

PAREDES DE COURA

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Plano de Ação para as Energias Sustentáveis

executive summary

PREAMBLE

The county of Paredes de Coura is located in the heart of the Alto Minho region, characterized by its green sceneries, picturesque villages and steep hills. It's both rich and diverse on environmental, landscape, heritage, cultural and gastronomic issues. Among its monuments, emphasis should be given to the beautiful 17th century pillory, to the Baroque church of the Holy Spirit and to the church of Ecce-Homo. The modesty of Paredes de Coura monumental heritage is largely compensated by its numerous archaeological vestiges (dolmens and Roman milestones); by its fine examples of rural architecture (windmills, stone granaries, threshing-floors) and by the undeniable richness of its fauna and flora. Also famous for its renowned open-air summer rock festival, held annually on the beach of the river Tabuão, Paredes de Coura highlights itself due to its characteristics and singularities. Essentially rural, the county has recently witnessed a slight process of industrialization and an expansion of its tertiary sector.

The sensitivity for the 'environmental' cause and the willingness to promote a simultaneously sustained and sustainable development are notorious and have driven the local authority's activities. Aware of the role it plays and its responsibility towards the people of Paredes de Coura, either as actor or as a model-entity and motivator, the municipality of Paredes de Coura decided to accept the challenge launched by the European Commission and, at its 17th December 2010 meeting, decided to endorse the 'Covenant of Mayors', committing itself, like its European counterparts, to:

- go beyond the objectives set by the EU for 2020, reducing the CO₂ emissions in our respective territories by at least 20%;
- submit a Sustainable Energy Action Plan including a baseline emission inventory which outlines how the objectives will be reached;
- submit an implementation report at least every second year following the submission of the Action Plan for evaluation, monitoring and verification purposes;
- organise Energy Days or City Covenant Days, in co-operation with the European Commission and with other stakeholders, allowing citizens to benefit directly from the opportunities and advantages offered by a more intelligent use of energy, and to regularly inform the local media on developments concerning the action plan;
- attend the annual European Union Conference of Mayors, giving its contribution.

Accordingly, Paredes de Coura has promoted a series of actions that have culminated in the drafting and approval of this document - entitled 'Plano de Ação para as Energias Sustentáveis de Paredes de Coura'. In terms of content, this action plan makes a brief description of the county of Paredes de Coura, characterizes its energy consumption and production and indicates a set of actions/measures whose implementation will lead to the progressive CO₂ emissions reduction and, subsequently, to the improvement of Paredes de Coura's energy and environmental performance.

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Overall strategy

Plan content and structure

The 'Plano de Ação para as Energias Sustentáveis de Paredes de Coura' (hereinafter referred to by PAES_PCR) is a strategic document that shows how Paredes de Coura will honour the commitment of reducing its CO₂ emissions to 20% below the 2008 level by 2020.

With a geographic scope of action of 138.2 km², the PAES_PCR is an instrument of the outmost importance for improving the energy and environmental performance of Paredes de Coura. Being based on a thorough research and data treatment - that culminated in the drafting of the 'Inventário de Referência das Emissões de Paredes de Coura' (hereinafter referred to by IRE_PCR) - the PAES_PCR gathers and systematizes a set of measures and actions whose implementation will enable Paredes de Coura to meet its 'Covenant of Mayors' pledge. Because it is a plan for the whole territory, PAES_PCR includes:

- measures that rely entirely on the internal responsibility of the City Hall of Paredes de Coura (from now on referred to by MPC) or that can be implemented by entities participated by the MPC;
- measures in whose implementation the MPC has no intervention on, despite their contribution to the objectives set.

The structure of this document is as described in Table 1.

Table 1 - Structure of the document and a brief description of its contents.

