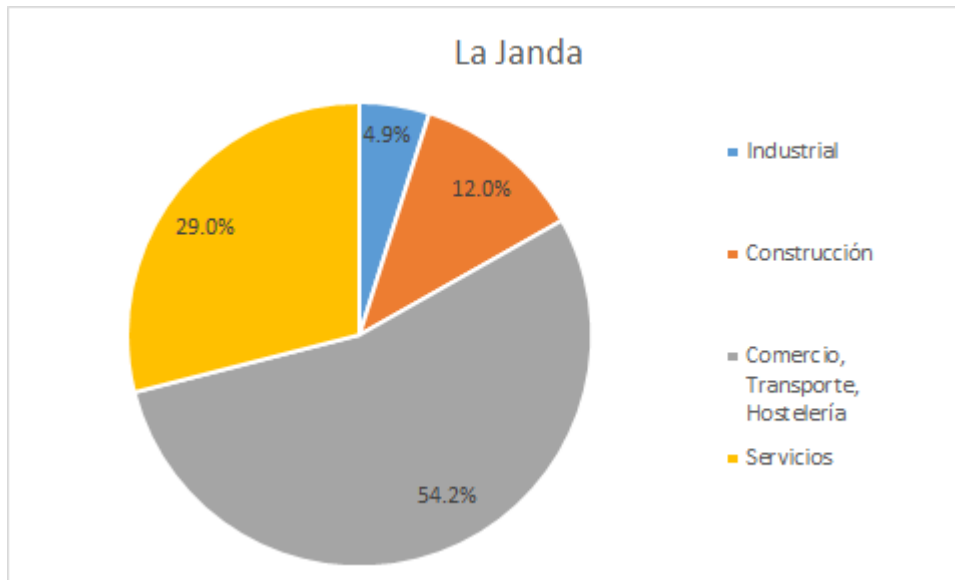
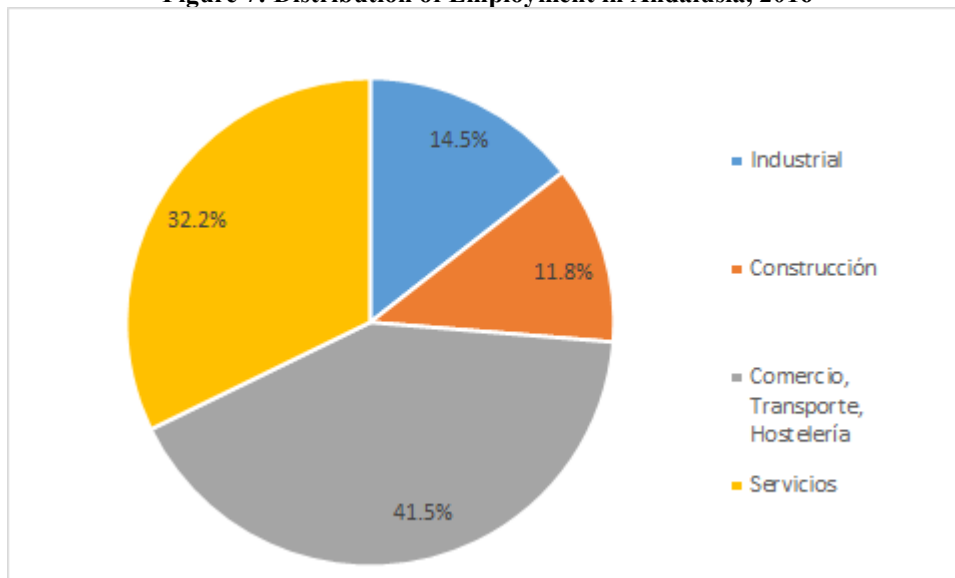


Figure 7: Distribution of Employment in Andalusia, 2016



We conclude that in La Janda there is an increase in the percentage of companies in the Trade, Transport and Hospitality sector that is detrimental to companies in the industrial sector, nearly three times less than in Andalusia in general.

Thus, it can be concluded that the increase in employability could be linked to an increase in the number of companies linked to the industrial sector. This potential for growth can be quantified, since the current 4.9% could reach up to 14.5% in the long term. In a short and medium-term scenario, policies should be established to gradually increase the current

proportion. For the following rough estimation, we will put a fictive increase of 1.5-2% per year.

- Finally, we evaluated the percentage of companies whose main dedication requires the development of professional and technical activities.

This indicator has a mean value in La Janda of 10.9%, with a minimum of 8.7% and a maximum of 12.7%. In more prosperous regions of Andalusia, the same indicator on average represents 12.7%. Therefore, it can be concluded that the percentage of companies with professional and technical activities can be improved. If the proportion of companies dedicated to the industrial sector with main activities based on professional and technical services will be improved by 1.5-2% per year, as recommended above, in consequence there will be created 80 companies in the industrial sector per year, which would imply the need of at least 80 professionals, in the case of single-person or autonomous companies. A large part of these new professionals will be employed in skill related to energy. Thus, these companies should capture and take advantage of the skills acquired by young unemployed jobseekers.

3.1.3 Interviews with Representatives of Companies

In different interviews with managers companies related to energy we discussed the market situation for renewable energies, their requirement and recruitment of experts from the region and their expectations concerning the professional formation were discussed.

The experts interviewed from the electric company in Cádiz emphasized that the market situation for renewable energy is currently highly encumbered by bureaucratic and legal hurdles. In contrast, the employment prospects for accordingly qualified young people are favourable if the framework conditions will improve, in particular for solar and wind energy. However, training is currently too theoretically structured and is not practical enough. It is also important to improve skills in working with digital technologies and the management and leadership of companies. The companies which are managed by our interview partners offer regular internship places. The interviewed think it being useful and necessary for the education in schools and colleges to involve the students for a certain time in the practical work of companies.

The managing directors of three companies in La Janda which are engaged in the solar segment declared to have no problems with securing incoming orders, but well to have difficulties in finding suitable personnel. The operator of a large-sized solar farm was only able to cover 30-40% of the personnel required for setting up the park from the neighbouring community; there was also not a sufficient number of qualified people available locally for operating the solar farm.

On the other hand, the companies do not expect comprehensive training in energy from their employees, but they do criticise the state for not offering enough institutions for targeted vocational qualification. In addition to vocational training, the ability is needed to be flexible in practice and when tackling new challenges and to learn on site. That is also why “dual” training” is very much favoured.

Despite a good incoming order situation, the companies see themselves as being slowed down by the government’s policies, in particular due to obstacles in using decentralised solar

energy. “Impuesto al sol”, sun tax, is a phrase that is now commonly heard in Andalusia in criticism of the existing legislation.

All three companies are interested in cooperating on a potential project. In particular, they have declared their willingness to take on young people for the practical part of their vocational training and are interested in doing this in a form similar to the dual model in Germany.

3.2 Greece

3.2.1 Interviews with Representatives of Companies

Interviews were held with 21 representatives of companies active in the field of energy, giving insights into the point of view of employers on an overall tense economic situation, yet expanding market for RES. The labour need is limited since companies often outsource the construction and maintenance of the equipment to their supplier. Thus, the possibilities to find employment for young people are estimated low. However, to find suitable personnel, often-personal contacts and recommendations by colleagues are highly relevant. Overall, the representatives explicitly identify a gap between high quality theoretical training and missing practical experience of available workers. The reasons are identified in the ability of educational institutions to cover the skill needs of the labour market. In the future, all present representatives expect Greece to expand RES in line with mandatory EU targets until 2020. Therefore, they expect positive employment effects in the fields of electrical, construction and mechanical engineering as well as topography. Factors hindering these developments are identified in a high level of bureaucracy concerning the development and approval of wind farms) and political instability (e.g. retroactive cancellation of feed-in-tariffs, etc.)

Concerning the companies’ willingness to train employees, the respondents indicate the general will to invest in training and generally identify this to be an important necessity that promises added value for companies. Limited financial opportunities are considered as an obstacle.

Offering young persons, a practice-oriented training is met open-minded by the respondents. Individual answers express their willingness to provide trainers/supervisors and a "regular payment" for possible interns in their company. As a prerequisite, however, financial incentives are needed to be able to provide the necessary human and financial capacity.

The clear majority of respondents is convinced that a vocational training in the sense of the “dual system” (simultaneous theoretical training in vocational school and practical training in company) can significantly increase the chances of applicants finding lasting employment. One respondent is critical; vocational training is good to gain experience but might not increase the chance of former interns to be regular employed afterwards.

