



REENERGY

Socio-technical consensus and controversies about renewable energy

Research brief n. 1

Public opinion on renewable energy

December 2012

Susana Fonseca

Mónica Truninger

Luís Junqueira

Ana Delicado

Socio-technical consensus and controversies about renewable energies is a research project on science and society studies, funded by the Portuguese Foundation for Science and Technology (PTDC/CS-ECS/118877/2010), carried out at the Institute of Social Sciences (University of Lisbon), in collaboration with the University of Aveiro and Centre for Research in Anthropology. <http://www.renergyproject.ics.ul.pt>

FCT

Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

 **ICS**
Instituto de Ciências Sociais da Universidade de Lisboa
Laboratório Associado

 **CRIA**
CENTRO DE RECURSOS
DE INVESTIGAÇÃO
EM ANTHROPOLOGIA



universidade de aveiro

Introduction

In March 2007 EU leaders committed Europe to become a highly energy-efficient, low carbon economy. In 2009, through the climate and energy package, a set of targets known as the "20-20-20" established three key objectives for 2020:

- A 20% reduction in EU greenhouse gas emissions from 1990 levels;
- An increase of 20% of the share of energy produced from renewable sources in the EU;
- A 20% improvement in the EU's energy efficiency.

Among these key objectives, the most relevant for the present research is the one related to the share of renewable energy sources in the overall energy consumption in the EU. This objective has been the main driver for investments in renewable energy across Europe and therefore, most of the actions taken in Portugal are a direct result from this political context.

According to Eurobarometer surveys, the way Europeans and particularly the Portuguese population perceive these objectives differ, as well as the perception regarding both present and future roles of renewable sources of energy in the energy mix. This Research Brief seeks to present and discuss some of the main results regarding these matters with a particular emphasis on wind and solar power energy sources.

Framework

Energy issues are an urgent environmental challenge. The threat of climate change

and scarcity of conventional energy sources have led countries to increasingly invest in alternative, renewable energy sources. Unlike other energy production technologies (such as nuclear or fossil fuels, but also biofuels and dams), solar and wind power are generally perceived as "clean," "green" or "environmentally friendly", and as an extension of traditional technologies like windmills.

However, literature in this area has identified a mismatch between generalised support to renewable energies and local opposition to the siting of energy-generating facilities, in particular windfarms. And in fact, whereas most public opinion surveys show support for renewable energies, there has been a wealth of studies on the local conflicts generated by windfarm projects and some consider that this is responsible for delaying the development of the wind energy sector in some countries, such as the UK and the Netherlands (Walker, 1995; Ek, 2005; Devine-Wright, 2005; Bell, Gray & Haggett, 2005; Breukers & Wolsink 2007; van der Host & Toke, 2010; Haggett & Futák-Campbel 2011).

Conversely, some authors have pointed out that public opinion on renewable energies is also not homogeneous, there are many "publics", and attitudes vary across social groups (Walker, 1995; Ek, 2005).

Though a dedicated survey on attitudes concerning renewable energies would suit our research objectives better, an analysis of Eurobarometer survey's results does allow us to explore differences between countries (with a particular emphasis on Portugal) and across social groups.

Methodology

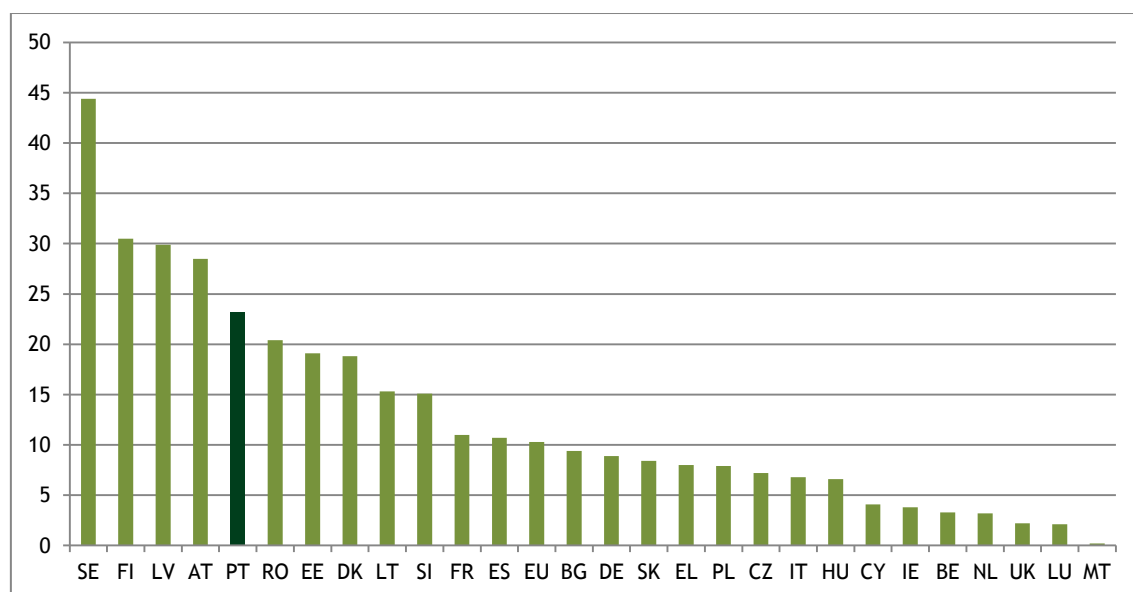
The main source of information for this Research Brief on public opinion on renewable energy is Eurobarometer surveys (Eurobarometers 57.0, 2002; 65.2, 2006; 65.3, 2007; 69.2, 2008; 73, 2010; 75.4, 2011), whose databases were accessed via the Zucat Gesis website. Data treatment consisted of extracting survey results from Portugal, the EU and some selected countries, of variables pertaining attitudes towards renewable energies and socio-demographic traits for cross tabulation. Data analysis was performed with the software IBM SPSS 20. Despite its benefits, namely in terms of cross-country comparisons, the limitations of Eurobarometer surveys should be mentioned: the questionnaires are created for policy, rather than scientific aims and

the way questions are built do not fully fit the intended research objectives.