Chapter	Subchapter	Contents
Territorial framework	-	Brief characterization of the county of Paredes de Coura both geographical and statistical.
Covenant of Mayors _ context and opportunity	Current context and vision for the future	Presentation of the vision for the county of Paredes de Coura in 2020 and of the reasons for the accession to the initiative 'Covenant of Mayors'.
	Organisational aspects	Description of the methodology adopted for the preparation of both the IRE_PCR and the PAES_PCR. Particular emphasis is given to the structure and ' <i>modus operandi</i> ' of the technical team and to the procedures adopted in order to assure the involvement of both stakeholders and citizens.
Current context and vision for the future	Synthesis of the diagnosis	Specification of: the provenance of the data used; the assumptions made and the calculation methods used for the preparation of the IRE_PCR. Moreover, characterization of both energy consumption and associated CO ₂ emissions referring to 2008 (baseline year selected) and to Paredes de Coura.
	Towards 2020	Portray of both macro and local framework of the PAES_PCR. Description of the strategy that will enable the county of Paredes de Coura to meet the desired targets of CO ₂ emissions (among other information, it is specified: which measures and actions need implementing; whose responsible for their implementation; which sources of funding are available for planned investments and how Paredes de Coura will monitor and evaluate the implementation of the PAES_PCR).
Conclusions	-	Brief summary of the main conclusions of the PAES_PCR and of the IRE_PCR.
References and sources of information	-	List of the sources of information consulted in the preparation of both the IRE_PCR and the PAES_PCR.

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Still regarding IRE_PCR and PAES_PCR content it is important to refer that, on their preparation, sources of CO₂ emissions other than those solely and exclusively related with the use and/or processing of energy weren't taken into account nor was it considered the potential contribution of sinks of CO₂ or of other greenhouse gases (GHG) to the aimed CO₂ emissions decrease.

A further comment to refer that, in the drafting of the IRE_PCR and of the PAES_PCR, it was taken into account the content of the various supporting documents to the implementation of the initiative 'Covenant of Mayors' by the signatories, produced by the Secretariat of the Covenant of Mayors, in particular the information necessary to fill in the "SEAP template". Accordingly it should be noted that the PAES_PCR has the year 2020 as time horizon and was structured taking into account the following sectors and subsectors:

- BUILDINGS, EQUIPMENTS / FACILITIES & INDUSTRIES
Municipal buildings, equipment/facilities; Tertiary (non municipal) buildings, equipment/facilities; Residential buildings; Industry; Municipal public lighting
- TRANSPORT
Municipal Fleet; Private and commercial transport
- LAND USE PLANNING
Strategic urban planning; Transport/mobility planning; Standards for refurbishment and new development
- PUBLIC PROCUREMENT OF PRODUCTS AND SERVICES
Energy efficiency requirements/standards
- WORKING WITH CITIZENS AND LOCAL ACTORS
Advisory services; Financial support and grants; Awareness raising and local networking; Training and Education.

Objective(s) and Targets

As previously mentioned, through the implementation of the PAES_PCR, Paredes de Coura aims to reduce its CO₂ emissions to 20% below the 2008 level, by the year 2020.

Current framework and vision for the future

Environment has been regarded, for quite some time, as a priority by the municipality of Paredes de Coura. The natural wealth of the county of Paredes de Coura and the commitment of a diverse set of organizations (among which the municipality of Paredes de Coura) made it possible to designate as a protected area 16% of the county's territory¹. In Paredes de Coura, it is noticeable a well-organized and a long term effort on behalf of both the recovery and preservation of the territory's natural heritage and the improvement of municipal networks - from sewerage to water supply to footpaths, for example.

Regarding Energy and despite the fact that, for obvious reasons, energy consumption is, and has been for quite some time, a major concern of the municipality, only now was it possible to define an integrated and concerted action strategy, guided by an accurate diagnosis, which deals solely and exclusively with energy issues and aims to reduce the county's energy consumption (with the subsequent effects on climate change).

¹ The 'Paisagem Protegida do Corno do Bico', classified since 1999, covers an area of 21.75 km² of the territory of Paredes de Coura. This natural sanctuary, whose management is committed to the Municipality of Paredes de Coura, covers five parishes of Paredes de Coura, namely: Bico, Castanheiro, Cristelo, Parada e Vascões (for further information see: <http://www.cornodebico.pt/portal/>).