Economic growth in the energy sector is expected in the next few years in the following areas:

- digitised energy services,
- energy cooperatives,
- energy storage,

- RES,
- energy efficiency,
- energy certification,
- passive energy houses,
- intelligent power grid control (smart grids).

In these areas, respondents also expect positive employment effects in the next years.

3.2.2 Interviews with Energy Experts

In Athens we held a group interview, combined with an intensive discussion, with 10 energy experts from universities, energy agencies and research institutes. Overall, the present energy experts estimated a slight positive view on the future expansion of RES in Greece. They expect corresponding positive employment effects especially in the fields of engineers and technicians. In general, the experts value the high quality of knowledge of young people with studies on energy and environmental issues. However, their employment opportunities are seen to be limited by several factors: lack of activities in construction sector, energy efficiency measures as well as a lack of practical experiences/on-the-job training. However, the overall difficult economic situation in Greece, the low relevance of a progressive energy economy in politics and strong competition among well-educated jobseekers are identified as critical factors to find employment for young people.

More in detail, the experts identify a wide range of obstacles to the implementation of RES projects. These included

- missing legislation, coupled with political conservatism towards a transformation of the energy system,
- problematic mentality (waiting for state actions),
- lack of financial incentives (investments mostly only by private sector),
- no positive business climate regarding RES projects,
- misguided state subsidy policy favouring fossil energy solutions (criticism of artificially maintaining the competitiveness of fossil energy production methods).
- the education system is not fulfilling the needs of the labour market. It is emphasized that the teaching content should be closely attuned to the needs/necessities of the national and local levels – integrating communities and ensuring their participation in local projects).
- There is also a lack of concrete implementation projects carried out by state agencies.

The experts agree that the outlook in the sector of renewable energies is difficult to predict in the coming years. The most likely positive impetus is expected in the field of technicians and engineers. Energy efficiency measures are expected to have a low and short-term positive impact on the labour market.

Concerning the quality and suitability of young people with energy-related training, the attendees highly appreciate the standard of knowledge of university graduates. However, they

identify a large gap between very well-trained and very low-skilled workers as well as a gap between the high quality of theoretical and almost absent level of practical education. Particularly in the construction sector, this results in especially very low-skilled workers carrying out low-quality work in terms of energy efficiency and RES. It is proposed to fill this gap by targeted training. Furthermore, the quality of the training and work of energy auditors ("Energy Inspectors") is criticized. Often, energy auditors perform energetic evaluations of property only at the computer/on the basis of data material, requesting lower payments. The basic object analysis of a property on-site is thus not carried out.

Concerning employment opportunities for young people with an energy-relevant education, the experts appreciate the possibilities in the construction sector to be limited, simply because of a lack of orders. In order to improve the employment situation, public awareness of energy efficiency and the potential of RES needs to be increased and financial resources to be provided to implement such measures/projects.

Concerning the establishment and successful operation of a new company/cooperative in the area of RES/climate protection, in principle, the experts estimate this to be a difficult undertaking. However, following possible areas of activity are identified:

- Research and development in cooperation with educational institutions (particularly solar thermal systems in combination with storage solutions)
- Data collection and evaluation (extensive data on the energetic state of the building structure do not exist, especially in public facilities)
- Networking and expansion of RES on islands (energy cooperatives are identified as a possible solution, for reasons of (economic) participation of the local population)

4. Youth and Work

4.1 Employment Effects of Energy Transition

An energy transition, which is imperative due to climate change, also opens a high demand mostly for qualified work in all southern European countries. This is particularly noticeable in energy efficiency issues.

For Spain 2020, the Commission for Infrastructure and Urban Development of the Spanish Association of Entrepreneurs has presented a detailed estimation of employment effects through comprehensive energy remediation in the Spanish building stock for the years 2014.³⁷ Under the condition of a defined proportion of state subsidies, following outcomes were calculated:

- The possible extent of energetic remediation in the building stock per year,
- The expected total cost of remediation and the corresponding share of government grants,
- The number of full-time jobs created or received
- The energy savings and CO2 reductions achieved in this way.

In the cost estimates, efficiency gains were considered through learning processes gained during the remediation process. The target was a reduction up to 80% in energy consumption and a 60% share of solar energy in the supply of warm water. For the generation of work, it was assumed that 18 workers were required per million Euro invested.

Under these conditions, the result were the following:

Scenario 1 (25 % government allowance)

Total cost of energetic remediation per year (in millions of Euro)

2014	2015	2016	2017	2018	2019	2020
1.289	3.030	3.157	4.229	4.187	3.806	5.291

Jobs per year

2014	2015	2016	2017	2018	2019	2020
34.746	81.082	85.236	114.193	113.051	102.776	142.845

Scenario 2 (40% government allowance)

Total cost of energetic renovations (mio.€)

2014	2015	2016	2017	2018	2019	2020
2.413	7.105	7.426	8.115	8.955	8.429	7.981

³⁷Comisión de Infraestructuras y Urbanismo de la CEOE (Confederación española de Organizaciones Empresariales), September 2014. URL: https://www.ceoe.es/es/informes/Industria_-_I+D+i/la-rehabilitacion-de-edificios-para-impulsar-el-sector-de-la-construccion-y-el-crecimiento.

Jobs per year

2014	2015	2016	2017	2018	2019	2020
65.141	191.833	200.499	219.105	241.797	227.585	215.483

As an intellectual experiment, we can interpolate the effects of employment in the investigated province of Cádiz, based on their share of the population within Spain. This step appears methodologically permissible because the settlement structure of the province with the dense urban agglomerations "Bay of Cádiz" and "Bay of Gibraltar/Algeciras" and sparsely populated rural areas of the settlement structure of Spain are roughly similar.

Jobs/Province of Cádiz (rounded)

	2014	2015	2016	2017	2018	2019	2020
<i>S1 -25%</i>	900	2.200	2.300	3.100	3.000	2.800	3.900
<i>S2 -40%</i>	1.800	5.200	5.400	5.900	6.500	6.200	5.800

The study outlined above allows to expect significant employment effects due to extensive energetic remediation in buildings, which would have a remarkable positive effect in the province with an presently extraordinary high unemployment rate, especially in the construction sector. Similarly, there is a corresponding increase in the demand for qualified personnel for energetic remediation in buildings.

The 25% and 40% government subsidies in the calculation considered seem not to be mandatory for the scenarios, given the fact that state standards for building renovations, combined with state impulses such as credit rebates and subsidies to a correspondingly smaller extent unfold effects analogically.

Under similar conditions, the state-owned Spanish Institute for the Diversification and Saving of Energy (IDAE) has calculated the employment impact of consistent implementation of all EU directives on energy efficiency for the period 2011-2020, in buildings as well as in other economic sectors. As a result, IDAE calculated that 288.000 mainly qualified jobs would be needed directly and 763.000 indirectly. If the already existing jobs in this sector are considered, 182.000 new jobs will still be available directly and 582.000 indirectly.³⁸

In the following years, it can be expected that the pressure to implement the EU directives in national laws and directives and a corresponding practice to realize the, will be certainly effective. E.g. in Spain, corresponding regulations have already been adopted by the government (cf. Chapter 6.1), which should be implemented in the next years. As a result, there is a considerable need for additional work and qualification for energetic renovations of buildings in the province under investigation.

³⁸ Instituto para la Diversificación y Ahorro de la Energía (IDAE), plan de Acción de Ahorro y de Eficiencia Energética 2011-2020, p. 116 ff.

To estimate the employment effect in the renewable energy sector, we refer to the study published at regular intervals by the association of entrepreneurs for renewable energies in Spain.³⁹

Employment (direct and indirect in the renewable energy sector)

2009	2010	2011	2012	2013	2014	2015	2016
127.877	121.626	127.548	118.112	100.154	76.874	77.326	74.566

In the wake of the economic recession since 2009 and with less favorable feed-in tariffs for "green" electricity since 2011, the share of employees in the sector has decreased by more than 40%, with a massive downturn from 2009 to 2014 and stagnation ever since. However, developments since 2016 and especially in the current year 2018 give rise to cautious optimism.

It shall be noticed that new tendering for wind and solar parks have been called out, improvements for solar "prosumer" announced as well as the active role of Spain in the definition of the EU targets for renewable energy by the year 2030 and the announcements of the new Spanish government since June 2018 (cf. Chapter 2.1.1).

