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Sustainable planning and energy policy: a governance based analysis of the European energy policy strategy and its relation to the Portuguese case

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I – Introduction

The main goal of the present research is to verify if there is any evident multi-level coherence between several policy instruments that pretend to develop the energy sector and how this multi-level coherence works in practice, having Portugal as case study. For this, an analysis of the coherence between the European, national and regional spatial and sectoral policies in the actual context of economic and environment global changes will be developed, not only considering the theoretical coherence of the objectives of each document, but also, verifying the execution and implementation of EU funds related to the energy sector linked to the diversity of promoters in a sector that is increasingly more open to multi-actor participation. It is in this context, of an evolving system of multi-level policies associated to a multi-actor participation, that we developed this paper. These research is integrated in a larger project titled SPOTIA – “Sustainable spatial policy orientations and territorial impact assessment – contribution to Portuguese context”, financed by the Portuguese National Foundation for Science and Technology and structured on a specific and updated policy issue: the assessment of the coherence and relevance of the Portuguese territorial and sectoral frameworks (policy programs and plans), and to evaluate the impacts of these policy orientations in the territorial development.

This paper has four distinct parts: the first part will focus in some European orientations and policies in the energy sector, as well as in the proposed targets and scenarios for a more efficient energy system. Also in the first part (with a special emphasis in Portugal), it will briefly analyzed the Portuguese energy profile and considered the main instruments that orientate the energy policy at national scale. In the second part, we use the SPOTIA methodology to assess the coherence among several territorial and sectoral instruments concerning energy sector, integrating european, national and regional instruments, in five adopted domains: infrastructure network (electric grid), energy and mobility, non-renewable energy technology, renewable energy technology and, finally, energy efficiency and management. In the third part, will be addressed the role of the Cohesion Policy for 2007-2013 in the “Energy” sector, analyzing the approved projects of Portuguese NSRF, its geographical location, the promoters and the available funds of three Portuguese regions as example – North, Lisboa e Vale do Tejo and Algarve. The conclusions are in the fourth part.

II – European scenarios and orientations for the future (2020 and 2050) of EU-27 energy policy

In the last years, the European Commission has emphasized the need of an energy policy that could foster a resource-efficient Europe, in order to reduce carbon emissions and support the sustainable management of resources, while at the same time maintaining the European economy competitiveness and energy security, as one of the main goals of its 2020 Strategy. Since the Gothenburg goals and the following orientations of European Sustainable Development Strategy, that energy is being integrated as a transversal domain in sectoral, regional and urban policies. “Europe 2020”, has established a target of reducing carbon emissions by 20 % (and by 30 % if conditions permit), increasing the share of renewable energies by 20 % and increasing energy efficiency by 20 %, in what was known as the 20-20-20 target (EU, 2010a). To reach this objective the European Commission has developed its Energy Strategy to 2020 in the initiative “A strategy for competitive, sustainable and secure energy” structured around five priorities: a. limiting energy use in Europe; b. building a pan-European integrated energy market; c. empowering consumers and achieving the highest level of safety and security; d. extending Europe’s leadership in the development of energy technology and innovation; e. strengthening the external dimension of the EU energy market (EU, 2010b). Figures 2 and 3 show the renewables evolution by country and type that, according to the UE estimates, will result by the implementation of the EU Energy Policy to 2020.

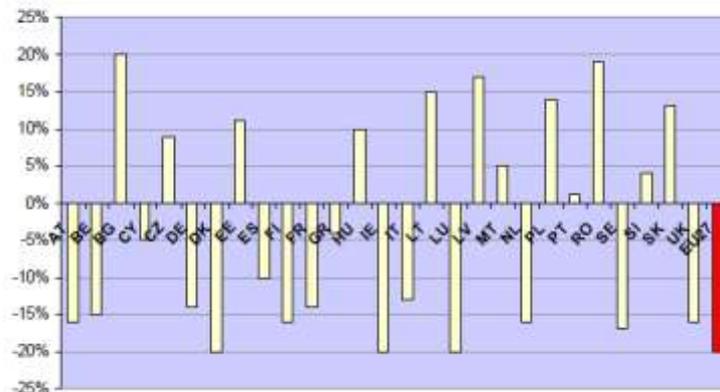


Fig.1: 2020 Greenhouse gas emissions targets (compared to 2005 levels)
Source: EU (2011a) – Key figures

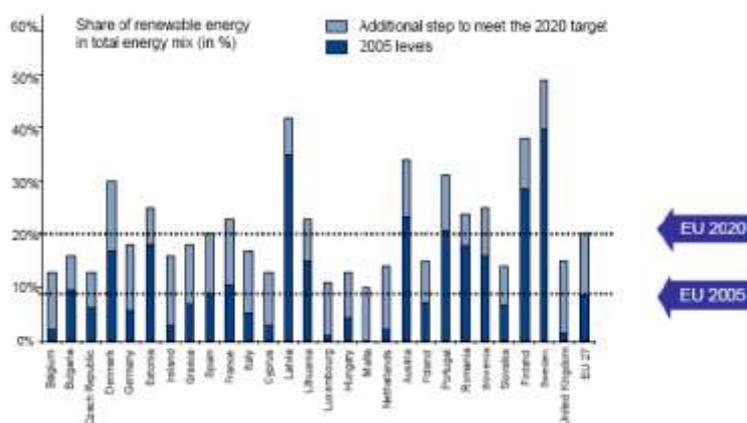


Fig. 2: Share of renewable energy in total energy mix (%), in 2005 and expected in 2020,
Source: EU (2011a) – Key figures

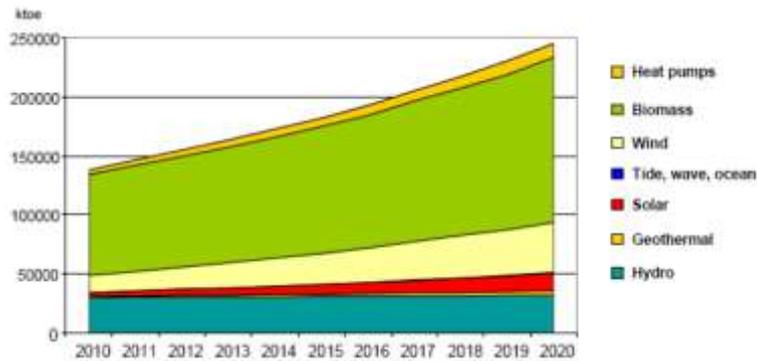


Fig.3: Renewables evolution per type (ktoe) from 2010 - 2020
 Source: EU (2011a) – Key figures

Other important policy document is the “Energy Roadmap 2050” (EU, 2011b). It was created in the sequence of the policy documents described before, and the acknowledgment that until the 2050 and without other strategy “They will however still be insufficient to achieve the EU’s 2050 decarbonisation objective as only less than half of the decarbonisation goal will be achieved in 2050”. There was also the acknowledgment that there was a gap after 2020 which “[...] creates uncertainty among investors, governments and citizens” (EU, 2011b).