Renewable energy in Portugal

Unlike most other environmental (or socio-economic) indicators, Portugal is at the top of the league in renewable energies. In the past decade, Portugal has made an extensive investment in renewable energy generation. The ambitious target of 45 per cent of electricity from renewable energy sources by 2010 was met and the percentage of renewable energies in total consumption is already 25 per cent (the goal for 2020 is 31 per cent), which places Portugal in the fifth place in the ranking of the 27 EU member states (Eurostat, 2011) (Figure 1).

Figure 1 Share of renewable energies in consumption - primary energy (%)



Source: Eurostat 2011

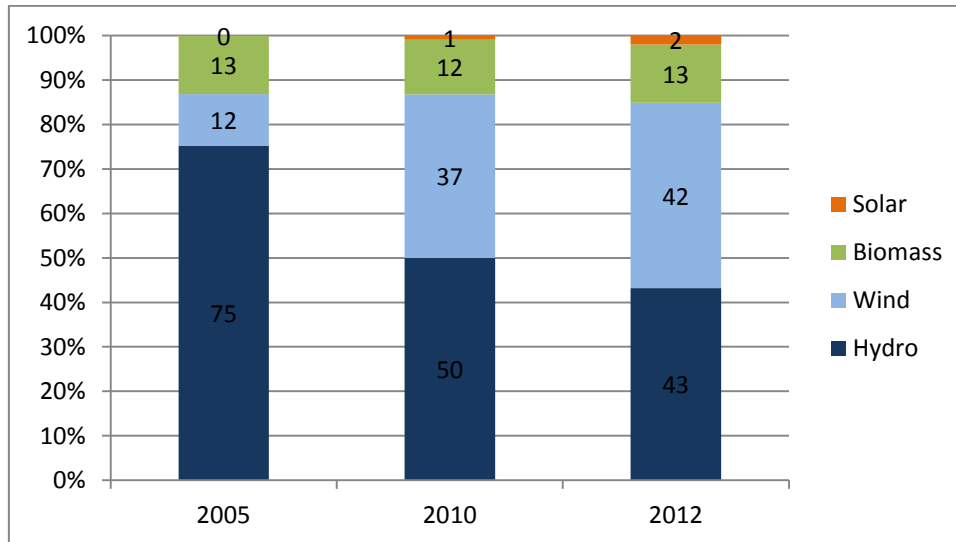
The main source of electricity through renewable energy is still hydropower, but wind energy has grown considerably in the past decade; solar power is responsible for just 2 per cent of electricity (DGEG, 2012) (Figure 2).

This development is largely due to a very favourable policy framework in the past decade: dedicated policy documents, such as the National Plan for Renewable Energies (2010), that set sectorial measures for reaching renewable energy targets, as well as feed-in tariffs that have provided strong financial incentives for

developers (Ringel, 2006). Several studies have shown how the effectiveness of such policy measures has influence over the

rate of development of renewable energies (Wolsink, 2000; Breukers & Wolsink, 2007; Toke, Breukers & Wolsink, 2008).