For Greece, we derive employment effects by the expansion of renewable energy from the 2013 study of the "Institute of Energy for South-East-Europe" (IENE) «Energy and Employment in Greece»: despite the strong increase in unemployment in recent years (from 8.3 % in 2008 to 24.2 % in 2012), the workforce of Greece's energy sector grew from 82,000 (2008) to 94,000 (2012), thanks mainly to RES and energy efficiency measures. Accordingly, 11.292 were employed in the RES sector in 2008, while 32.354 people were employed in 2011, which accounts to a 34.9 % rise.⁴⁰ Furthermore, "[i]n the years to come, the planned investments in the electricity grid, the natural gas grid, in the hydrocarbon exploration and production, as well as in energy efficiency, are expected to create new job positions and lead to an overall net increase in energy related jobs."⁴¹

Overall, this provides a glimpse into the strong potentials of the expansion of renewable energy for job creation in southern European countries, despite the ongoing economic challenges, particularly in emerging sectors such as RES and energy efficiency.

4.2 Overview of the Employment Situation in Greece

According to Eurostat, the highest unemployment rates in the EU were observed in Greece (20.7 % in October 2017). In absolute terms, unemployment amounted to 990.000 persons in October 2017. The unemployment rate for men was 17 % and for women 25.4 %. The unemployment rate for young people (under 25) in Greece increased to 40.8 % in October 2017, compared to 40.3 % in September 2017. In 2016, 17,2 % of people with tertiary

³⁹ Asociación de Empresas de Energías Renovables (APPA), Estudio del impacto Macroeconómico de las Energías Renovables en España 2016, www.appa.es, p. 13.

⁴⁰ Institute for Energy of South-East Europe (IENE) 2013, Energy and Employment in Greece, URL: http://www.iene.eu/articlefiles/executive%20summary_en.pdf, p. 2f.

⁴¹ C.f. p. 7.

education, 24,2 % of people with upper secondary education and 26,2 % of people below secondary education and between 25-64 years old were unemployed.

A report published 2017 by diaNEOsis, a Greek research centre, states that the percentage of Greek youth able to subsist on its own income includes only 44.5 % of the 18-35 age group. In detail, the majority of the Greek youth survey respondents contacted in the report considered the likelihood of finding a job in the next six months to be "improbable". Some 36 % believed their lives will be worse than that of their parents, compared to 29 % that considered their lives will improve while further 35 % thought their quality of life would remain the same.

Also, 41 % of them were willing to consider migrating to find a job. The study covered 1,500 respondents aged 18-36 from across Greece and their feedback reflected that those with a higher educational level tended to participate less in collective action, had less faith in state institutions and were less religiously inclined than the previous generation of their parents.

To differentiate further, the unemployment rate among the 20-24 age group amounts to 45 % in Greece. In the 25-29 age group, unemployment figures average at 25,9 % according to Q1 2017 data published by Elstat, the Greek statistical office. The high share of youth unemployment is also prolonged into elder age groups. According to the European adult education survey, the share of people aged 25 to 64 attending any kind of education in the previous 12 months was 14.5 % in 2007, with no significant differences between men and women. The rate of participation in education activities of people with tertiary-level education (31.8 %) is double that of those with a secondary education (15.2 %) and eight times that of those with only a primary education (4 %). Finally, 84 % of those surveyed declared that the education activities in which they had participated had taken place outside the formal education system.

In Greece, besides the institutional framework of education, there is no structured offer for practical training that integrates private companies. Municipalities can offer young people practical exercises but there is no coordinated structure.

In the technical universities, the number of students and, especially, post graduates are relatively low that can gain practical training. This depends on the policy and initiative of each university and existing European funds, i.e.:

The Universities of Patras and Crete are very well organized in terms of the practical exercise for students. It is interesting that for this year more than double, from the available positions, young electronic engineers wanted to participate (102 for 40 positions). The same also with the students of the Department of Environmental & Natural Resources Management (57 for 35 positions). These results do indicate the need and the increasing demand of the students to practically training.

A well-known training program to that direction, which demonstrates exemplarily the importance of practical training for young graduates to find employment, is implemented by a company engaged in Aluminium. A specific program enables young engineer graduates, up to 28 years of age, to carry out 12 months of paid training in the aluminium industry. This initiative is the continuation of the first program, 2015-2016, which, fulfilling its main goal, put 90 % of its graduates to work in less than 3 months afterwards. The example illustrates, that acquiring practical experience in the field of environmental technical jobs enables unemployed young graduates to find employment in a timely manner even in an economically tense situation like in Greece.

4.3 Employment and Education of Greek Youths

The problematic situation for young people in the region of Attica and beyond that is heavily influenced by several factors. The decisive factor here is the difficult economic situation in Greece. The financing possibilities for companies are also conceivably difficult. This also applies to the Greek energy sector, which creates only small investments and therefore only few new jobs.

The general political instability (no confidence in stable/stringent legislation) has a negative impact on the business climate. The circle of energy experts particularly criticizes the fact that in society there is an expectation towards the governments/institutions to provide financial incentives for the implementation of energy efficiency measures and the development of RES.

Overall, in consequence, the majority of interlocutors currently and in the next years see little growth in the area of RES and sustainable construction. The labour market is characterized by a strong supply-sided surplus of job-seeking university graduates. Long phases of job search often alternate with further university training phases; accumulation of educational qualifications, moving abroad (brain-drain effect) or tasks non-related to their education can be observed.

Most of the interlocutors (entrepreneurs, energy experts, graduates) identify a gap between (high) theoretical education (quality) and lack of practical experience of graduates. The quality and topicality of the university's educational content, especially concerning technical and practical training elements, is questioned by individuals.

Overall, the findings of the meetings confirm the initial assumption of our study: a dual training can theoretically offer a possibility to fill the gap between highly qualified and low-to-non-skilled workers. Further, the evaluation of the questionnaires confirms this overall impression. All responding actors identify a need for practical training opportunities. However, important factors for possible projects to train unemployed youngsters as energy experts should include:

- the provision of financial incentives for readily available training establishments,
- close cooperation with existing educational institutions,
- anchoring in the institutional framework,
- the further expansion of RES in Greece (achieving 2020/2030 targets).

The academic quota in Greece is comparably high, since approx. 70%⁴² of high school graduates start a university education. 30.2 %⁴³ of 25-64-year-olds in turn hold a title of tertiary education level (according to the World Bank, these are commercial schools and universities (of applied sciences)). These graduates often (also in international comparison) command over a high-quality theoretical training in environmental engineering subjects, which is also reflected in the statements made by the respondents. However, it is criticized that university graduates often have little or no practical experience, which, according to statements of representatives of companies in the field of energy, reduces the chances of an applicant to find a position. The unemployment rate among persons with completed tertiary education in Greece accounts to 17.2 % in 2016 and is, thus, the highest value in OECD

⁴² DAAD-Education Analysis 2017, p. 16 F. URL: https://www.daad.de/medien/der-daad/analysen-studien/bildungssystemanalyse/griechenland_daad_bsa.pdf.

⁴³ OECD, Adult education level, URL: <https://data.oecd.org/chart/54wp>.

countries (for comparison: Spain 10.9 %, Germany 2.2 %) ⁴⁴. All involved stakeholders agree that there is a need for combining high-quality theoretical training with practical experience in a model of applied sciences.

A common vocational training, such as offered by the Vocational Training Institute (IEK) Greece has a length of two years. A training, which can be offered as part of a project, will be based on this multi-annual training length.

However, to attract university graduates who already hold a post-graduate degree (at least five years for the "Ptychio"(Diploma), equivalent to Master) for an education in the context of a project, a shorter training period could be offered, in which particularly practical content and experience in the company are taught (and less basic theoretical educational content). Such an offer could not only be attractive for those university graduates, but also form an incentive for companies to give higher education graduates a possibility for employment which have no or only little practical experience. This could also have a positive impact on the high unemployment rate among academics.

4.4 Student Practices – A Case Study in Cádiz

Each student in the engineering department of the University of Cádiz has the obligation for an internship to complete in a regional company. Therefore, to assess the demand for qualified work in “energy” we have analyzed the internship offers for students of the University of Cádiz during the last two years. Of the 353 practices for undergraduate and master students a total of 16 is work related to energy, 4.5% of the total practices offered during the period. Analyzing more in detail, in 14 of the above the companies requested studies of "Technical Engineer in Mechanics, Machines and Thermal Energy" or "Master's Degree in Renewable Energy and Energy Efficiency".

We can conclude that there is no great awareness on the part of the companies of additional training acquired in the sector of energy efficiency, energy provision. Additionally, we can conclude that the number of internships offers linked to energy may increase in the province analyzed, if we compare the result with those for a degree specifically focused on energy engineering of the “Campus of International Excellence Andalucía Tech” in Sevilla, where the offer of companies for students of this university with 10% is twice as high than in Cádiz

Going more into more detail, 10 of the 16 job offers linked to the energy sector are associated with an average English requirement. Therefore, it is advisable for students who want to opt for this profile to complement their training with language studies. This is consistent with the fact that the new bachelor’s degrees include in their curricular itinerary the requirement to obtain the B1 language certificate in English.