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Being aware of its role in mitigating the effects on the climate change, the municipality of Paredes de Coura decided, at its December 17th, 2010 meeting, to accept the European challenge and to sign the 'Covenant of Mayors'. As a corollary of this act, Paredes de Coura committed itself to:

- go beyond the objectives set by the EU for 2020, reducing the CO₂ emissions in its respective territory by at least 20%;
- submit a Sustainable Energy Action Plan including a baseline emission inventory which outlines how the objectives will be reached, within one year of the adhesion date;
- submit an implementation report at least every second year following the submission of the Action Plan for evaluation, monitoring and verification purposes;
- organise Energy Days or City Covenant Days, in co-operation with the European Commission and with other stakeholders, allowing citizens to benefit directly from the opportunities and advantages offered by a more intelligent use of energy, and to regularly inform the local media on developments concerning the action plan;
- attend and contribute to the annual EU Conference of Mayors for a Sustainable Energy Europe.

Promoting energy efficiency and the use of renewable energy resources thus became understood as fundamental, aiming Paredes de Coura at *'being, in 2020, a model county in terms of energy, where the sustainable use of energy resources guide the performance, drive innovation, quality, attractiveness and competitiveness of both territory and entities there based, and enhance the quality of life of all those resident'*.

Organizational and financial aspects

Coordination and organisational structures created/assigned

Given its profile and experience, the municipality of Paredes de Coura took over the coordination of the initiative 'Covenant of Mayors' and carried out all the necessary procedures in order to obtain information on energy consumption and production, as well as to involve different sectors of activity in the development of both the IRE_PCR and the PAES_PCR.

Staff capacity allocated

Aiming to ensure: all technical support; the production of all documentation and the organization of all necessary activities, and thus, ensure compliance with the targets set by Paredes de Coura upon the adhesion to the initiative 'Covenant of Mayors', a technical and multidisciplinary team was formed. It comprises the following institutions and elements:

- Municipality of Paredes de Coura – the municipality allocated three elements to the initiative 'Covenant of Mayors';
- Agência Regional de Energia e Ambiente do Alto Minho (AREA Alto Minho) – two elements of this energy agency collaborated with the Municipality of Paredes de Coura.

This technical team met as often as necessary in order to: define a joint action strategy; allocate responsibilities at each stage of the process; set targets and timings for implementation, assess obtained results and introduce adjustments whenever needed.

Furthermore, there was an involvement of the municipality of Paredes de Coura at three distinct stages of the process, namely: adhesion to the 'Covenant of Mayors' (on December 17th, 2010); consolidation of the action plan and formal approval of the PAES_PCR (on March 26th, 2012).

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Involvement of stakeholders and citizens

During the first year of adhesion, in addition to the municipality's employees, citizens and stakeholders² were involved. In order to inform, both citizens and stakeholders, about the commitments made by Paredes de Coura in the ambit of the 'Covenant of Mayors' a set of information was produced and made available. Information and awareness sessions were also organized aiming to: present this European initiative; explain the Covenant of Mayors' implications and to collect contributions from the stakeholders and citizens present for the IRE_PCR and the PAES_PCR. Subsequently, was established a direct and individualized contact with some strategic stakeholders, aiming to gather more detailed information for the elaboration of the action plan. Thus, the PAES_PCR was the result of fairly participated consultation process enriched by the contributions given by various entities such as: schools; transport and construction companies; commercial establishments; accountancy firms; restaurants; accommodation facilities; Parish Councils; local mass media; among others. Additionally, in order to mobilize citizens and institutions and to encourage the implementation of 'environmentally friendly' solutions, several and diverse initiatives were promoted. For their contribution to the objectives of the PAES_PCR, emphasis should be to the placement of information alluding to the 'Covenant of Mayors' on the municipality's official website (see: http://www.cm-paredes-coura.pt/portal/page/paredesdecoura/portal_municipal/municipio/Apresentacao_PA_PCR_0.pdf) and to the publication of several news both in the municipality's official website and in local press.

Foreseen financing sources for the investments within your action plan

Considering the measures within the PAES_PCR and given the specific financial instruments presently available, it can be foreseen that the annual public funding sources will be the Energy Efficiency Fund (EEF) and the funds to be allocated through the National Strategic Reference Framework (QREN). As far as private investment is concerned, the annual sources of funding may arise from incentives systems and from the Plan for Promoting Efficiency in Consumption (PPEC).