Figure 2 Electricity production through renewable sources

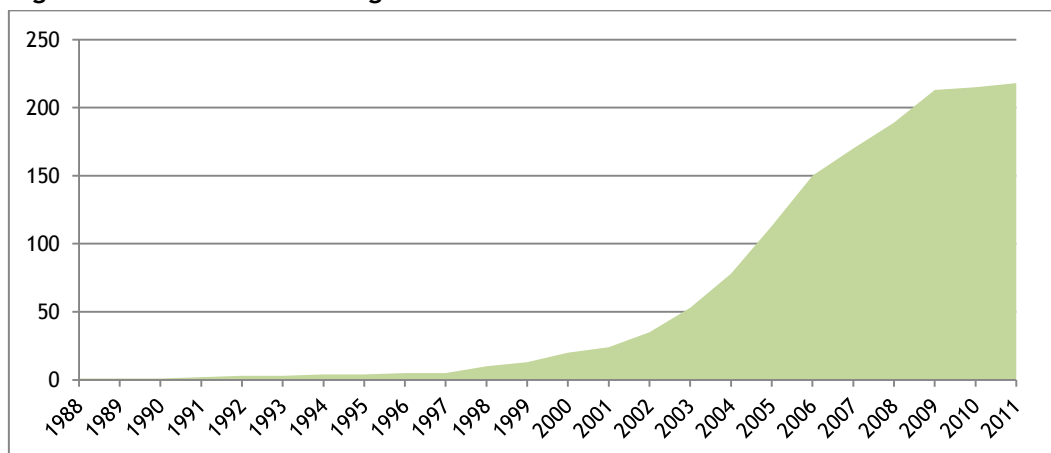


Source: DGEG 2012

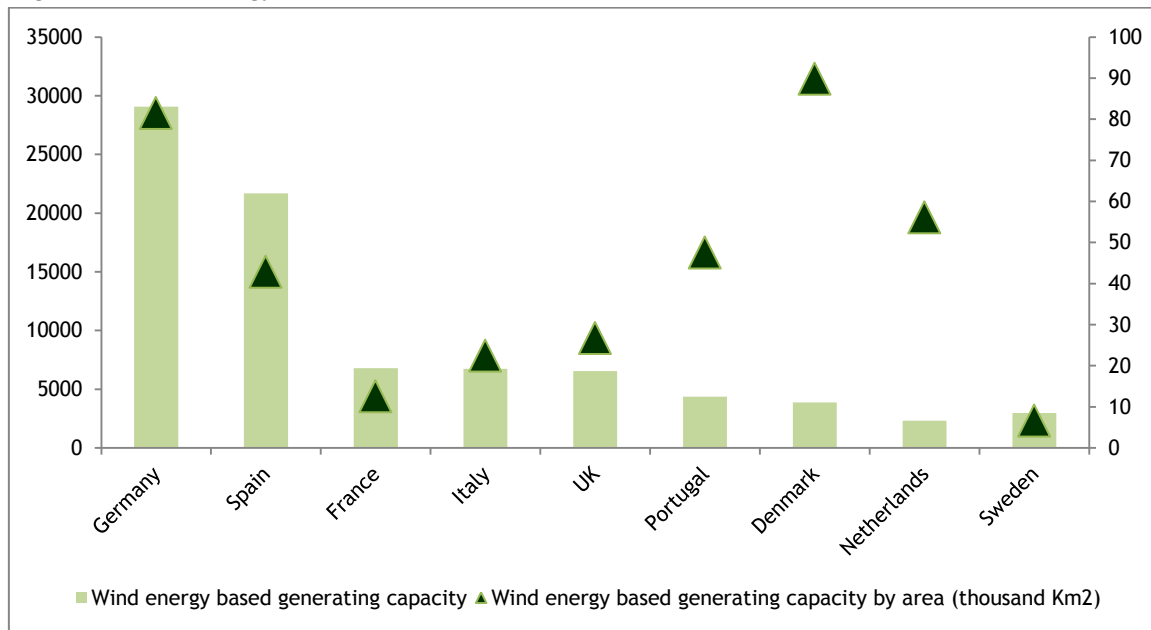
Whereas there is just one sizeable solar power plant (with 45.8 Mw installed capacity), windfarms have grown exponentially in the last decade (Figure 3). After a slow start in the 90s, with just 18 windfarms functioning by the end of the decade, in 2012 there were almost two and a half hundred windfarms in the country. These windfarms have a total of 2349 turbines, which generate 4372.8 Mw.

This places Portugal behind five other European countries in terms of wind energy based generating capacity (Figure 4), but if one takes into consideration the relative size of countries, Portugal fares better than the UK, Spain, France and Italy.

Figure 3 Wind farms in Portugal



Source: INEGI 2011

Figure 4 Wind energy

Source: INEGI 2011

All windfarms in Portugal are onshore, since the coastal sea bed is too deep. Most windfarms are located in mountain ranges in the North and Centre regions of the country, as well as close to the coast north of Lisbon. In a small country of 92 thousand square kilometres, this rapid expansion of wind power, with a corresponding increasing salience of wind

turbines on the landscape will not have failed to have an impact on the perceptions and attitudes of the Portuguese. Also, the most favourable locations for windfarms tend to coincide with natural parks, protected landscapes and other conservation areas (Afonso & Mendes, 2010), which raises another point of contention.

Opinions regarding energy sources

When it comes to expressing an opinion about the main sources of energy in Europe, the Portuguese present a higher acceptance of fossil energy sources than Europeans in general. The pattern is clearly different when we analyse the opinions on nuclear energy (Portugal being far less favourable than the average European), but also regarding some sources of renewable energy. The

Portuguese are less enthusiastic about biomass than Europeans, but are more favourable to ocean energy than the average European. As for wind and solar, it is somewhat surprising that the Portuguese seem to be less favourable to both power sources than Europeans in general, but that happens not so much due to the expression of an opinion against, but mostly due to the number of people who feel that are not able to express an opinion (Table 1).

Table 1 Opinion regarding energy sources (%)

	In favour		Balanced		Opposed		DK	
	EU25	PT	EU25	PT	EU25	PT	EU25	PT
Solar	89	82	4	2	3	4	4	13
Wind	85	77	5	3	5	3	5	17
Hydroelectric	76	77	8	5	6	4	11	14
Biomass	72	58	8	7	10	10	10	26
Gas	67	70	15	11	14	10	4	9
Ocean	67	76	8	3	9	3	17	18
Oil	51	59	19	14	27	19	4	9
Coal	39	53	18	15	38	19	5	13
Nuclear	31	16	12	13	50	53	7	18

Source: Eurobarometer 65.3 (2007)

For these opinions variables like gender, education, age and type of community do not introduce any clear or significant differences.

When it comes to the knowledge of the most used energy sources in the country,

Portuguese respondents tend to overestimate the role of two sources of renewable energy (solar and hydropower) and to underestimate the role of coal (Table 2).