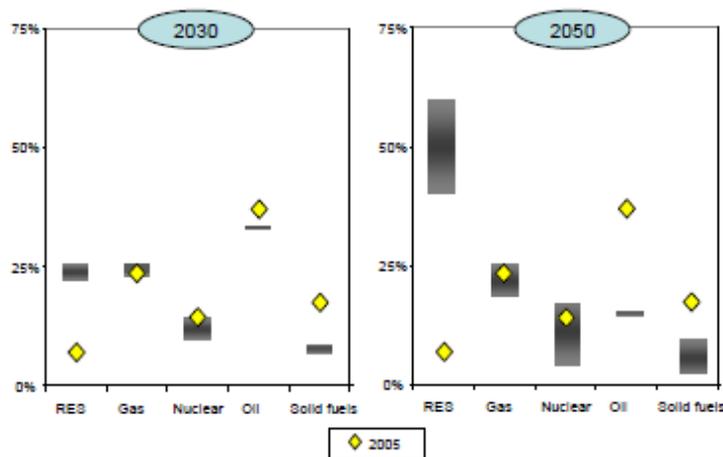


Fig.4: EU Decarbonisation scenarios – 2030 and 2050 range of fuel shares in primary energy consumption compared with 2005 outcome (in %)
 Source: EU (2011b)

In order to achieve the objectives of reduction until 2050, the EU suggests that the prime focus should remain on energy efficiency, with a special emphasis on: switching to renewable energy resources (in order to have the biggest share of energy supply technologies in 2050); highlighting the importance of gas in the transition to a de-carbonized energy system (by substituting coal and oil), helping reducing the emissions; investing in *Carbon Capture Storage* (CCS) technology, smart technology, storage and alternative fuels. In what regards the markets, it should be made an effort in finding new ways to manage electricity, integrating local resources, centralized systems and establish carbon pricing (Fig.4).

The momentum that was originated with these policies, along with other sectoral instruments that were created, has enabled some pressure on the European Union countries to develop their national energy agendas through strategic policies and legislation. With the “Directive 2009/28/EC” mandatory targets concerning the quota of renewable on the energy mix were established in the final consumption of energy (20%), including a specific target of 10% for transportation. Also, these policies and directives turned mandatory the promotion in each EU country of a “National Action Plan for Renewables”; certification of the origin of electricity; the existence of flexibility mechanisms for the fulfillment of the quotas, namely in collaborative projects and statistical transference between EU countries; required more and better availability of information about the funding for renewables, and a better supply of certification systems and professional qualification for the suppliers of small renewables; demanded a more open access of the renewables to the electrical network and simplification of the authorization, certification and licensing process; and turned mandatory the fulfillment of the sustainability criteria for the accounting of energy from biofuel and bio-liquids (Silva, 2010).

In other way, the Directive 2012/27/EU established a common framework for the promotion of energy efficiency measures in the EU, with the objective of reducing final energy consumption in 20% with energy efficiency gains. Specific measures include the rule to overcome market barriers that don't allow an increase in efficiency in storage and use of energy, and it also predicts the establishment of national objectives in terms of energy efficiency to 2020¹.

Also, in the business sector and society, the need to rethink and act towards the problem of energy production and consumption has attracted the attention to the problem of energy sustainability. An important issue, especially under the economic crisis that developed countries face nowadays, especially European ones, is the cost of such policies. According to the study conducted “The Impact of Climate and Energy Policies on the Public Budget of EU Member States” (THINK, 2011), the impact of these policies on the EU countries budgets has been marginal, but positive in an overall tendency (Fig.5). This study has taken into consideration the measures that will be adopted through the implementation of the 20-20-20 EU policy namely: “*carbon taxes applied in non-ETS sectors and additional support payments and energy efficiency regulations increasing the penetration and development of clean technologies.*” It determines the implementation effect of the referred policies on public budget by computing and comparing public revenues and expenses under a baseline and enhanced policy package. It is investigated the level of both direct effects of new climate policies on public budgets and indirect effects resulting from changes in the use of resources triggered by these policies.

¹ <http://www.dgeg.pt/>

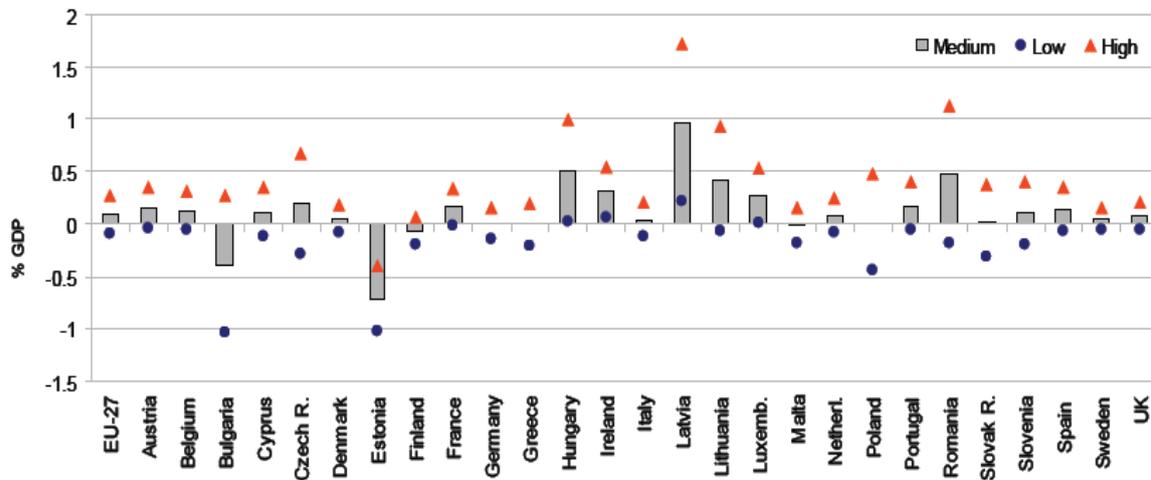


Fig.5: Net budget impact of new energy policies, namely the EU 20-20-20 targets
Source: THINK (2011)

While some countries present in the case of low abatement costs a decrease in their GDP of up to 1% in (Bulgaria and Estonia the most negative examples), we can observe that, with a medium abatement cost only those two countries present a negative value, and with a positive abatement cost only Estonia still presents a negative value. The study and the results show a need to study in more depth the impacts of such a changing policy. On one hand, the 20-20-20 Policy will possibly bring new revenues with the carbon market and the new technologies required not only with the renewables expansion but also with the non-renewables increased efficiency, but, on the other hand, will require major investments in technology, fiscal incentives, and a constant decrease in the tax revenue that comes from non-renewable energy. Other important factor to be taken into account is that the Carbon Market is not having the expected development and growth in the EU, as it was foreseen in the 20-20-20 Policy.

- **Portugal within EU-27: the national profile and the main policy instruments in the Energy sector**

Portugal, a heavily external energy dependent country, has been in the last years the focus of some attention due to its progress on renewables research and implementation, as well as a source of innovation in what concerns the “clean energy” business sector.

Concerning the national policy structure and the respective instruments in the Energy sector, the National Strategy for Energy 2020 (Estratégia Nacional para a Energia 2020 – ENE 2020) is the main policy document, and frames the strategy for the energy sector in Portugal till the year 2020 (ENE, 2010). This instrument was approved in 2010 and their main objectives are:

- 1) reducing Portugal’s energy dependence through an increase in energy production from endogenous resources;
- 2) guarantee the fulfillment of the agreements assumed by Portugal in the context of the climate change policies;

- 3) reducing in 25% the energy imports balance with energy produced by endogenous sources;
- 4) creating wealth and consolidating an energy cluster in the renewables sector in Portugal;
- 5) and developing an industrial cluster associated with the promotion of energy efficiency².

In what concerns energy efficiency and renewable, Portugal has two important policy initiatives for the fulfillment of the EU’s objectives. The PNAEE - National Action Plan for Energy Efficiency (Directive 80/2008) and PNAER - National Action Plan for Renewable Energy, that, together with the National Plan For Climate Change (Directive 104/2006), form the backbone of the Portuguese Policy towards the 20-20-20 EU Strategy (Fig. 6).



Fig. 6: Instruments scheme in SPOTIA analysis

Source: Produced by the authors

The PNAER (National Action Plan for Renewable Energy) establishes Portugal’s objectives concerning the quota of renewables in the consumption of energy in 2020, considering the energy used in the transportation, electricity and heating and cooling in 2020, identifying the measures and actions predicted in each of those sectors.

The PNAEE (National Action Plan for Energy Efficiency) focus the promotion of energy efficiency in the areas of transportation (urban mobility, public transportation, incentives for car changing and efficient technology), residential sector and services (retrofitting, efficient equipments, renewables, and certification), state and behavioral measures.