On the other hand, the JESSICA initiative (Joint European Support for Sustainable Investment in City Areas) and the ELENA Program (European Energy Local Assistance) could also support the implementation of some of the actions recommended in the PAES_PCR.

Finally and although not being, in itself, a source of funding, it must be pointed out the contribution that is to be expected from energy service companies (ESCOs) for the implementation of the PAES_PCR. At present, following the publication of the Council of Ministers Resolution No. 2 / 2011 of 01.12.2011, it is possible to hire energy service companies (ESCOs) to implement measures that lead to the improvement of energy efficiency in public buildings and equipments allocated to the provision of public services. Therefore, given the current Portuguese economic and financial situation, it is likely that such contracts may be celebrated in order to finance some of the investments within the PAES_PCR.

Planned measures for monitoring and follow-up

As previously mentioned (see the content of the item 'Staff capacity allocated'), some resources were allocated to the preparation of the IRE_PCR and of the PAES_PCR, by the municipality of Paredes de Coura and by AREA Alto Minho. Among other tasks, these entities collected, processed and systematized a great set of information on the consumption of various energy vectors and its consumers as well as on energy production and its producers. Furthermore, these entities: promoted and participated in information and awareness sessions; produced and disseminated information concerning the initiative 'Covenant of Mayors'; compiled and systematized the various contributions, from various sectors, for the PAES_PCR. They are, therefore, motivated and familiar with the requirements of the 'Covenant of Mayors' and with the commitments made. Therefore, it is expected that these same resources become involved in the tracking, monitoring and evaluation of the implementation of the PAES_PCR.

From an operational standpoint, the implementation of the PAES_PCR will be monitored and an implementation report will be submitted, at least every second year following the submission of the Action Plan, for evaluation, monitoring and verification purposes. To achieve this, a network of information

² For PAES_PCR purposes, stakeholders are an array of local and regional actors considered by the municipality to be 'strategically important'.

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exchange will be established and a 'Centre for energy and environmental sustainability of the county of Paredes de Coura' will be created.

Since the implementation of PAES_PCR is essentially an interactive and joint process, it is expected that the reports and conclusions arising from its monitoring will be disclosed and discussed with all partners from different sectors and with the Paredes de Coura's citizens, thus becoming a means to assess the degree of compliance, to promote discussion and to improve the PAES_PCR's execution. The municipality of Paredes de Coura through its website and other communication tools at its disposal will assure the compilation and dissemination of obtained results.

Regarding energy consumption and 'local' energy production – i.e. those associated with the 'Municipal buildings, equipment/facilities' and 'Municipal Fleet' - the monitoring of the measures/actions within the PAES_PCR will be carried out by some of the elements of Paredes de Coura's covenant of mayors technical team. In order to meet all the necessary requirements, in the standards and procedures already implemented in the municipality of Paredes de Coura adjustments will be introduced and issues related to the monitoring and implementation of the PAES_PCR will be incorporated.

Finally, it should be noted that the PAES_PCR:

- is a medium-long term plan;
- involves a broad number and a wide variety of players;
- is based on a set of assumptions that are likely to change from now until 2020,

therefore, it may be necessary to make some alterations to its content in order to adjust it to the different realities that might arise during the course of its implementation. The opportunity to apply corrective actions should be systematic and always aim to improve and not just be an expression for the correction of deviations or errors, may they be motivated by a lack of information or the natural changes that occur in the society, whose nature may be technological, structural or economic.

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Baseline Emission Inventory

According to the SEAP template instructions, statistical data was gathered, processed and then allocated to the following categories and subcategories:

- “Buildings, equipment/facilities and industries”: “Municipal buildings and equipment/facilities”; “Tertiary (non municipal) buildings, equipment/facilities”; “Residential buildings”; “Municipal public lighting”; “Industry”;
- Transport: “Municipal fleet”; “Public transport”; “Private and commercial transport”.