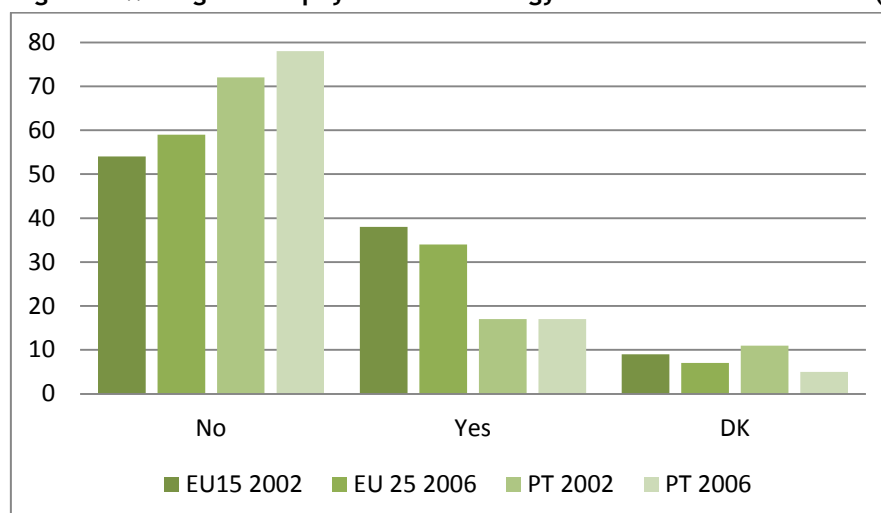
Table 2 Most used sources of energy in the country (%)

	EU25	PT
Oil	81	73
Gas	77	64
Nuclear	36	2
Coal	35	15
Hydroelectric	17	61
Wind	7	11
Solar	6	9
Biomass	3	1
Ocean	1	2

Source: Eurobarometer 65.3 (2007)

When asked about their willingness to pay more for energy from renewable energy sources, the results show that the Portuguese are far more likely to answer negatively than the average European (Figure 5). In fact, Portugal had one of the

lowest rates of availability to pay more for renewable energy in Europe, preceded only by Lithuania. It should also be noted that negative answers rose also in the EU25 average between 2002 and 2006.

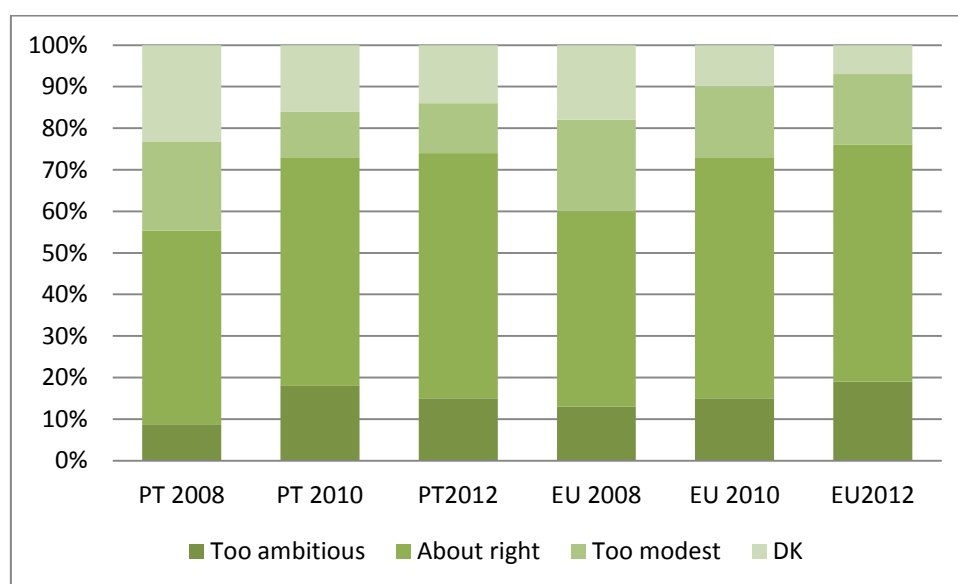
Figure 5 Willingness to pay more for energy from renewable sources (%)

Source: Eurobarometer 65.3 (2007)

Energy targets

When we consider the objective regarding renewable energies (Figure 6), the Europeans' opinion on the suitability of renewable energy targets for 2020 seems to be clearer in 2012, since there was a substantial reduction in the number of citizens who were not able to express an opinion about it (2008 - 18%; 2010 - 10%; 2012 - 7%) and at the same time a

reinforcement of the opinions that considered the targets to be balanced or "about right". On the other hand, when it comes to consider the targets as "too ambitions" or "too modest", the four years since 2008 resulted apparently on an increase in the number of citizens who consider them to be "too ambitious".