Both PNAEE (National Action Plan for Energy Efficiency) and PNAER (National Action Plan for Renewable Energy) suffered a revision process in 2012, and were approved in February 2013, being the main objective in the revision of the PNAER the projection of new targets to 2016 considering the main concerns in reducing primary energy to 2020, while the changes in PNAER reflect concerns that take into account the new economic scenario and the resulting reduction of the demand and excess in the energy offer³.

Concerning Portugal’s energy profile, in what regards energy dependency Portugal (PT) was in the 9th position of the EU’s countries with around 80% energy import in 2010 (EU, 2012), which shows a heavy dependence on external energy sources, despite the advances on national energy production. As it can be seen in figure 7, the predominant energy source is oil, which comes in its entirety from other countries, since Portugal doesn’t have oil reserves. Renewables now are the second most important energy source regarding consumption, while natural gas is the third, and coal the last.

² http://www.apisolar.pt/images/stories/Legislacao/RCM_54-2010.pdf

³ <http://www.adene.pt/pt-pt/Comunicacao/Noticias/Paginas/Not130228a.aspx>

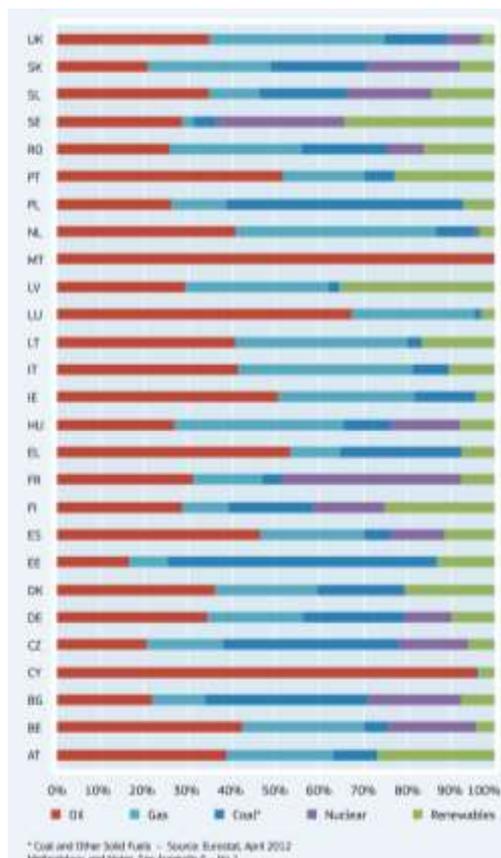


Fig. 7: EU 27 Gross inland consumption/ Energy mix in 2010 (%)
Source: EU (2012)

Regarding the targets established to 2020 (Fig. 8), and taking into account the emissions targets, it can be seen that Portugal is decreasing the GHG emissions. In the case of renewables integration, Portugal is one of the countries with most ambitious targets with around 30%, and with an increased share in what regards the final energy consumption. In terms of energy efficiency it can be seen that energy consumption is decreasing in Portugal, not only in absolute terms but also in relative terms as it can be seen in the index “Primary energy consumption - % of savings”, that shows the contribution of energy savings to the decrease in primary energy consumption, which indicates an approximation to the 20% target.

Indicators of Europe 2020		2005	2008	2009	2010	Target
Target 1. Greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower than 1990						
Indicator1. Greenhouse gas emissions (Index 1990 = 100)	EU-27	92	89	83	85	-20% (base 1990)
	PT	144	130	124	118	-1% (base 2005)
Target 2. 20% of energy from renewables						
Share of renewable energy in gross final energy consumption (%)	EU-27	8.5	10.5	11.7	12.5	20.0
	PT	19.6	23.0	24.6	24.6	31.0
Target 3. 20% increase in energy efficiency						
Primary energy consumption - 1 000 tonnes of oil equivalent (TOE)	EU-27	1704354	1683452	1596185	1646839	1474000
	PT	24897	23265	23399	22633	...
20% increase in energy efficiency Primary energy consump.- % of savings	EU-27	100.0	98.8	93.7	96.6	86.5
	PT	100.0	93.4	94.0	90.9	...
% of savings	EU-27	0.00	2.42	7.67	5.44	20.00
	PT

Fig. 8: Targets for the Europe 2020 in Climate change and energy sustainability in Portugal and UE-27 (2005-2010)
Source: Eurostat

Despite the ambition of the target, in 2011/2012 Portugal surpassed already the interim target as it can be seen in figure 8.



Fig. 8: 2020 Targets in renewable energy – share of renewables in gross final energy consumption (%)
Source: EU in figures (2012)

III – A first approach of the assessment of coherence among territorial and sectoral Portuguese instruments concerning the Energy sector

This energy policy analysis is framed by the SPOTIA research project and its methodology. This project has the objective of evaluate the coherence and relevance of the territorial policies that result from the planning instruments (programs and plans) and the measurement of their impacts in the territorial development. One of the specific objectives of the project is the identification and analysis of the most relevant EU and Portugal’s policy documents by domains, and it is within this objective that the matrix analysis of the Energy theme is developed. The final aim of the project is the creation of a Spatial System of Decision Support (Sistema Espacial de Apoio Decisão – SEAD) that could produce results that support the decision making in planning processes.

Previously to the analysis is the definition of relevance and coherence concepts:

- Relevance – is a criterion that checks the adequacy of the programme objectives in relation to the problems and needs of the sector or the territory under analysis in its various scales;
- Coherence – is a criterion which stresses the connection between the structure of the programme and other programmes, plans and policies.

Focusing SPOTIA methodology for this concrete case (Figure 9), the following steps were developed: a) identification of the European, Portuguese and regional instruments (both territorial and sectoral sphere), and each set of objectives; b) classification of all objectives recurring to a set of domains and sub-domains defined previously by SPOTIA Team; c) specific analysis domain by domain to assess the coherence between instruments. In step b), five domains related to the objectives and target of all documents about energy theme were created: 1) electric grid - to address subjects related with energy planning, regulation and markets, and smart grids, 2) renewable energy technology, 3) non-renewable energy technology, 4) energy efficiency and management - to address buildings retrofit measures, certification schemes, efficiency in equipment's, and 5) energy and mobility - to address urban planning and transportation, namely hybrid/electric vehicles, innovation in public transportation, innovative planning solutions.

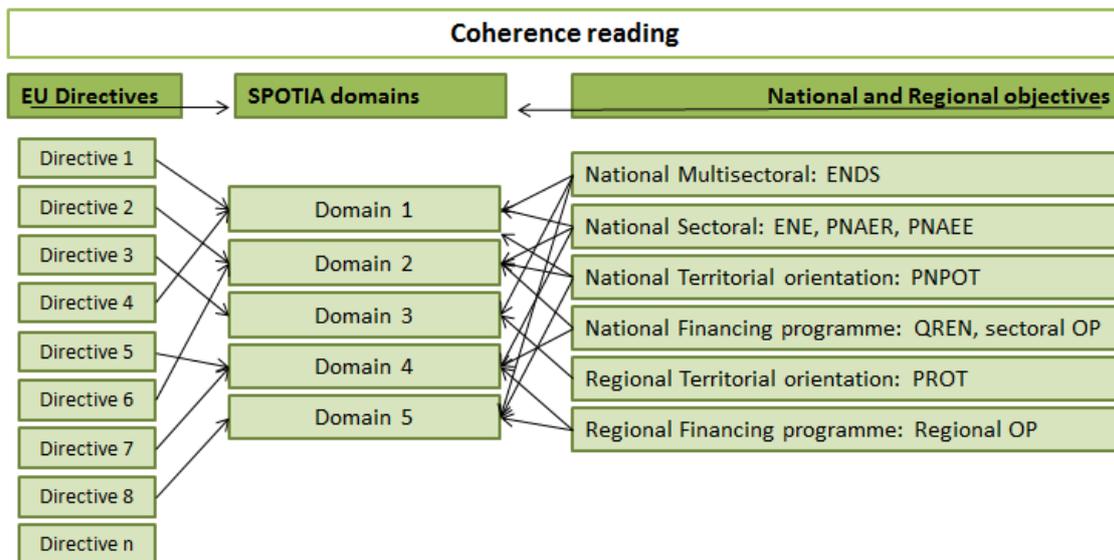


Fig. 9: Coherency analysis according SPOTIA methodology
Source: Produced by the authors