Finally, analyzing the tasks to be performed during the period of development of the practices by students we find that 11 of them are narrowly linked to energy, being included in the following fields or areas of knowledge:

- Energy audits.
- Energy saving and efficiency improvement, energy management.
- Combustion, heat exchange, cogeneration.

⁴⁴ OECD, unemployment rates by education level, URL: <https://data.oecd.org/chart/54wr>.

- Study of energy savings in chemical processes
- Formative learning in projects. Innovation projects

4.5 Professional Background of Job-seekers

In the province of Cádiz, being characterized by the highest rate of unemployment on national level (31,25% 3/2018), we studied the unemployment data by professional profiles, registered in the jobcentres and divided in 2 regional zones,

- “Bahía de Cádiz”, with Cádiz, Puerto Real, Puerto de Sta. Maria etc., with 48.082 registered job-seekers 2016
- “Costa-La Janda”, the 8 rural towns mentioned and some coastal towns south from Cádiz, with 23.080 registered job-seekers 2017.

We analyzed the statistics with the following result:

Job seekers, who declare to have accomplished schools visit	La Janda Cádiz	66% 62%
Job seekers, who have passed short formation in a job-creation offer	La Janda Cádiz	8% 11%
Job seekers who have accomplished a professional formation	La Janda Cádiz	10% 20%
Job seekers who didn't accomplish primary school	La Janda Cádiz	11,7% 3,5%

To sum up: the professional level of the registered job seekers is relatively low, in particular in the formerly rural towns. So we can conclude that there will be a high demand for professional formation in activities of climate protection and energy in the next years, in particular in the formerly rural town with a lower proportion of formation and a relatively high rate of early school-leavers. The rate of these youngster in the rural towns itself is estimated much higher than in the job-seeker statistics. We suppose, that a high proportion of early school-leavers, for better chances to find a job, declare to have accomplished their school visit. However that be, in qualification projects for tasks in climate protection it will be necessary to offer pathways for future work to early school-leavers, too (ch. 4.6 below).

4.6 Shortcomings of the European Youth Guarantee⁴⁵

With the **European Youth Guarantee** the European Commission and the European Council committed all Member States to offer all young people aged between 15 and 24 (the upper age limit was later raised to 30) either a paid job or a training place within four months.

The Member States are asked to develop programmes able to put this arrangement into practice. To meet this requirement, they receive an amount of funding based on their general plans and on the level of youth unemployment in the country. An EU fund was set up for

⁴⁵ Cf. also ch. 8: proposal how to amplify the EU-Youth Guarantee

these activities, with a budget of EUR 6.4 billion to cover the period from 2014 to 2018; a further EUR 2 billion was made available last year and the scheme was extended until 2020

4.6.1 Spain

Spain was the first country to present a programme for implementing the Youth Guarantee (YG) at the end of 2013. On this basis it received €2.6bn which was further topped up with an undisclosed sum from its own funds. But by March 2016 only every fifth (19%) unemployed person under the age of 30 in Spain had signed up for YG programmes⁴⁶; in October 2016 this figure had risen to 421,000, representing almost 40% of the registered unemployed under 30. Of those who signed up, 2/3 were placed on further training programmes without any company connection or internship for a maximum of one year and only 1/3 (143,000) received a temporary internship or apprenticeship with a company⁴⁷. According to the trade union Comisiones Obreras, CCOO, currently 122,000 out of 448,000 young unemployed are registered for the YG in Andalusia, although being the Europe-wide “record region” for youth unemployment⁴⁸. In the above described town Paterna de Rivera, whose youth unemployment rate has been put at 75%, hardly any of the young people affected were aware of the possibility of registering for the YG in spring 2015.

The risk of abuse by companies is obvious. If young people are hired as “trainees” for a minimal wage which is subsidised by the state without receiving any parallel training outside the company, this invites companies to deploy them as workers without remuneration or with remuneration that is declared as lower than the training allowance. The company can then keep its employment level constant with a low level of wage expenditure. Effectively the YG would no longer be creating work, just more subsidised work. Whether and how such misuse of the YG can be effectively checked, sanctioned or excluded cannot be discerned from the provisions to date.⁴⁹

4.6.2 Greece

Greece submitted a Youth Guarantee Implementation Plan on December 31st, 2013, updated in June 2014. Greece is eligible for funds from the Youth Employment Initiative: it has an allocation of 171.52 million € for young people between 18-24 who are neither in work, education or training programs (so called NEETs). The program refers to all 13 Greek regions because of their youth unemployment >25%.⁵⁰

The results of YG monitoring for 2015 show that the Greek YG scheme reached only a third (33.5 %) of NEETs aged under 25, though this is an improvement compared to 2014 (27.7 %).⁵¹ Less than one in four (24.1 %) of those leaving the scheme in 2015 took up an

⁴⁶ El País 23.03. 2016.

⁴⁷ Crónica Global (Internet newspaper in Spanish), 10.3. 2017.

⁴⁸ Europapress/Andalucía, 20.6.2017.

⁴⁹ For detailed analysis: Hartwig Berger, Abgehängt in Europa, Kap. 3 +4. www.hartwig-berger.de.

⁵⁰ European Commission, Youth Employment in Greece, URL: www.ec.europa.eu/social.

⁵¹ Data for 2014 do not include young people already registered as unemployed on 31 December 2013 and who may have benefitted from relevant services/measures after 1 January 2014.

offer within 4 months of registration, considerably less than in 2014 (42.7 %).⁵² The difficulty to deliver timely offers is reflected in the fact that more than half (56.1 %) of those in the scheme at any point during the year had been registered for more than 4 months while one in six (16.9 % of the total) has been registered for more than 12 months. Follow-up data of those leaving the YG in 2016⁵³ show:

- 26,4% took up employment after < 4 months
- 26,1% took up employment after > 4 months
- 46,3% were unemployed
- 1,1% unknown

Follow-up data for those leaving the YG scheme in 2014 suggest that outcomes are increasing to 40.3 % after 12 months and to 43.8 % after 18 months.

4.7 Youth without Work and Training

Due to the economic upswing in Spain, the percentage of young people without work in the Spanish region analysed in recent years has decreased slightly but is still at a very high level. In Greece the chances of youngsters to be employed are even worse. In the province of Cádiz, employment for young people is mainly to be found in the service sector, in particular in seasonal tourism. For this reason, the vast majority of employed young people are faced with job insecurity, working either on a per season basis or always on fixed-term contracts. In addition, it is suspected that especially new employees are obliged to work in irregular conditions, for less wage, more hours and less holidays than legally provided. Due to the lack of state controls and the pressure of high unemployment, this form of criminal business activities is very widespread⁵⁴.

An important problem which is strongly recognised by the public is the large number of “Ninis”, (now a common word), which means young people without work and without training, many of which left school early. Suitable opportunities need to be found for these people. There are sporadic offers of work from the local town halls that are financed by the national government, regional government and EU funds. Depending on the approach and financial situation, the work can be for several weeks or several months and some are linked with training programmes. In these “talleres juveniles” (youth workshops) young people work for a wage, but this is usually limited. These measures do not create any bridges to local companies and thus further reduce the already low chance of later employment. The participating young people fall back into unemployment afterwards.

For young people without a school leaving qualification or only a basic school certificate without any further training, a comprehensive training as an energy expert appears to be too demanding. It was therefore necessary to investigate proposals for this group of young people. Local experts see opportunities in climate protection and climate adaptation measures in agriculture, forestry and in general landscape work. Like other Mediterranean regions, over the coming years Andalusia will be affected very strongly by the worsening consequences of

⁵² Results for “implementation” are likely to be understated because the destination on exit was unknown for 49.6 % of those leaving the YG within 4 months of joining. Some of this group may have taken up an offer without informing the YG provider.

⁵³ European Commission, The Youth Guarantee in Greece, May 2018, URL: www.ec.europa.eu/social.

⁵⁴ Cf. Hartwig Berger, Abgehängt in Europa? Mit Klimaschutz gegen Jugendarbeitslosigkeit, 2017, URL: www.hartwig-berger.de.

global climate change (extreme weather events, droughts, flooding, erosion, desertification etc.). It is therefore especially important to adopt countermeasures in advance. In order to carry out the necessary landscape-related activities, there is a growing need for employees that acquire the necessary qualifications through shorter and less demanding training courses. However, this first requires funding programme for climate change and climate adaptation as well as official obligations to be imposed on agriculture at the national and European level.