Figure 6 Agreement with renewable energy targets to 2020 (%)

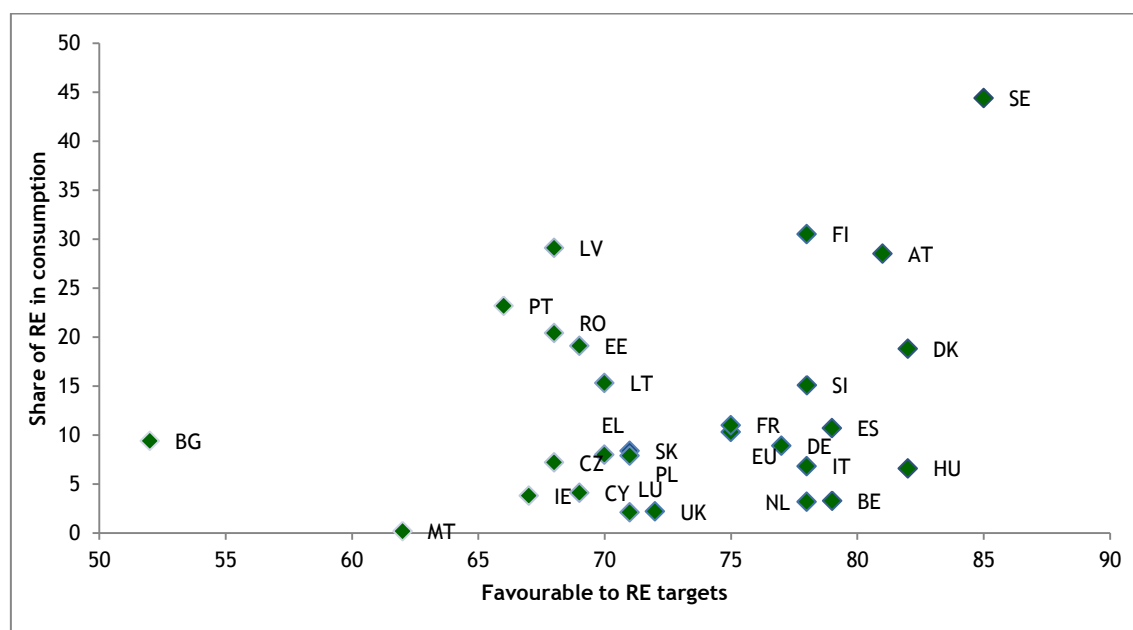
Source: Eurobarometer 69.2 (2008); Eurobarometer 73 (2010), Eurobarometer 78 (2012)

This new trend is particularly clear among Portuguese respondents, where the proportion of citizens who claim the targets are “too ambitious” were in 2010 twice the proportion of responses that could be found in 2008, with a slight decrease in 2012. Such a result might be the outcome of two distinct factors. On the one hand, there has been a clear increase on the number of wind farms in Portugal, particularly since 2004 (see above). The more marked presence in the landscape and the need to live with some of the less positive aspects of these energy infrastructures could form the basis of this change of opinion regarding the ambition associated with European objectives to integrate renewable energy sources. Along with this increased visibility, there is another possible explanation that has more to do with the public debate around the

costs of renewable energy and incentives that are being given to renewable energy producers and its impacts on energy prices for the consumer. Although this needs to be consubstantiated with other empirical data (from media analysis, for instance), we believe that this debate may have contributed to a change of opinion regarding the ambition of renewable energy targets for 2020, particularly in a context of economic contraction as Portugal is undergoing for the last four years.

Nevertheless, it should be noted that, at the same time that the number of Portuguese who consider the objectives for 2020 to be too ambitious has increased, so has the number of answers that point to the suitability of the targets, herein the main number of answers is found.

Figure 7 Share of renewable energies in consumption and agreement with targets (%)



Source: Eurobarometer 73 (2010); Eurostat, 2011

Considering the possible connection between agreement with renewable energy targets (summing the answers that targets are about tight or too modest) and the current share of renewables in energy consumption in all EU countries (Figure 7), we obtain a very mixed picture. Some

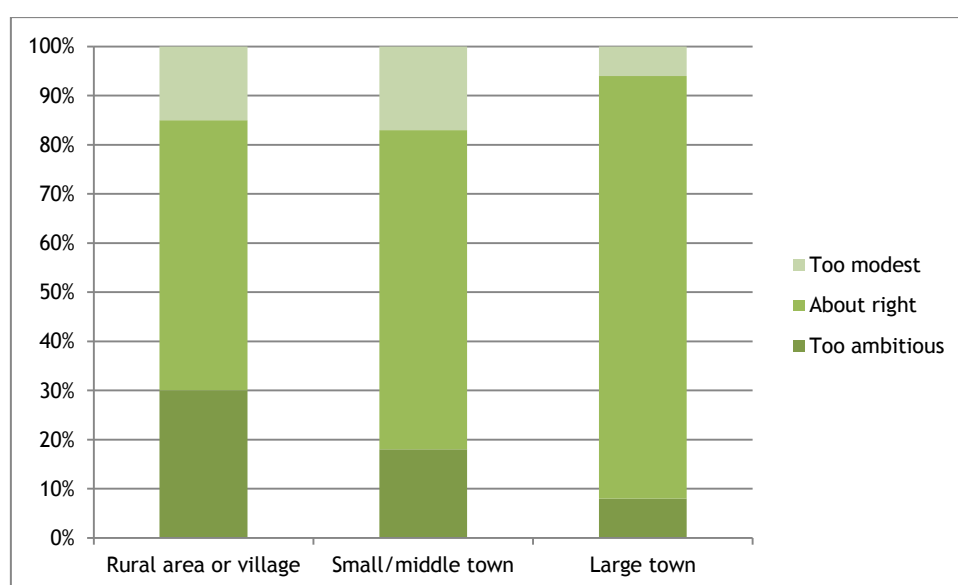
countries that are highly favourable to renewable energy targets already have a high share of renewables (namely the Nordic countries), others, though favourable, still have a long way to go (especially in central Europe). Portugal, together with some eastern European

countries, already has an above average share of renewable energy, but general attitudes are among the least favourable to targets.