Taking into account the analysis of all instruments, five domains have emerged as the baseline for the analysis, and some matrixes were created for the analysis of the energy policy documents in three spatial levels:

- At the European level, one matrix for the EU's energy policy documents (Energy 2020, Directive 2009/28/EC, 2012/27/EU);
- At the National level, in a sectoral perspective, 3 documents were included: ENE, PNAER and PNAEE (National Action Plan for Energy Efficiency);

- c) At the National level in a spatial perspective, the planning policy instruments that had specific objectives and measures related to energy were: National Strategy for Sustainable Development – ENDS and National Program for the Planning Policy – PNPOT;
- d) And at the Portuguese Regional level in a spatial perspective, the regional operational programs.

The last three are pertinent because they are the center of the national planning structure, relevant for an analysis of the presence of the Energy theme in the main planning policy documents in Portugal. To synthesize the information, the team resorted to pivot tables to identify the presence of each domain and sub-domain in each instrument, being possible to make a cross-reading by instrument or by domain too.

Observing the figure 10, the analysis of EU level shows:

- In the Energy 2020 document all five domains are focused, but in this case, with special emphasis in the technological side of energy production.
- Regarding the Directive 2012/27/EU, despite being a document directed towards renewable energy, the most present domains are the “Energy efficiency and management” and “Electric grid”.
- And in the Directive 2009/28/EC the focus is more on “Energy and mobility” and “Non-renewable energy technology”, despite the reference to the all domains in the document orientations.

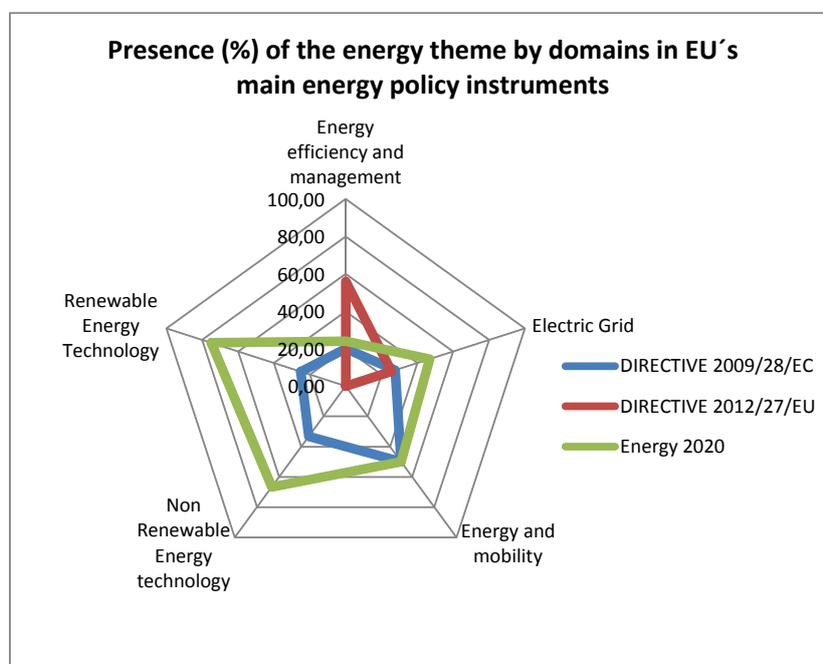


Fig. 10 – Presence (%) of the domains in EU's main planning policy documents

Source: Produced by the authors

Focusing now the results about the sectoral documents about Energy at national scale in the case of Portugal, analyzing the presence of each domain according to the number of objectives or measures of each one, it's possible to see that they are somewhat complementary, benefiting a stronger Energy national policy. We highlight that:

- All the references to “Non-renewable technology” are in the ENE document;
- The PNAEE document show a strong presence of the “Energy efficiency and management” domain;
- And PNAER (National Action Plan for Renewable Energy) essentially focus three domains: “Electric grid”, “Energy and mobility” and “Renewable energy technology” (Fig.11).

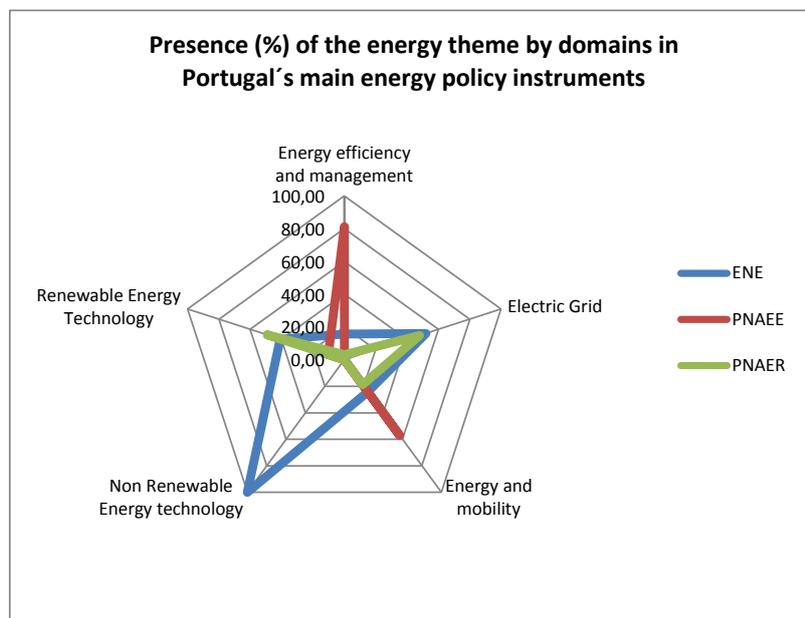


Fig. 11 – Presence (%) of the domains in Portugal's main energy policy documents
Source: Produced by the authors

Considering the Figure 12, it's shown the importance of energy in the planning policy documents:

- The ENDS document has all the references for the “Non-renewable technology” and show a multidisciplinary approach since there are references in all other themes, which is adequate to a national strategy for Energy;
- Being a strictly planning document, the PNPOT shows many references to the “energy and mobility” theme, that is a theme with strong presence of cities and urban planning as key factors in energy production and consumption.
- At last, having the North and Centro regions in consideration, both OP registered only one result, when we consider the described objectives, in OP Norte related with

“Energy efficiency and management” an in OP Centro related with “Energy and mobility”.

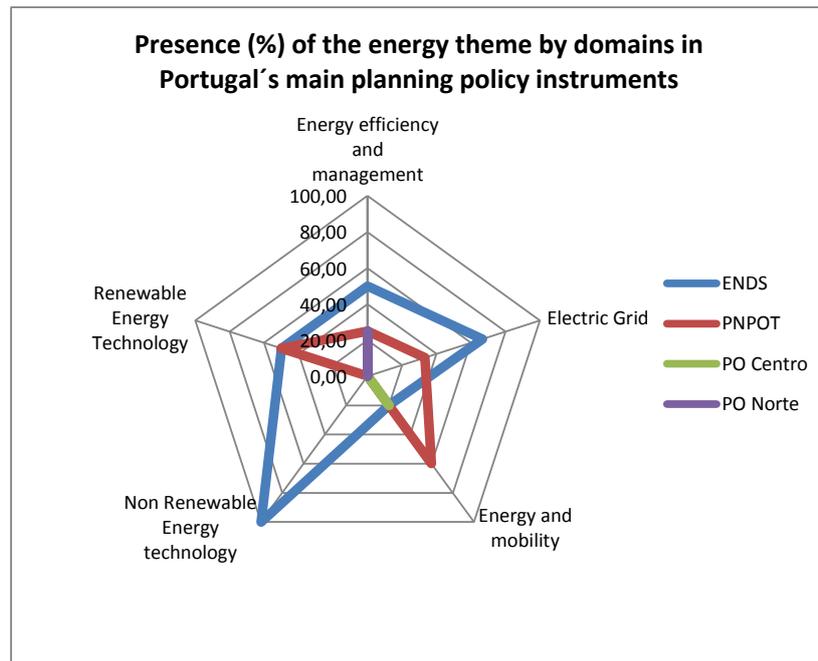


Fig. 12 – Presence (%) of the domains in Portugal’s main planning policy documents
Source: Produced by the authors

A summary of the presence of domains per energy policy document can be observed in figure 13.