5. Surveys under Young People

5.1 Survey under Young Job-seekers in Cádiz

Via the social media we arranged a survey under young job-seekers in the province of Cádiz, with a total of 95 respondents. From them:

- 77 (81.1%) have never worked (3 graduates and 1 master).
- 7 (7.4%) have worked at some time in the energy sector. These jobs have been long lasting (> 5 years) in only 1 case. All these respondents declared to have a university education.

Analysing the group of respondents who have never worked, we find:

- 15 of them have a primary education, 21 compulsory secondary education, 11 baccalaureates, 14 vocational training, three are graduates and one has a master's degree.
- All are in a position to continue their studies except one of the graduates who is currently unemployed.
- 19 have no knowledge of energy at all, 22 have low knowledge in this subject, 17 recognize having a medium level, seven claim to have knowledge on a high level of energy-related issues.

36 consider it interesting to increase their current level of knowledge in renewable energy and energy efficiency. These are distributed as follows: 11 of the null knowledge group, 13 of the low, 11 of the medium and one of the high.

Therefore, we can conclude that 37% have a level of knowledge in renewable energy and medium / high energy efficiency and of these 50% consider it interesting to increase their training in this sector. These pupils might be may be possible candidates for future education and work in the energy sector.

5.2 Climate and Climate Protection – a survey concerning school pupils

The surveyed group consisted of 22 school pupils (11 female, 11 male) in the second class of their baccalaureat (the 2nd year of upper secondary school) studying either sciences or languages in Paterna de Rivera, a rural town in La Janda. The school pupils were given a questionnaire about their career aspirations, their knowledge of climate change and their potential interest in learning and working in this field later on. Regarding their future career, the majority aimed to study and in both classes environmental and health-related subjects such as biology, biotechnology, (veterinary) medicine, psychology and nursing dominated. We then conducted an open conversation about the topic.

In response to the question “what do you know about climate change?”, around half (12 out of 22) of the school pupils provided an answer that was largely correct, whereas the other 10 school pupils had no idea what climate change is or only a very vague or incorrect understanding e.g.

*“The exhaust fumes of cars, rubbish everywhere”,
“The ozone layer is being destroyed”.*

With regard to the causes of our changing climate, most of the school pupils have an unclear understanding. For the majority (cited 15 times), environmental pollution (“contaminación”) is considered to be the main cause without any differentiation, in eight of these replies it is even thought to be the sole cause.

A connection with high greenhouse gas emissions was expressly mentioned twice, e.g.

“Pollution with car exhaust, radioactive waste(?!), high level of consumption by people, the cutting down of forests, use of fuels such as coal and crude oil”.

The excess level of consumption mentioned above was also cited in another answer, the destruction of forests in a total of 3x. The (less related) reference to nuclear power plants and nuclear waste was listed three as a cause. Three school pupils listed plastic waste as a cause of climate change – a sign of an intensively debated environmental topic in their peer and reference groups.

In response to the question “What can be done against climate change?”, eight school pupils gave no answers or only provided very vague answers, others provided a more detailed reply, for example:

“We can reduce the percentage of CO₂ emissions; to do this we have to reach an agreement with all countries, especially those with a high level of industrial activity”.

The reduction of energy consumption is listed three times, energy generation from wind and sun six times, a few times with explicit reference to the regional potentials. Less motorised transported is mentioned eight times, with the focus on private use. Two remarkable responses:

*“Don’t pollute, for example walk to places nearby or take public transport”
“Use more public transport, go on foot, ride bicycles etc.”⁵⁵*

Summarizing, the survey painted a very disparate picture. Some of the school pupils are properly informed, others are not informed at all or only to a minimal degree. “Climate change” is frequently viewed as an indicator for environmental problems overall, with daily experiences and aspects discussed in the media often in the foreground. It is striking that climate and waste issues were very mixed up, especially, plastic waste. Eight school pupils mentioned plastic waste reduction and recycling of waste as a key way for slowing climate change. In youth culture, i.e. face-to-face contacts and in social networks, climate change only appears to be a marginal topic, even though last year the region of Andalusia particularly suffered from unprecedented periods of high temperatures and extreme drought.

⁵⁵ The five municipalities in inner La Janda have extremely bad public transport connections and within each municipality it is usual to travel even short distances by car. Cycling is very widespread among men, however almost exclusively for the purpose of sport and hardly at all for daily travel.

5.3 Survey concerning Trained Energy Consultants in La Janda

In 2014, a three-month training course was conducted for young energy consultants in Paterna de Rivera (La Janda) which was effectively preliminary work for the present feasibility study, ZEW-Klima. Eight young people who were unemployed at this point in time participated in the course, which was operated under the name “More work and less energy”. The three women and five men were aged between 20 and 29. The training was jointly led by Elisabeth Herrera Acosta, an engineer from the same municipality, and Dr. Hartwig Berger, private lecturer for sociology at FU Berlin. The three-month course was financed by the Heinrich Böll Foundation and by private sponsors from Germany.

The goals of the training were:

- To acquire knowledge about efficient energy use in private households and small companies in the formerly rurally oriented area
- To acquire knowledge of solar and wind energy
- To learn about energy audits and energy consulting and how they should be conducted in homes and businesses
- Local public relation work on economic use of energy and the major risks of worsening climate change
- To improve the prospects of later finding a job through the training course.

The course has been documented and evaluated in written form and as a film⁵⁶.

For the present feasibility study, it was important to find out whether the course had any benefits for the working life of the participants. For two of the participants it contributed to them finding a job in the “energy” sector, one female participant was inspired to focus on “energy efficiency” in her subsequent engineering degree, four participants found a job with little to do with “energy”, two of them outside Spain. One of the women is still permanently unemployed.

We conducted detailed interviews with six of the participants (3 women and 3 men).

1. All participants emphasised that the course was useful for them. It above all helped them to make better use of energy in their private life, for advising family and friends, and sometimes also in non-energy related jobs later.

For example, G.:

“It was super for me, it really made a difference for the residential building and also in part for the business, you also helped us to understand more about climate change. The same goes for economic efficiency. The course did more than we expected, namely making people aware how you can save as much as possible in a home”.

2. Regarding the question of whether the course helped with finding a job, the assessments were different. For two women it was not helpful in this respect, although this is compounded by the fact that it is especially difficult for women in this region to find any jobs in technical professions. One of these women had trained for two years as an electrician some years before the course.

⁵⁶ Available at www.hartwig-berger.de.

The third female participant, M., commented:

“I think that the course can help me to find work in the future and properly so because I believe that energy efficiency is on the agenda”.

A successful example is P.:

“Yes, of course. The course helped me to be hired by a company and provided me with orientation for the work there. For example, I learned how to do energy certificates and I use this now in my job. The knowledge about energy efficiency helps me a lot now. We advise our customers on the best thing for them to install and the best way to do this. If we install solar panels, we estimate the energy consumption beforehand, recommend the power of the solar panels and the storage unit and advise how everything can be organised with less consumption and more efficiency. Many people ask about this, also about thermo solar energy.”

3. However, the interview partners felt that future courses could be improved in two respects: Firstly, they said that it would be important to incorporate more practical work and experience of a more intensive nature in the training. Secondly, more weight should be given to renewable energy. A clearly positive resonance was exhibited regarding all dual approaches.

E.g. N.:

“I think that’s fantastic, as that way the companies are involved”.

And G.:

“I think the dual system is really great; learning and working at the same time, they know you already and you already know everything in practice. But the title must be official, perhaps at the European level.”

4. Regarding the question of what opportunities currently exist for the decentralised use of solar energy in households and companies, opinions were divided. Criticism of the “sun tax” was unanimous. Despite hindrances imposed by the state, it is interesting that in particular Pedro who works in the solar segment declares a good order situation of his company.

5. There have always been extensive discussions about the energy transition in Spain and Andalusia. All of the survey subjects recognised the huge potential which Andalusia in particular has for using the sun and wind as well as for reducing energy consumption and criticised government policy in light of this. They said that with regard to the issue of “climate change” there is still a significant need for learning.

N.:

“The disadvantage is that Spain puts barriers in our way, the government always goes in the direction of the money, you can see that in the sun tax and other obstacles that they put in the way.”

G.:

Although we have lots more sun in Spain, there’s a lot less photovoltaic than in Germany. The sun here is a gold mine that we don’t use”.