Looking at internal variations in Portugal, the only variable that has some influence in the answers appears to be the type of community (Figure 8). Residents in rural areas tend to consider the objectives “too ambitious” more often than residents in

other communities, and those who live in big cities are more inclined to express the opinion that the objectives are “about right”. These differences cannot be found in the distribution of answers for EU27. At this level, gender and education are the variables that play a bigger role. Men and those more highly educated tend to consider more often the objectives “too modest”.

Figure 8 Agreement with the renewable energy targets for 2020 according to type of community (%)

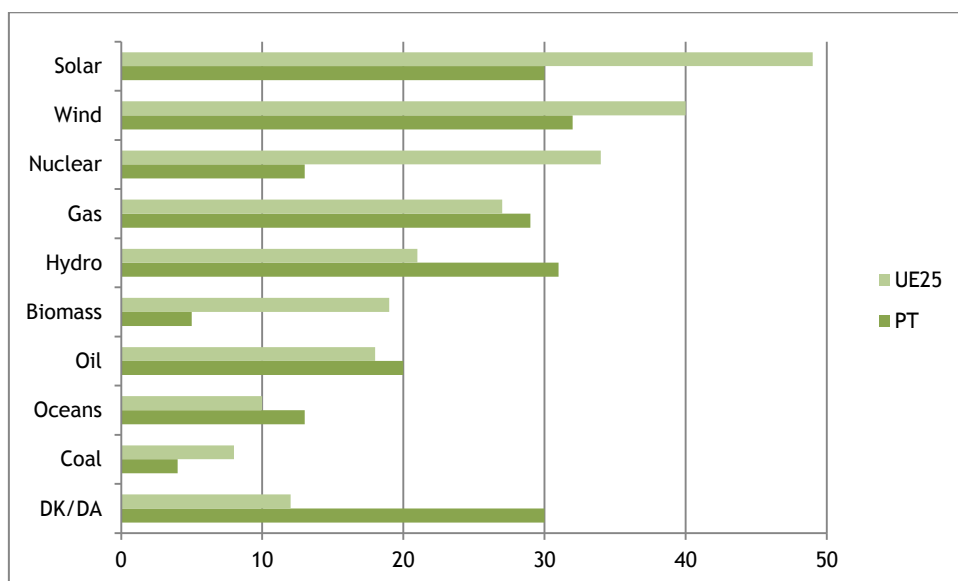


Source: Eurobarometer 73 (2010); N = 852; p = 0,000; Cramer's V = 0,175

Future prospects on energy

Regarding the future, when asked to express an opinion on which energy sources will be used more frequently in 30 years' time (Figure 9), the Portuguese select renewable sources less often (except hydro and oceans) and non-renewable more often than the average European citizen. Another important

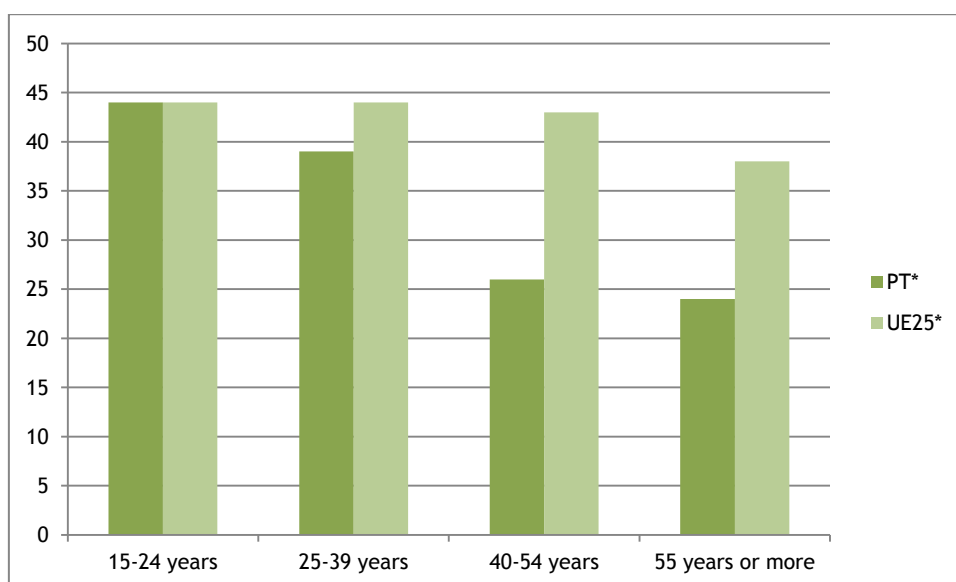
element to consider is the very expressive number of respondents who do not have an opinion on the matter (almost 30%, more than twice the results for the EU25) clearly showing the difficulties Portuguese citizens tend to present whenever they have to express an opinion on the future of energy in their country or in Europe.

Figure 9 Energy sources that will be most used in your country in 30 years (%)

Source: Eurobarometer 65.3 (2007)

Considering the two sources that are more relevant to the present research, men refer wind energy more often than women. Moreover, the relevance attributed to the role it will play in the future increases as the age diminishes, that is, young people

are more likely to highlight the role of wind in thirty years' time (Figure 10). This trend is far less obvious in the UE25, where the difference of opinions is only relevant when we consider the older respondents.