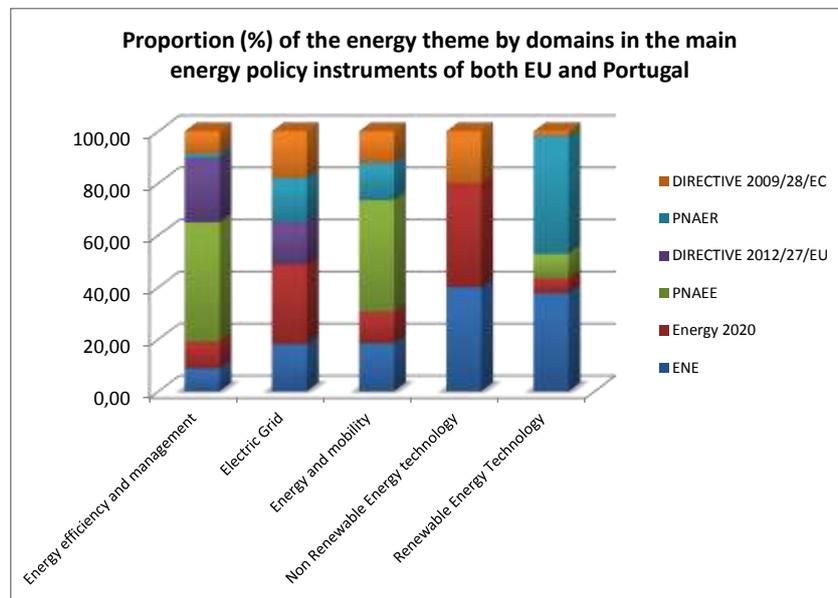


Fig. 13 – Presence (%) of the domains in EU’s main planning policy documents
Source: Produced by the authors

In a more detailed analysis of the Portuguese planning and energy policy documents concerning the proportion of the domains in both, the predominance of energy domains is

obvious in the energy documents, but it can be seen that there is a strong representativeness of the non-renewable energy domain in the planning documents as well as the electric grid domain (Fig. 14).

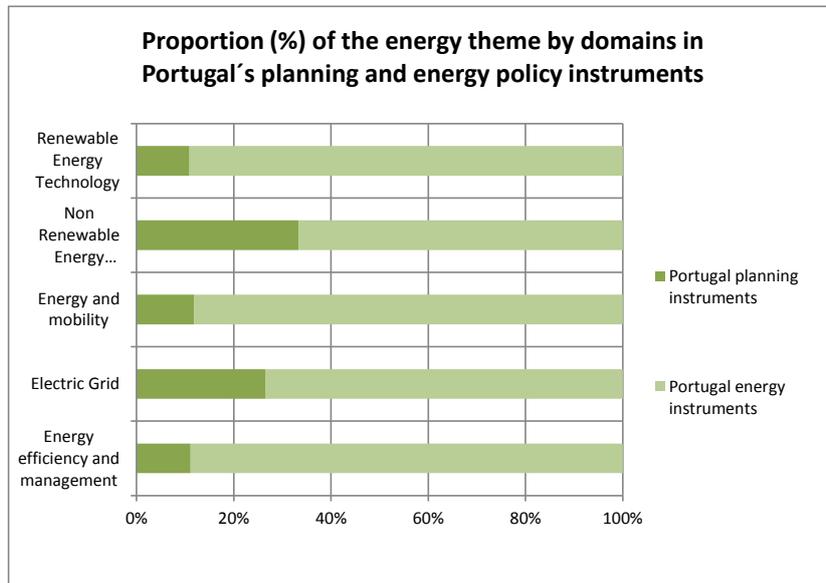


Fig. 14 – Proportion (%) of energy domains in Portugal's planning and energy policy
Source: Produced by the authors

Analyzing both the EU and Portuguese energy policy documents proportion of domains (Fig.15), it is easy to note the great investment that Portugal is doing in renewables. Also, the role of EU as a strategic and policy oriented institution is also understandable by looking into the figure if the "Electric grid" domain is taken into account, showing the importance that EU gives to the energy planning, market and regulation.

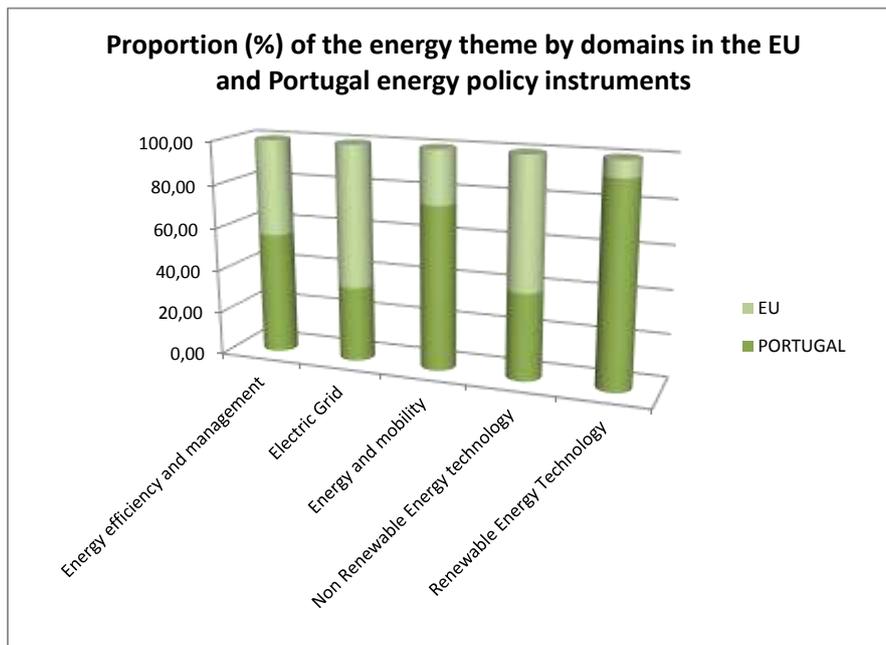


Fig. 15 – Proportion (%) of energy domains in the EU and Portugal energy policy instruments
Source: Produced by the authors

Looking with more detail the domains and sub-domains codified by the SPOTIA Team on Portuguese planning policy documents, it can be seen the types of measures that were present in these documents (Fig.16).

Domains	Sub-Domains	Document				TOTAL
		ENDS	PNPOT	PO Centro	PO Norte	
Energy efficiency and management	Incentives to the acquisition of more efficient equipment	2				2
	Awareness measures regarding energy efficiency				1	1
	Buildings structural retrofit		1			1
Electric Grid	Market, regulation and tariffs	4	1			5
	Energy planning and operation	1	2			3
	Smart Grids	1				1
	Transports and network management		1			1
Energy and mobility	Mobility legislation		2			2
	Urban planning and mobility	1		1		2
	Natural gas, products and technology	1				1
Non Renewable Energy technology	Natural gas, products and technology	1				1
Renewable Energy Technology	Wind energy	1				1
	Hydroelectric, geothermal, other	1				1
	Solar Energy	1				1
	Policy		3			3
TOTAL		13	10	1	1	25

Fig. 16 – Types of domains and sub-domains in the Portuguese planning documents
Source: Produced by the authors

IV – The strategy implementation – assessment of approved and executed projects in the Portuguese National Strategic Reference Framework in the Energy sector, 2007-2013

The previous chapter was centered in the relevance and coherence analysis of the strategic and development policies for energy in Portugal. In this chapter we will confront the implementation or execution of policies, based on the investment and number of approved projects, in the National Strategic Reference Framework (NSRF).