5.4 Attitudes towards Renewable Energies – a survey in Cádiz

In a study carried out by members of the Energy Transition Board of Cádiz, May 2017 we have taken samples of 432 inhabitants from all areas of the city, professions and ages, to know what the inhabitants of Cadiz know about their electricity bill, about the energy from which the electricity comes from which they make daily use, what energy model they want for their city and for Spain, what energy saving and/or energy efficiency measures they apply at home, what saving measures they consider to be a priority for them to be implanted in the city, what they know about renewable energies, what centres exist in the province of Cádiz, etc. Regarding the theme of our study, a great ignorance about renewable energy was detected, 9 out of 10 people surveyed had problems to distinguish renewable energies from those that are no. On the other hand, a high percentage exceeding 90% of individuals favoured a 100% renewable model for the year 2050 in Spain and in their city.

- 92.6% of the population would like the city of Cádiz to be supplied mainly by renewable energies.
- 94.4% of the population would like Spain to be energy self-sufficient with renewables by 2050.
- In addition, 19.3% of the population that thought that renewable energies were more expensive, even so, were positive before a renewable model both at the municipal and national level.

We can conclude, that the citizens of Cádiz are pleading nearly unanimously for a transformation of the energy sector and to make full use of renewable energies as a common property.

5.5. Surveys in Greece

In Greece we realized two surveys via questionnaires among young people in Athens.

1.

To the first answered 48 students and university graduates in studies relevant to environment or energy (45% male, 55% female, average year 26).

Rating of own qualification level

high to very high	48%
neutral	35.4%
low to very low	16.7%

Rating of chances to find an employment in the context of own qualification:

high to very high	17%
Neutral	51.2%
low to very low	31.9%

Flexibility in job research (space, finance, tasks):

high to very high	48.8%
Neutral	29.2%
low to verry low	23%

Willingness for additional training:

high to very high	91.7%
Neutral	8.3%
Low	2.1%

Willingness to professional autonomy or to work self-employed:

high to very high	37.5%.
Neutral	31.3%
Low to very low	31.2%

As further conditions necessary to find employment are named:

Personal motivation, personal contact with companies, language skills (especially English), change of mentality within the population on environmental issues, practical experience in the energy sector.

When asked what can be done to improve the *employment situation for young people*, it has been answered:

- tax rebate for start-ups,
- capacity building in local communities,
- financial incentives for entrepreneurs that offer vocational training programs
- consistent RES expansion.

The *general employment situation for young persons* is appreciated by

- 81.25 % very low to low and 18.75 % neutral.

The majority of the respondents' state that they have not gained *practical work experience* in the last 12 months in the energy sector. Occasionally, respondents report *positive experiences from the circle of acquaintances*, which are increasingly attributable to personal contacts and few could find employment by regular application procedures after several months/years.

2.

The second questionnaire was distributed between youngsters who are studying or working in sectors with no relation to energy of environment. There were 28 respondents (average age: 23.8 years, 18 males, 10 females).

Self estimated qualification level:

very low to low	14.3%
Neutral	57.1%
very high to high	28.6%

Chances to find an employment that earns a living wage:

very low to low	50%
Neutral	28.6%
very high to high	21.4%

Willingness to continue training/education:

very low to low	14.3%
Neutral	21.4%
very high to high	64.3%

The awareness of employment opportunities in the field of energy and/or sustainable construction:

very low to low	53.5%
Neutral	21.4%
very high to high	25%

The (general) employment situation for young persons:

very low to low	78.5%
Neutral	21.5%
very high to high	0%

Necessary *conditions for self-employment* are seen in

- an improvement in the business climate,
- lower taxes and lower social security costs for self-employed workers,
- more promotional legislation for start-ups and
- the provision of financial incentives for founders.

Concerning the *experience to find a sufficiently paid employment*, isolated respondents indicate to have very good experiences. But a high majority of respondents said that they are earning their income by means of temporary work or as day labourers.

6. Education and Employment for Climate Protection – Recommendations

6.1. The Future of Energy Efficiency in Buildings

We recommend creating a market for energy efficiency in buildings to boost the Greek and Andalusian economy, especially in formerly rural regions like the community association “La Janda”, investigated in this study. The construction industry, being involved in the task proposed, is of high importance in both countries. In Spain with a turnover of more than 10% of Spanish GDP and nearly one million jobs, with 88% in SMEs (small and median enterprises) and a growing importance in the sector of rehabilitation. 2007 the proportion of investments in rehabilitation of buildings in Spain did amount to 13%, in 2014 already to 31%. The energy rehabilitation would help to reduce the energy demand by 70-90%, with the buildings in Spain responsible for 41% of the final energy consumption and only 4.6% of them meeting the basic energy saving requirements⁵⁷.

Employment in energy rehabilitation can boost the economy of the formerly rural region with their high rate of unemployment, improving the quality of life of the inhabitants of the region, too:

It is labour intensive, creating more jobs than equivalent investments in new construction, which are

- realized mainly by SMEs, being a sector, which promotes entrepreneurship and creating jobs in the local community as well,
- requiring the participation of a diversity of professionals since the sector employs engineers or other graduates in the building sector, as well as energy efficiency experts on different levels,
- requiring professionals of all ages, with the ability to train the entire range of the active population thus reducing youth unemployment,
- reducing energy consumption, greenhouse gas emissions and energy poverty,
- increasing comfort and thermal comfort in buildings and homes, thus reducing the risk of suffering certain diseases and the loss of effective work days,

To achieve this goal, several lines of action must be developed:

- The town councils have to maintain their current efforts in improving energy efficiency by promoting their own measures, and by spreading - even for their own use - funding channels for the national energy plan.

In this sense, it is recommended to organize information days and dissemination to citizens of the existing national and regional energy plans and the possibilities for funding energy activities. At the technical level, dissemination days can be held in relation to the administration and the main agents involved in the rehabilitation sector. Likewise, a "catalogue of success stories/best-practices" can be generated that collects existing positive experiences and can serve as an example for future initiatives. Finally, prizes could be promoted at the municipal level but also regional or autonomic for actions of urban rehabilitation, regeneration and renewal.

At a normative level, municipalities could create Municipal Rehabilitation and Renewal Strategies and Plans for Urban Renewal through the development of a standard methodology based on the existing tools of the Vulnerability Observatory (Atlas of Vulnerability and Atlas

⁵⁷ Information by University of Cádiz.

of Residential Construction). Likewise, support should be given to the creation of local offices for the management of Urban Regeneration and Renewal Areas. Finally, in Spain recommended by the Ministry of Public Works in the document for energy rehabilitation, it could be established, in coordination with other existing initiatives, a permanent dialogue-platform between different municipalities to exchange their innovative experiences.

Entrepreneurs and companies linked to the construction sector can use already existing staffs of qualified technicians to create and to implement new business models linked to energy rehabilitation.

The knowledge and technological bases are already existing, satisfying possibilities and needs that are often not perceived by the owners, despite the difficulties they have in coping with the energy bill or maintaining comfort conditions. As it has been verified, a possible way to make understandable the importance of the energetic rehabilitation can result from the energetic certificate and their diagnosis. The companies charged with energy certificates and energy efficiency in general would undoubtedly contribute to the local development creating jobs just in the building sector with a high rate of unemployment, e.g. in developing rehabilitation projects that could even include contracting models to facilitate financing by the owners.

The creation or constitution of rehabilitation cooperatives, or associations of owners with similar purposes, can have great advantages in various aspects. On the one hand they can act as focus in the purchase of construction products necessary for rehabilitation, thus obtaining lower prices. On the other hand, they can provide an extra guarantee for banks in order to grant loans for rehabilitation. Also, in its relations with the Administration, the dialogue with this type of cooperatives can facilitate access to public aid and speed up its processing and concession.

This constitutive process could arise from training activities followed by the neighbours themselves, such as empowerment courses. In this regard, it is worth mentioning the pilot course held in 2014 in Paterna de Rivera by 8 unemployed young people. The development of this type of courses in municipalities such as those that constitute the “La Janda” region could lead to the creation of jobs and improvement of the energy efficiency of buildings at the initiative of the owners.

The aforementioned points constitute in their entirety a social action plan for the region that we believe can improve overall the quality of life of the people who live and work there.

6.2 Young Experts for Climate-friendly Schools

Many young people in the regions investigated have completed energy-related vocational training but have not found employment in this field. At the same time, the energy efficiency of most schools and education centres in the municipalities is poor and urgently needs improving. Therefore ...

it is proposed that comprehensive energy refurbishments in educational institutions – especially in schools – should be conceptually designed and planned as part of training programmes for young unemployed funded by the EU. The work should also include decentralised energy generation and use and soft forms of climate control. They should follow the “dual” model in the form of exemplary activity at selected schools.