Figure 10 Selection of wind energy in 30 years according to the age of respondents (%)

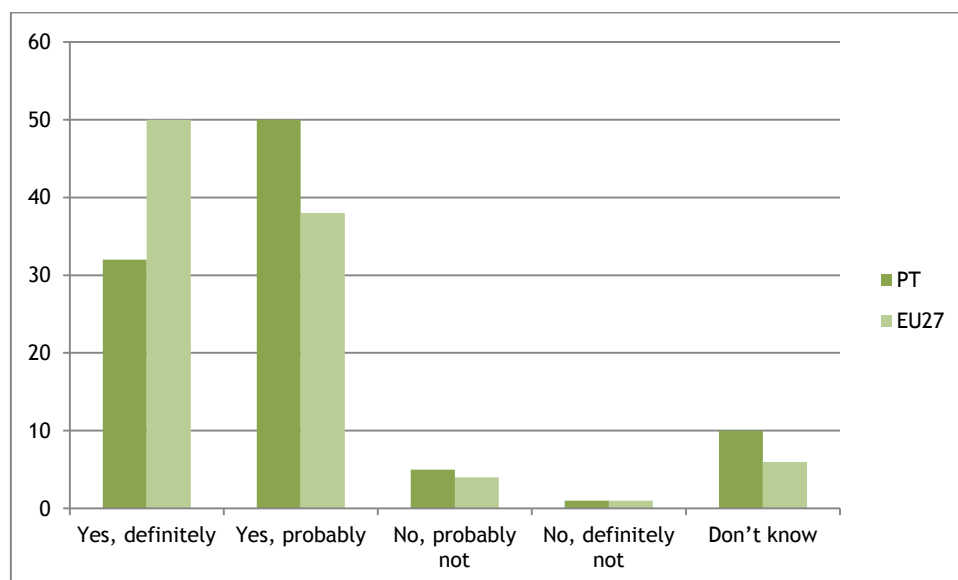
Source: Eurobarometer 65.3 (2007); * N = 1000; p = 0,000; Cramer's V = 0,171; ** N = 24815; p = 0,000; Cramer's V = 0,061

When we consider solar energy, the trend is similar, but less strong, and Portuguese answers follow a similar pattern of the EU25 ones with a clearer difference mainly between those who are less and those who are more than 55 years old, with the first group mentioning solar energy more often as one of the three main sources of energy in 30 years than the last, although a reduction in references is seen in the age group 40-54 years old.

If the timescale is stretched even further, from 2030 to 2050, we can find continuities in the overall opinions of both

Portuguese and Europeans regarding future visions of renewable energy use. Thus, in a recent Eurobarometer survey (75.4, 2011) the Portuguese were amongst a small group of European countries (Poland, Romania, Italy, Lithuania, Bulgaria and Hungary) that were more sceptical about the wide use of wind and solar power as energy sources in 2050. Portuguese citizens were the ones that collected the least percentage of responses (32%) in the category 'yes, definitely' in 2050, *people will be using renewable energy sources such as wind and solar power more than they do now* (see Figure 11).

Figure 11 Expectations of using renewable energy sources (e.g. wind and solar power) in 2050 (%)

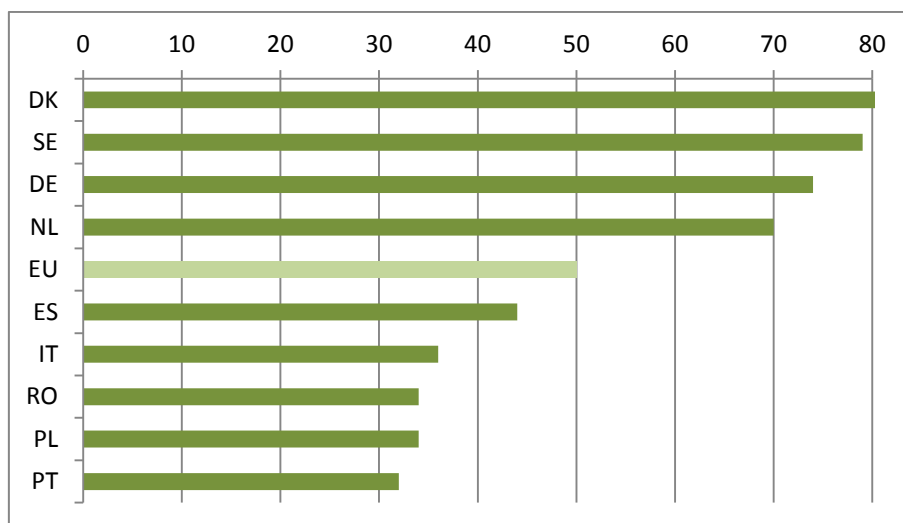


Source: Eurobarometer 75.4, 2011.

The most positive outlook came from Denmark (82%) and Sweden (79%) (Figure 12). Regarding the Swedish public opinion on acceptance of wind power, Ek (2005) has reported a very positive opinion on these infrastructures, not finding evidence of NIMBY effects among this population. Eurobarometer results for Sweden still confirm this positive outlook found a few years ago. But even in Portugal we can find a high overall expectation of more renewable energy in the future if we

combine the two positive response categories ('yes, definitely', 'yes, probably'), with 82% citizens in total across the two categories. However, this support is somehow less empathic than in other Member States. Moreover 10% of Portuguese citizens (against 4% of Europeans) did not know what to answer to this question, confirming some degree of uncertainty regarding the future of renewable energies.