The NSRF 2007-2013 is the reference instrument that orientates the European Union funding at the national and regional level and thus, it is of great importance to analyze this policy focusing on the Energy theme. To develop this analysis about the Energy sector in Portugal, were summed the approved total investment, the approved eligible investment and the approved community fund framed by the regional OP, beyond the possibility of a geographical analysis through the mapping by municipality of the number of approved projects, a brief analysis of the agents who competed for the NSRF funding (that represents the acting agents in a multi-level and multi-actor governance), and the type of projects approved related with the main domains identified previously.

The NSRF includes the regional and the sectoral programmes⁴. Due to the specific characteristics of each region, the Cohesion Policy develops three objectives: “Convergence – solidarity among regions”, which includes the portuguese regions of North, Centre, Alentejo and Azores archipelago, and Algarve region framed in the transitional regime of phasing-out (cofinanced by ERDF, ESF and Cohesion Fund), “Regional Competitiveness and Employment”,

⁴ In the actual programming cycle, the architecture of the Portuguese NSRF is composed by five Regional Operational Programmes (OP) – North, Centre, Lisboa e Vale do Tejo, Alentejo and Algarve (co-financed by ERDF) – and three Sectoral OP – “Human Potential” (co-financed by ESF), “Competitiveness” (co-financed by ERDF) and “Territorial Development” (co-financed by ERDF and Cohesion Fund).

which includes Lisbon region and Madeira archipelago in the transitional regime of phasing-in (co-financed by ERDF and ESF), and “European Territorial Cooperation” (co-financed by ERDF). All Portuguese regions are eligible to participate in the collection of OP for the objective of “European territorial cooperation”, as cross-border co-operation programmes, transnational co-operation programmes and interregional co-operation programmes.

Until December 2012, it were approved a total of 45.200 projects in Portugal framed by the various OP, both regional and sectoral (being actually 47.996), summing more than 27.000 million euros of eligible investment and about 18.058 million euros of approved community fund, representing more than 1.700 euros per capita of the community funding for Portugal (EU, 2007). In the context of the Cohesion Policy 2007-2013 for Portugal, and taking into account the last actualized list of approved projects from December 2012, there are a total of 343 projects for Energy, distributed for the five regions of mainland Portugal, representing a small percentage of projects in each region (between 0,3% in North and 1,4% in Alentejo). All the energy projects are co-financed by ERDF and are included in the area of intervention of “Network infrastructure to support regional competitiveness” (Fig. 17).

	Approved projects TOTAL	Approved projects "Energy"	% of approved project in "Energy"
North	20075	59	0.3
Centro	14715	164	1.1
Lisboa	3635	24	0.7
Alentejo	5272	76	1.4
Algarve	1503	20	1.3
TOTAL PT	45200	343	0.8

Fig. 17 – Total of approved Portuguese projects and approved Portuguese projects about “Energy”.

Source: Portuguese NSRF, December 2012. Produced by the authors.

TOTAL - ENERGY						
Regions	Approved eligible investment (€)/(%)		Approved community fund (€)/(%)		Total approved investment (€)/(%)	
North	32551559	42.8	21435473	40.8	54060372	42.0
Centro	27441114	36.1	19838769	37.7	47279883	36.7
Lisboa	3661709	4.8	1830855	3.5	5492564	4.3
Alentejo	9852915	13.0	7861832	14.9	17714748	13.8
Algarve	2488138	3.3	1617290	3.1	4105428	3.2
TOTAL	75995435	100.0	52584219	100.0	128652994	100.0
TOTAL - ENERGY (% of total national)						
Regions	Approved eligible investment		Approved community fund		Total approved investment	
North	0.30		0.28		0.29	
Centro	0.35		0.38		0.36	
Lisboa	0.23		0.19		0.22	
Alentejo	0.26		0.32		0.28	
Algarve	0.50		0.56		0.52	
TOTAL	0.31		0.32		0.31	

Fig. 18 – Volume of approved investment – Total of projects and “Energy” projects for the mainland Portugal Regions

Source: Portuguese NSRF, December 2012. Produced by the authors.

Analyzing the investments related with the approved projects for 2007-2013 (Fig. 18), it is possible to understand that the regions in the “convergence objective”, as North, Centro and

Alentejo regions, are the ones that concentrate more community funding when the total amount for energy related projects is taken into consideration. However, despite this discrepancy, in all five mainland Portuguese regions, the approved eligible investments, as well as the approved community fund, represent a very small part of the total regional allocated budget (no more than 0.6% in each case).

Focusing now on the geographical location of the projects by municipality in Portugal, we can see a great dispersion of the approved projects by 58% of the mainland municipalities (Fig. 19 and 20), appearing too some municipalities that don't have any project until now in the energy theme. In this context, we highlight that in the North region there are eleven projects that aren't referenced at the municipal scale but have a regional impact. Focusing the approved Community Fund, it can be observed that there isn't a much defined spatial pattern, despite the identification of more northerner municipalities with higher Community Funds for energy projects, which reflects in part the higher number of approved projects (Fig. 20).

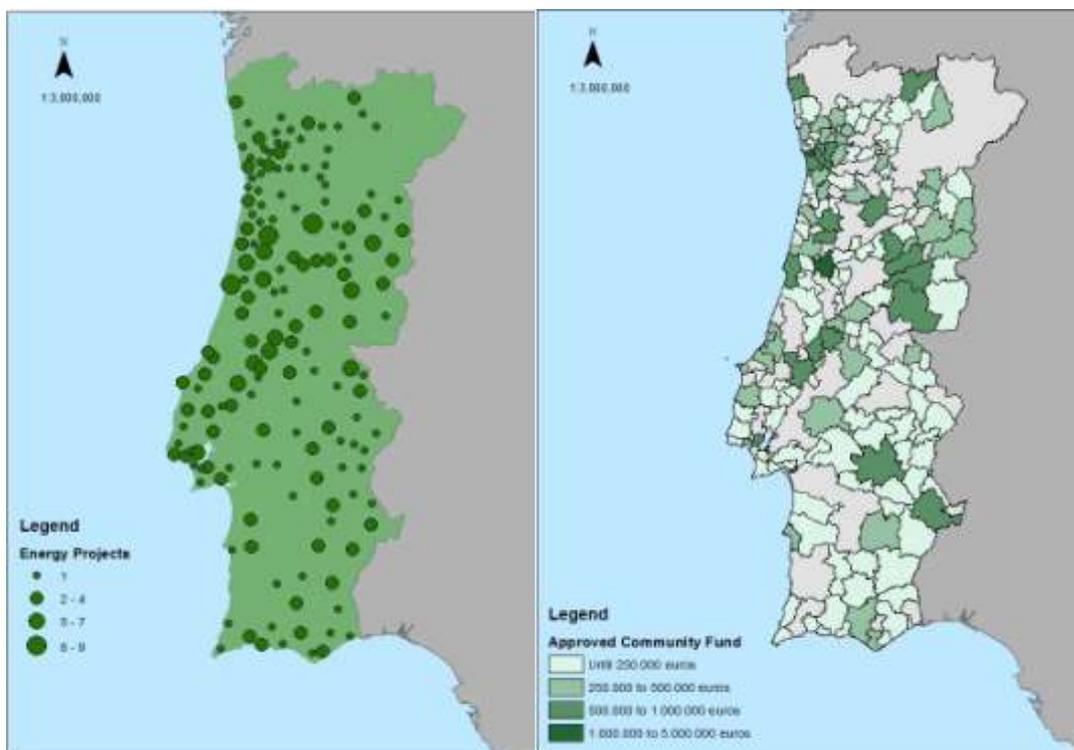


Fig. 19 - Number of "Energy" approved projects by Portuguese NSRF by municipality
 Fig. 20 – Total amount of approved Community Fund for "Energy" projects by municipality
 Source: Portuguese NSRF, December 2012. Produced by the authors.