Young people already trained in energy issues that have so far not found any employment or self-employed work will be engaged in this programme under supervision. They should try to continue with practical work:

- Outworking comprehensive energy audits of school buildings including their surrounding environment.
- Developing proposals how these buildings can be redesigned to make them more climate friendly by reducing energy consumption and how renewable energy can be put in use for the buildings itself.
 - Calculating the required costs and time in which they are re-financed by the results of energy saving the fotovoltaic put in use for the buildings.

The results of the studies will be presented to the municipalities as a basis for activities and initiatives.

A central component of the energy audit are potential climate-friendly heating techniques and above all the cooling of buildings, so-called “bioclimatic” concepts, which in contrast to commonly used techniques requires far less use of energy and are also significantly more cost-effective. The project would react to the intensive debate regarding the increasingly frequent overheating of buildings as a consequence of climate change, which is a subject of discussion at least among the Spanish public.

Justification:

In the investigated regions the energy efficiency of buildings is in most cases seriously in need of improvement. Particularly in schools this has negative health consequences and also seriously impairs the willingness to learn during the frequent hot periods and also during cold periods. It is possible, in fact even probable, that state action is to be expected in this regard in the coming years, especially as both of the countries investigated in this project, Spain and Greece are obliged by Europe-wide regulations to increase the energy of efficiency of such activities and the EU investment programme initiated in 2015 provides for the granting of low-cost loans by the EIB for precisely such refurbishment programmes. As the outlined area of activities involves extensive planning and conceptual development, this corresponds with the requirements for training developed in the project.

The proposed project would respond to energy related debates in the regions investigated, since teachers, pupils and parents are suffering from bad temperatures in the school buildings – too cold in winter, too hot in late spring, summer and early autumn time . A consequence of these debates, e.g. in the regional parliament of Andalusia a draft bill to use energy-saving bioclimatic techniques and renewable energy for better climatic conditions in the school is currently being consulted⁵⁸.

6.3 “Round-up” Experts for Solar Energy

In terms of its climate conditions and building structures, the investigated region offers ideal conditions for decentralised power generation and usage, in particular of solar energy. At the same time, there seems to be a lack of competent “solar generalists” with practical experience and a comprehensive knowledge of all aspects of planning and installing power generation plants. Therefore ...

⁵⁸Legislative action in the Andalusian parliament 13.9. 2017: 10-17/PPL-000010, Proposición de Ley para la mejora de las condiciones térmicas y ambientales de los centros educativos andaluces mediante técnicas bioclimáticas y uso de energías renovables.

a project should be developed for training youngsters as “solarteurs” – a profession name protected by the EU – e.g. in the region of Athens and in the Spanish province of Cádiz and an application for funding should be submitted. Young unemployed should participate in the training, ideally 50% of which should be young women. They should already have a trade or technical qualification and knowledge of IT. The training should be conducted following the “dual” model, i.e. including continual work in a company. It should therefore take slightly longer than the usually prescribed 6 months for a solarteur and incorporate a learning placement in Germany to gain experience with solar projects in practice. It should be investigated whether the training should also include the use of decentralised wind power.

Justification

In the investigated regions there is a shortage of people with comprehensive training in solar energy who plan, install, commission and organise the maintenance of photovoltaic plants, solar thermal plants and heat pumps and also advise on costs, viability, available funding, state regulations, how to set up an efficient and economic system, etc.

There is also a lack of state-operated training programmes in this field.

By European standards, both regions have exceptional potential for sun and wind, which makes decentralised usage appear particularly expedient and cost-effective. It is to be expected that in part yet existing state hindrances to decentralised power generation will be relaxed and liberalised soon.

6.4 “NEETS” Working for Climate Protection

A very high number of unemployed young people in the region do not have any vocational qualifications and have often not completed their school education⁵⁹. At the present time, they cannot be integrated into training programmes and professions in the energy sector. However, they have great difficulty in finding employed or self-employed work (cf. chapter 4.6). Therefore ...

it is proposed that an exemplary training programme should be offered for this specific group of young people that contains climate protection and climate adjustment measures in the area of agriculture, forests and landscape work in general.

The “dual” structure programme should last about six months and upon obtaining employment in this field the participants should receive a subsequent period of advice and support.

Justification:

Like other Mediterranean regions in Europe, the investigated regions will be affected very strongly in the coming years by the worsening consequences of global climate change (extreme weather events, droughts, flooding, erosion, desertification etc.). It is therefore especially important to adopt countermeasures in advance. To carry out the necessary landscape-related activities, there is a growing need for employees that acquire the necessary qualifications through shorter and less demanding training courses. Young unemployed people from this highly rural region very often have previous experience in agriculture and/or forestry. However, a training programme of this nature first requires funding programmes for climate change and climate adaptation as well as official obligations to be imposed on agriculture at the national and European level.

⁵⁹ According to Diario de Cadiz, at the beginning of March 2017, 26% of all school pupils in the province left primary school before completing their education.

7. Conclusions

- The *outlook for the strong development of the “renewable energy” and “energy efficiency” sectors* is unclear for the near future but can be generally assessed as positive and promising. Negative factors in **Greece** are the difficult economic situation, the dependency of the energy industry on lignite production and lobby interests from the oil trade, especially from the shipping companies between the mainland and the numerous islands. Positive factors are the development of solar and wind energy in the years before the crisis and for solar energy in particular the virtual net metering provision for solar prosumers, decided 2017⁶⁰. Furthermore, the development targets that have been entered into at the European level and the declarations of government for their national commitment.

In **Spain** an originally very promising development of wind and solar energy was slowed down since 2011, but with more favourable perspectives since 2017 and in particular since the change of government in June 2018. In the decision of more ambitious goals for renewable energy until 2030 on European level in June 2018, the Spanish government took an active role. Furthermore, it announced new impulses for wind and solar parks and the introduction of favourable rules for solar prosumers. In the energy efficiency sector, a high national level of ambitions can be observed, which should result in an also ambitious strategy of efficiency and energy saving, if the aims already decided will be realized.

- The energy transition and climate protection activities offer **significant employment potential for quite different specialities**. In the energy-related renovation of buildings we expect for Spain a six-digit and for Greece a nearly six-digit number of new jobs in the next years. In the different tasks of renewable energies, we estimate a five-digit number of new jobs in both countries. In any case, many qualified persons are needed for different professions, e.g. energy advisers, technicians, architects, energy economists and energy “all-rounders”. Accordingly, it is highly necessary to offer corresponding vocational training programmes in energy-related and climate-protective activities for young people which might be narrowly connected to practical work in enterprises.
- **Youth unemployment** remains extremely high in both investigated regions, despite a slight decline in Spain. This is compounded by the fact that a growing number of young people fall into long-term unemployment or are obliged to accept a high level of job insecurity and irregular employment conditions to the detriment of regular employees.

⁶⁰ Production *and* consumption of solar energy, typically by households or small enterprises. “net-metering” permits the prosumer to feed their excessive electricity into the grid and to receive it from the grid in case of shortcoming, both under the same conditions.

- Young people that have completed an **energy-related training programme** or a relevant university degree in Spain still have great difficulty of finding a job in their profession that they can live from. In Greece this situation of being “young, qualified but without work” is even more serious. The trend can therefore be observed that these generally well to very well-trained young people leave their country in order to find work abroad.
- An important reason for this is the **lack of practical application in the vocational training**, which is limited to short-term internships.
- Without exception, the close interlinking of “theoretical” vocational training with practical learning in companies is viewed as constructive and positive, **similar to the dual education model in Germany**.
- In both countries the expansion and further development of vocational training like the dual model makes complete sense. This is already being institutionally drawn up in sections by the relevant education authorities. It is for these reasons that **cooperation with German education institutions** is useful and will also foster the exchange experiences around energy. A good example is the Greek-German cooperation project “GRAEDUCATION” in which training for environmental professions is further developed and adapted to the future challenges through co-creative collaboration between ministries, education institutions and companies.
- However, when implementing dual training programmes, attention must be paid to avoiding pitfalls, such as the **risk of misuse** by companies wanting to save on paid work by using cheap trainees.
- To shape a dual education model offering the possibility to fill the gap between highly qualified and low-to-non-skilled workers, several factors are crucial
 - provision of **financial incentives** for readily available training establishments,
 - close **cooperation with existing educational institutions**, anchored in the institutional framework.
- In companies in the regions investigated, the technically and economically advantageous **scope for energy-saving measures** is high. However, company managers often lack the necessary understanding for energy saving analyses and measures. This also reduces the employment prospects of young people with relevant training.
- The scope for **energy efficiency in buildings** in general is likewise very high. However, there is still a lack of binding rules for implementation and a system of checks for the requirements that must be observed with new buildings or renovations.