Figure 12 Expectations of using renewable energy sources (e.g. wind and solar power) in 2050 in selected countries (%)



Source: Eurobarometer 75.4, 2011.

On the same question, detailed socio-demographic analysis concludes that there is variation in the distribution of responses across a set of variables, namely the number of years in education, gender, age, and type of community (see Table 3).

Table 3 Expectations of people using renewable energies in 2050 in PT by sex, age, education and type of community (%)

	Total "Yes"	Total "No"	No change	DK
Sex*				
Male	85	7	1	7
Female	78	7	2	13
Age**				
15-24	86	6	1	7
25-39	86	5	2	7
40-54	84	7	0	9
55+	75	9	2	14
Education (end of)***				
15-	80	6	2	12
16-19	90	7	2	2
20+	92	5	2	1
Still studying	92	2		3
Type of community****				
Large town	91	2		7
Small or middle sized town	85	3		8
Rural area or village	75	10	2	13

Source: Eurobarometer 75.4, 2011.* N = 1048; p = 0,022; Cramer's V = 0,096; ** N = 1048; p = 0,010; Cramer's V = 0,083; *** N = 950; p = 0,000; Cramer's V = 0,110; **** N = 1048; p = 0,000; Cramer's V = 0,106

A resounding positive outlook on the use of renewable energies in the future is higher amongst people still studying or that attended education for a longer period of time (20+ years). Men, individuals between the ages of 15 and 39 years old, and the ones who live in a large town are more certain that renewable energies will be more used in 2050 than now, in contrast to women, the elderly and individuals who live in a rural village. These social differences are also visible at a European

level, but are less contrasting than in Portugal. To give an example, if we take the total 'yes' response category, then we notice that in Portugal the gap between living in a 'rural area and village' and 'large town' is 16.4pp, in Europe 27 it reduces substantially to 1.4pp (see Table 4). This means that the urban-rural divide has a significant discriminatory power in Portugal, especially when contrasting with the European average.

Table 4 Expectations of people using renewable energy in 2050 by type of community (Total yes) (%)

	PT*	EU27**
Rural area or village	75	90
Small or middle sized town	85	90
Large town	91	91
Rural-Urban Gap	16,4pp	1,4pp

Source: Eurobarometer 75.4, 2011; * N = 1048; p = 0,000; Cramer's V = 0,106; ** N = 24763; p = 0,000; Cramer's V = 0,028

Conclusion

In conclusion, despite the considerable development of renewable energies in Portugal, public opinion seems to be less favourable to them than in other European countries. This may be due, on the one hand, to the education levels of the

population (lower than the European average), and, on the other hand, to the rapid growth of wind farms and negative media coverage regarding costs for the consumer. However, a less than enthusiastic public support to renewables did not seem to hinder government investment in this area.

References

Afonso, A. I. & C. Mendes (2010) 'Energía Eólica Y Paisajes Protegidos: Controversias En El Parque Natural De Montesinhos', *Nimbus* 25-26: 5–19.

Bell, D., T. Gray, & C. Haggett (2005) 'The 'Social Gap' in Wind Farm Siting Decisions: Explanations and Policy Responses', *Environmental Politics* 14(4): 460–477

Breukers, S. & M. Wolsink (2007) 'Wind power implementation in changing institutional landscapes: An international

comparison', *Energy Policy* 35(5): 2737–2750.

Devine-Wright, P. (2005) 'Aspects of UK Renewable Energy Development: Exploring Public Beliefs and Policy Implications', *Local Environment* 10(1): 37–41.

DGEG (2012), *Renováveis: estatísticas rápidas*, nº 93, Lisboa: DGEG

Ek, K. (2005) 'Public and private attitudes towards "green" electricity: the case of

Swedish wind power', *Energy Policy* 33(13): 1677–1689.

Eurostat (2011) *Energy, transport and environment indicators 2011*. Luxembourg: Publications Office of the European Union.

Haggett, C. & B. Futák-Campbell (2011) 'Tilting at windmills? Using discourse analysis to understand the attitude-behaviour gap in renewable energy conflicts', *Mechanism of Economic Regulation* 51: 207–220.

INEGI (2011) *Windfarms in Portugal*. Porto: INEGI/APREN

Ringel, M. (2006) 'Fostering the use of renewable energies in the European Union: the race between feed-in tariffs and green certificates', *Renewable Energy* 31(1): 1–17.

Toke, D., S. Breukers, & M. Wolsink. 2008. 'Wind power deployment outcomes: How can we account for the differences?', *Renewable and Sustainable Energy Reviews* 12(4): 1129–1147.

Van der Horst, D. & D. Toke (2010) 'Exploring the landscape of wind farm developments; local area characteristics and planning process outcomes in rural England', *Land Use Policy* 27(2): 214–221.

Walker, G. (1995) 'Renewable energy and the public.' *Land Use Policy* 12(1): 49–59.

Wolsink, M. (2000) 'Wind power and the NIMBY-myth: institutional capacity and the limited significance of public support,' *Renewable Energy* 21(1): 49–64.