- **A particular analysis about three Portuguese regions and their OP: North, Lisboa e Vale do Tejo and Algarve**

To have a more detailed view about the type of approved projects in the context of the Portuguese Cohesion Policy 2007-2013, having as the funding instrument the National Strategic Reference Framework, we will briefly focus three Regional Operational Programmes: OP of North region (a "convergence" region), the OP of Algarve Region (a "convergence" region in transitional regime of phasing-out) and the OP of Lisboa e Vale do Tejo (LVT) (a "Competitiveness and Employment" region). As we mentioned before, we will highlight two

points: who is the beneficiary or the promoter of the approved projects in the Energy theme, and to understand what kind of projects are proposed by them, according to the main policy axes present in the policy instruments referred previously which are: “Energy and mobility”, “Electric grid”, “Energy efficiency and management”, “Renewable Energy technology” and “Non-renewable energy technology”.

Analyzing the percentage of approved projects according to the main beneficiaries or promoters (Fig. 21), the “municipalities” stand up in all of case studies: a significant presence in North region (convergence region) (68%), less in Algarve (a phasing-out of convergence objective) (50%), and even less in Lisboa e Vale do Tejo (LVT, a competitiveness region) (21%). Of the three, the North region presents a greater variety of beneficiaries or promoters beyond the “municipalities”, like the “associations of municipalities” (7%) or “companies” (2%). In other hand, in the LVT and Algarve regions is visible a major dynamic of “social, cultural and sport institutions” (79% in LVT, 50% in Algarve and only 14% in North region). It is interesting to highlight that only a small number of entities won more than one project in each region, highlighting Paredes municipality (4 projects), Viana do Castelo municipality (3 projects), Santa Casa da Misericórdia do Porto (2 projects) and CEBI - Fundação para o Desenvolvimento Comunitário de Alverca (2 projects). Besides the different dynamic of beneficiaries or promoters, in all the regions there are a pattern related with the projects that each agent develops:

- The municipalities majorly focus their attention to the energy efficiency of public lighting and the semaphore signaling, an aspect with an important weight in the municipalities budgets, taking measures as the installation of luminous flux regulators, adjusting the lighting in times of greatest need in an efficient mode, and keeping lighting in times of reduced need without taking extreme measures, such as cutting the lighting, benefiting the community and their safety in public space;
- In this context, the Association of municipalities have essentially the same role of the municipalities per se, promoting projects for a set of municipalities;
- The Regional energy agencies combine the issue of research, planning and implementation of projects related to energy, searching for a more efficient system;
- The collective associations, both public and private, as nursing homes, community center, educational center, among others, search for a rationalization of the energy consume and start to promote the energy efficiency through the installation of mechanisms for saving energy and to stimulate energy efficiency, for example by heating homes and water, but also start to evolve into the production of energy through various instruments, such as the installation of solar panels.
- At last, although companies can apply for other funds, this fund can be an option too. Essentially, these companies seek to develop the production and the distribution networks for energy.

Agent	North		Lisboa e Vale do Tejo		Algarve	
Municipalities - Energy efficiency of public lighting - Installation of luminous flux regulators - Ecoefficient semaphore signalling - Implementation of sustainable energy systems - public pools	40	67,8%	5	20,8%	10	50,0%
Association of municipalities - Energy efficiency of public lighting - Installation of luminous flux regulators	4	6,8%	0	0,0%	0	0,0%
Regional energy agencies - Energy efficiency of public lighting	6	10,2%	0	0,0%	0	0,0%
Social, cultural, sport Institutions - Rationalization and efficiency in nursing homes, community centre, educational centre, - Renewables (installation of solar panels, solar thermal system, thermal production)	8	13,6%	19	79,2%	10	50,0%
Companies - expansion operation of distribution networks for natural gas	1	1,7%	0	0,0%	0	0,0%
TOTAL of "Energy" projects	59	100%	24	100%	20	100%

Fig. 21 - Number of approved projects in "Energy" sector according the beneficiary or promoter
Source: Portuguese NSRF, December 2012. Produced by the authors.

	North		LVT		Algarve	
Renewable energy technology - Wind energy - Hydroelectric, geothermal, Other - Solar energy	6	10,2%	9	37,5%	1	5,0%
Energy efficiency and management – general - Incentives to the acquisition of more efficient equipments - Building structural retrofit - Sustainable energetic systems - Energy rationalization of equipment - Use of renewable energy technology to building heat	8	13,6%	10	41,7%	8	40,0%
Energy efficiency and management - public lighting - Public lighting installation and efficiency - Reduction of the electricity bill	37	62,7%	4	16,7%	10	50,0%
Electric grid - Market, regulation and operation - Smart grids	1	1,7%	0	0,0%	0	0,0%
Prospection and planning - Regional Energy Agencies	6	10,2%	0	0,0%	0	0,0%
Unidentified	2	3,4%	1	4,2%	1	5,0%
TOTAL	59	100%	24	100%	20	100%

Fig. 22 - Number of approved projects in "Energy" sector according the main goal
Source: Portuguese NSRF, December 2012. Produced by the authors.

It is relevant in this paper to analyze the main objectives of the approved projects within the Cohesion Policy 2007-2013 for “Energy” sector (Fig. 22). In the two “convergence regions” North and Algarve, the predominant projects are associated to the promotion of “Energy efficiency and management of the public lighting” (63% and 50%, respectively, against only 17% in LVT region). Still in “General energy efficiency and management”, there are some relevant projects related with the rational use of energy in collective equipments, as day centres, nursing homes, schools or swimming pools (40% in Algarve, 42% in LVT and 14% in North). However, reflecting the “competitiveness objective” of LVT, this region stands out with projects related with “Renewable energy technology” (38% in LVT against 10% in North and 5% in Algarve). In the North region, with a higher number of projects of this theme, appear a significant number of projects related with “Prospection and planning” (10%), related with the work of the regional energy agencies, and in the same region is identified the unique project for electric grid promoted by one company.

North OP			
Energy Domains	ACF (euros)	ACFE (%)	ACF/capita
Renewable energy technology	1032994.11	4.8	0.28
Energy efficiency and management – general	672286.4	3.1	0.18
Energy efficiency and management - public lighting	13725850.84	64.0	3.66
Electric grid	4042535.32	18.9	1.08
Prospection and planning	1674410.04	7.8	0.45
Unidentified	287396.55	1.3	0.08
TOTAL	21435473.21	100	5.72
LVT OP			
Renewable energy technology	401621.39	21.9	0.14
Energy efficiency and management – general	821883.9	44.9	0.29
Energy efficiency and management - public lighting	567051.83	31.0	0.20
Electric grid	0	0.0	0.00
Prospection and planning	0	0.0	0.00
Unidentified	40297.4	2.2	0.01
TOTAL	1830854.52	100.0	0.64
Algarve OP			
Renewable energy technology	24650.6	1.5	0.09
Energy efficiency and management – general	308147.13	18.9	1.08
Energy efficiency and management - public lighting	1284536.5	78.6	4.51
Electric grid	0	0.0	0.00
Prospection and planning	0	0.0	0.00
Unidentified	16192.8	1.0	0.06
TOTAL	1633527.03	100.0	5.73

Fig. 23 – Approved Community Fund by Energy domain and Approved Community Fund by Energy domain per capita

Legend: ACF (euros) - Approved Community fund (euros), % ACFE - % of Approved Community fund for domain based on the total Approved Community fund for Energy, ACF/capita - Approved Community fund per capita

Source: Portuguese NSRF, December 2012. Produced by the authors.