- The group with by far the greatest difficulty in finding employment are **the so-called NEETs**, young people without vocational training and only elementary education or who quit school early.
- Employment opportunities need to be found for them that require a basic preliminary qualification that is not too elaborate. A suitable option, in particular in rural areas, is a shorter-term **training programme** with later employment **in climate adaptation and preventative action** against climate change in agriculture, forests, landscape work in general and urban green areas.
- There is a high level of credible willingness in the **consulted municipalities** to participate in targeted training projects in the area of energy and to promote them as far as possible.
- The **European Youth Guarantee** can be a resource for financing targeted training projects. The Youth Guarantee should be used to fund training in professions where a high demand for specialised workers is to be expected in future, e.g. a climate-friendly energy transition.
- The **viability of solar energy for and by prosumers** is very high in both countries due to the climatic conditions. The legal framework conditions are favourable in Greece, in Spain they are currently yet problematic. However, on the condition of complete self-sufficiency, solar energy in both countries it is viable and economic. A growing market of decentral solar energy offers a correspondent demand for experts in the necessary tasks, which have to be trained.
- For **low-income households**, and especially in Greece, off-grid solar power generation can be achieved through the granting of **micro-loans, energy-contracting or financial aid**.

8. How to improve the European Youth Guarantee – An additional proposal

By Hartwig Berger/Rolf Kreibich

For more than 10 years now, an unacceptable number of young Europeans are unemployed. Many of them are hindered to practise the profession for which they have been trained and find themselves either locked out of paid work or employed only short-time under poor working conditions. Young people in southern Europe are most severely affected, but there are also major problems in other countries, in Croatia, Slovenia and France for example.

Five years ago, with the **European Youth Guarantee** the European Commission and the European Council committed all Member States to offer all young people aged between 15 and 24 (the upper age limit was later raised to 30) either a paid job or a training place within four months.

The Member States must develop programmes to put this arrangement into practice. To meet this requirement, they receive an amount of funding based on their general plans and on the level of youth unemployment in the country. An EU fund was set up for these activities, with a budget of EUR 6.4 billion to cover the period from 2014 to 2018; a further EUR 2 billion was made available last year and the scheme was extended until 2020. Funding under the European Youth Guarantee is provided on the expectation that Member States will draw up an effective implementation strategy and take practical measures designed to increase considerably the perspectives of young people securing a job which can provide them with a livelihood.

Today, it is clear that the financial incentives offered through the European Youth Guarantee are very far from enough to reduce unemployment rates to any significant extent. The countries hardest hit by youth unemployment have not introduced suitable policies and measures, nor have the Youth Guarantee's monitoring tools proved effective as a means of reviewing the measures, rewarding success and penalising failure, as it would be appropriate. Thus, in the spring of 2017, more than four million young Europeans were unemployed, and youth unemployment rates were 43% in Greece, 41% in Spain, 35% in Italy and 24% in France¹. These figures shame Europe and are blighting the future of an entire generation.

Particularly alarming is the proportion of young Europeans who are unemployed and at the same time without any professional formation or participation in training courses. In 2017, 14.5% of young people aged between 15 and 34 in the EU were in this situation. The figure for Italy was 25.5%; for Greece 24.4%; for Bulgaria 19.5%; for Croatia 18.9%; and for Spain 17.9%².

The Youth Guarantee's limited success is unsurprising, as it will not be able to create jobs, unless additional measures are taken to boost investment and innovation in sectors of the economy with relation to the formation of the youths. This would also require an improvement in the underlying economic situation compatible with the ecological requirements and with advances in science and technology. Under the present conditions, young people who are employed via the European Youth Guarantee or in similar employment programs with public aid, in their large majority will be unemployed anew when the activity financed by the Youth Guarantee has come to an end. At best they find afterwards only short-term employment contracts, frequently outside of their profession or they decide to emigrate

to European regions offering better economic conditions. The companies involved in youth guarantee programs should therefore also be required to employ young people on a longer-term basis. It is clear from all of this that, without further incentives to expand and safeguard the development of high-quality products and services, the European Youth Guarantee alone cannot create lasting employment for young people in the countries where the problem is most severe. The Youth Guarantee's financial aid is thus only a partial solution, which must be supplemented with further-reaching support initiatives to develop sustainable future-oriented products and services.

One reason why youth unemployment in Europe has a little bit decreased in recent years is that many young people have migrated to regions that are currently prosperous. In many cases they have only been able to find work outside their qualification. At the same time, youth mobility within Europe is augmenting disparities between regions, especially, if the country from which workers emigrate has had to pay for their education.

The situation regarding youth unemployment in Europe is likely to be a major topic for debate in the context of next year's European elections. The low turnout among young people in the elections will once again be an issue. Given present findings, however, it should come as no surprise if young people who are long-term unemployed, or only precariously employed, feel they have little to gain from the EU and the notion of solidarity between Europeans. The EU has not yet been of any tangible help to them in significant areas of their lives. But what future can the Union expect if a large part of young Europeans in particular is permanently excluded from the labour market? Turning the problem around, it is precisely this generation that the EU needs to win over if it is to hold up the reduction of youth unemployment as a Community achievement. The run-up to the European elections offers a great political opportunity to set out convincing ideas and take further credible steps to implement them.

Against this background, we propose:

The EU offers young people who have yet to find work a vocational training in professional fields being necessary for a sustainable development in Europe. The education should include an empowerment to start activities, for example establishing a company or cooperative afterwards. One obvious area here is climate protection and mitigating the effects of global warming. We propose to amplify the European Youth Guarantee by adding a further EU-funded programme: "*Young people for a sustainable future*". The aim is to offer young Europeans – including young refugees with residence permits – a basic or supplementary training in professions that are important and necessary for climate protection. This training should be closely linked to practical activities and work experience, also in other European countries. It should be run along similar lines to the so-called 'dual model' of vocational training. The young people involved should also learn how to be proactive in the climate protection and energy transition sector, how to establish start-ups and get involved in projects in the solidarity-based economy. Developing a climate-friendly energy system and climate-friendly forms of employment is a field in which creativity and a sense of initiative are particularly in demand.

The training being offered must be combined with climate-protection activities in the Member States. By ratifying the Paris Agreement, all EU Member States have pledged under

international law. “*Young people for a sustainable future*” should be an important step to fulfil this commitment. Young people who have hitherto been excluded could thus be offered a sustainable future, as part of a common effort and cooperative activity of and in the European Union.

We are restricting our proposal for an EU-wide offer to education and activities concerning climate-protection, in particular to the task of transforming our energy system from one that is destructive for the global climate to one that is climate-protective. In developing just this one sector, substantially more than a million young Europeans could be employed in fields which offer them a future.

For this to happen, however, Member States will have to meet their obligations under international law. And precisely Europe’s southern regions, which are hardest hit by youth unemployment, are best placed to employ young people in the switch to an energy transition which is based on solar power. In the coming years, they will also face more severe climate challenges than regions in the north and will have to do a great deal to mitigate desertification, erosion risks, severe droughts and damage to agriculture, - all the more a reason why they cannot afford to exclude young people from employment or to force them to migrate to other parts of Europe. It is in these countries own interest to keep their young people at home, they need their activities to safeguard a sustainable future at home. It is obvious, too, from the aforementioned climate-protection challenges that practically all sectors of the economy – mechanical engineering, electronics, ICT, agriculture, forestry, construction, timber construction, etc. – need well-trained young people with practical work experience and will need more of them in the future.

Relevant fields for training in the areas of climate protection/climate change mitigation are, for instance:

- Energy service management, which, in addition to energy technology know-how, calls for knowledge of economics, law and climate protection and training in entrepreneurial and communication skills.
- Renovating and constructing buildings to low-energy and zero-energy standards, timber und mud construction.
- Energy audits in connection with climate-friendly heating and cooling technologies;
- “Solar technicians” who plan, install and maintain decentralised renewable energy systems for heating, cooling and power generation, taking due account of both technical and economic factors and being able to give energy advisory.

Young people without any vocational qualifications, so-called NEETs, are particularly likely to face long-term unemployment and social marginalization. It is therefore essential to integrate them into the training component of an extended Youth Guarantee scheme. Training in the following fields could be offered, for example:

- Low-threshold energy consulting for households and small businesses in municipalities, city districts and neighbourhoods.

- Practical climate-protection and climate-adaptation activities in agriculture and forestry, landscape and green management, greening buildings, etc.