Considering now the available Community fund for the approved regional OP projects, in the context of Energy sector and specifically about the Energy domains for the three studied regions, it is notourious again the focus in different domains depending on the region (Fig. 23). Note that the investment is not proportional to the number of projects by region, due to the great range of projects, from small projects promoting energy efficiency in social facilities, to large scale expansion of power distribution network. In this context, we highlight the different patters:

- In the North, the domain of “Energy efficiency and management of public lighting” present a huge approved budget, reflecting 63% of the approved projects, but the second most budgeted domain “Electric grid” (19%) only represent one of the OP North projects in the Energy sector;
- In the context of Algarve, the “Energy efficiency and management of public lighting” allocates about 79% of the Energy regional Community fund for 50% of the projects, while 40% of the Algarve energy projects framed in the “General Energy efficiency and management” domain only represents 19% of the funding;
- At last, in LVT region there is a greater dispersion of projects and of total funding for several domains in the energy sector, having the “General Energy efficiency and management” about 45% of the energy approved budget for 42% of the energy projects, 31% for the “Energy efficiency and management of public lighting” (representing 17% of the energy projects), and 22% of Community funds for Energy comes to “Renewable energy technology”, responding to the needs of 38% of energy projects.

Despite the North and Algarve regions present an approved Community fund for energy projects per capita very similar (5,72 euros/capita in North and 5,73 euros/capita in Algarve), the reasons are quite different: the North region, being the most populated portuguese region, had a massive involvement in the NSRF call on the theme of energy. On other side, the Algarve region (with around 10% of the North region population), received only 7% of the same investment type for energy. In LVT, a very populated region, it's notourious the tiny investment in this sector, being the ACF per capita of 0,64 euros.

It is also extremely important to correlate the distribution of funding for energy projects and the territory distinguishing urban municipalities, considering the municipalities that have one or more cities, and the other municipalities (in this last category are counted the non-territorialized projects that serve all the region or a part of it). This reading would be presented not only for the Energy theme in but for each domain too (Fig. 24). In this sense, it is in Algarve that we verified a larger percentage of projects located in urban municipalities (85%), followed by LVT (79%) and finally North region (63%). It should be noted once again that the urban municipalities didn't considered the non-territorialized projects, as North region has 12 projects in this category. If we consider the Approved Community Fund for urban areas, we could find three distinct phenomena:

- In LVT region, the percentagem of projects in urban areas is very similar to the proportion of Approved Community Fund for urban areas (79% and 73% respectively);

- In the North region, the percentage of projects in urban areas is higher than the proportion of Approved Community Fund for urban areas (63% and 47% respectively), reflecting a smaller cost and size of projects in urban areas as compared with other areas;
- In Algarve region, there is the opposite situation, as the percentage of projects in urban areas is lower than the proportion of Approved Community Fund for urban areas (85% and 93% respectively), reflecting a further concentration of both projects as investment in the urban areas.

	Number of projects in urban areas *	ACF for Urban areas *	ACF for Urban areas * (% of domain)	ACF for other areas **	ACF for other areas ** (% of domain)
North OP					
Renewable energy technology	6 in 6	1032994.1	100.0	0	0.0
Energy efficiency and management – general	6 in 8	573567.2	85.3	98719.12	14.7
Energy efficiency and management - public lighting	23 in 37	8274110	60.3	5451740.82	39.7
Electric grid	0 in 1	0	0.0	4042535.32	100.0
Prospection and planning	0 in 6	0	0.0	1674410.04	100.0
Unidentified	2 in 2	287396.55	100.0	0	0.0
TOTAL	37 in 59	10168068	47.4	11267405.3	52.6
LVT OP					
Renewable energy technology	6 in 9	215753.82	53.7	185867.57	46.3
Energy efficiency and management – general	8 in 10	520450.28	63.3	301433.62	36.7
Energy efficiency and management - public lighting	4 in 4	567051.83	100	0	0.0
Electric grid	0 in 0	0	0	0	0.0
Prospection and planning	0 in 0	0	0	0	0.0
Unidentified	1 in 1	40297.4	100	0	0.0
TOTAL	19 in 24	1343553.3	73.4	487301.19	26.6
Algarve OP					
Renewable energy technology	1 in 1	24650.6	100	0	0
Energy efficiency and management – general	8 in 8	308147.13	100	0	0
Energy efficiency and management - public lighting	7 in 10	1161947.8	90.5	122588.7	9.5
Electric grid	0 in 0	0	0	0	0
Prospection and planning	0 in 0	0	0	0	0
Unidentified	1 in 1	16192.8	100	0	0
TOTAL	17 in 20	1510938.3	92.5	122588.7	7.5

Fig. 24 – Approved Community Fund by Energy domain for type of municipality (urban and others)

Legend: * Urban areas – municipalities that have a city included in the area; ** Other areas – municipalities without cities or non-territorialized projects; ACF (euros) - Approved Community fund (euros), % ACFE - % of Approved Community fund for domain based on the total Approved Community fund for Energy, ACF/capita - Approved Community fund per capita

Source: Portuguese NSRF, December 2012. Produced by the authors.

V – Final remarks

The analysis that was presented regarding the energy policies of EU and Portugal is a work in progress, and a focus on the indicators that are present in the measures proposed by each instrument will be made, as well as a more detailed analysis of the sub-domains in terms of their connection (both from the UE with Portugal and within Portuguese energy and planning documents). However, the research that was presented, and that addressed the analysis of the objectives and measures proposed by domains, showed important results that indicate some complementarity but also interesting unexpected variables. The data show a predominance of the EU energy policy in the domains that concern market tariffs and regulation, grid management and planning, research towards smart grids, while in Portugal, policy documents reflect a concern towards renewables technology development and implementation, but also on energy and mobility, a domain that is characterized by the development of the electric vehicle (that had a significant commitment by Portugal's governments). The concern with non-renewable energy technology is also apparent in EU's energy policy documents, namely in technology that permits an increase in the efficiency in energy production, with a special emphasis on carbon capture and storage – CCS.

Justifying the complexity of this theme in the context of the planning strategy, in the actual Cohesion Policy cycle (2007-2013), the energy theme presents not only different concerns within the EU-27, according to the needs of each country, but also different concerns in the several regions of some countries. These differences, strongly related with the Cohesion Policy's objective for each region – “Competitiveness” vs “Convergence” - promote the development of different types of projects, all for the benefit of the energy sector. and impacts in the environment, economy and society, streamlined by several agents (from the municipalities to the schools or social institutions). While in the “Competitiveness regions” the projects that stand out are about “renewable energy technology” and “Energy efficiency and management”, in “convergence regions” the projects with a bigger impact are about “energy efficiency and management of public lighting of cities” and “prospect and planning” by the regional energy agencies. In Portugal, the proportion of approved investments for these projects based on the total investments is really low when we highlight the relevance of this sector in the sustainable development, justified by the partition of the initial budget for each theme, and the (lack of) stimulation of the several agents for the development of projects in the sector.

The research presented therefore indicates that the number of energy related measures in the Portuguese planning instruments is residual, which above all reflects the difficulty that still exists in the planning area of creating multidisciplinary instruments that connect the various dimensions that characterize the complexity of the territory. However, great synergies could be created by enabling the promotion of energy related measures in planning. The fact that there is a strong relation between energy production and consumption with the specific geographical characteristics of a certain territory, the importance that energy security and transportation is gaining, and also the importance of the ecological and climate variables to the renewables implementation and development, indicate that future strategic planning documents in Portugal should encompass the energy dimension as a crucial element for the promotion of an innovative planning policy, that could foster economic development, environmental accountability and social cohesion.

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