Synthesis of the Diagnosis

The IRE_PCR is a prerequisite to the development of PAES_PCR. In this document and according to the content of the supporting documents produced by the Secretariat of the Covenant of Mayors, both energy production and consumption should be characterized for a given baseline year. However, due to lack of complete, official and reliable statistical information which allow to determine and characterize Paredes de Coura 2008th 'energy production' it was only possible to incorporate on the IRE_PCR the information alluding to 'energy consumption'.

Because it integrates a large set of quantitative information, alluding both to the energy consumption and to their associated CO₂ emissions, specified by energy carrier and by category of consumption, the IRE_PCR allows, on one hand to identify the nature of the issuers of CO₂ and, on the other, to adjust to Paredes de Coura a strategic plan which aims to improve this territory's energy and environmental performance. In the future, IRE_PCR will be an instrument of paramount importance assessing both the implementation of the PAES_PCR as well as the effectiveness of measures adopted.

Methodology

In order to maximize the reliability of the IRE_PCR, official statistical information, published by DGEG, was used whenever possible. In the case of the municipal energy consumption – i.e. that associated with 'Municipal buildings, equipment/facilities' and 'Municipal fleet' - were considered those concerning the operation of the local authority itself and the consumption values were obtained through interpretation of the various invoices related to the energy consumption incurred in the year 2008³. Thus, it was processed the information listed in Table 2.

Table 2 – List of the information processed and its origin.

Designation	Indicator used	Period	Source of the information
Electricity	Electricity consumption (kWh) by type	2008	DGEG
	Electricity consumption (kWh) by economic sector of activity	1994-2008	DGEG
	-	2008	MPC (EDP invoices)
Fossil Fuel / Bio fuel	Fuel Consumption per county (tonnes)	1990-2007	DGEG
	Sales of liquid and gaseous fuels (tonnes) by location and type of fuel	1990-2008	INE
	Sales of Petroleum Products in the Internal Market by county and economic sector of activity in 2008 (tonnes)	2008	DGEG
	-	2008	MPC (suppliers invoices)

The data was processed for each energy carrier and four types of analysis were promoted, namely:

³ 2008 was the chosen baseline year for the inventory, being this the closest year to 1990 for which the most comprehensive and reliable data could be collected.

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- evolutionary analysis of the consumption in the county of Paredes de Coura for the time series of available data;
- distribution of percentage of the consumption in 2008 in the county of Paredes de Coura by sector of economic activity;
- distribution of percentage of the consumption in 2008 in the county of Paredes de Coura by category;
- disaggregation of energy consumption registered and of its associated CO₂ emissions, for 2008 in the county of Paredes de Coura, by category.

It's important to state that:

- for the conversion of the various units of measure available to MWh, were used the conversion factors and net calorific values available on the website of DGEG;
- for calculating CO₂ emissions, it was used, whenever possible, emission factors contained in the 'Technical Annex to the SEAP template instructions document: the emission factors' - when unavailable, were used those contained in Order No. 17313/2008 of June 26.

Concerning the activity sectors considered on the preparation of the IRE_PCR and, subsequently, the PAES_PCR, and given the freedom given to the 'Covenant of Mayors' signatories, Paredes de Coura chose to include 'Industry'. It should however be referred that the criteria used to select which sectors of activity correspond to the category 'Industry' was, in essence, the one used by INE in preparing the 'Contas nacionais' (namely the 'E.6.2 Contas da Energia' of the 'E.6 Contas Satélite do Ambiente'). Thus, the statistical sections / divisions processed are listed in Table 3.

Table 3 - List of sectors included in the analysis of the IRE_PCR and the PAES_PCR

Section	Designation	Section /division relationship
A	Agriculture, animal production, hunting, forestry and fishing	01+03
C	Manufacturing	10+13+14+15+16+18+22+23+25+28+31+32
D	Electricity, gas, steam, hot and cold water and cold air	35
E	Collection, purification and distribution of water, sanitation, waste management and remediation	36+38
F	Construction	41+42+43
G	Wholesale and retail trade, repair of motor vehicles and motorcycles	45+46+47
H	Transport and storage	49+52
I	Accommodation, catering and similar	55+56
J	Information and communication activities	58+60+61
K	Financial and insurance activities	64
L	Real estate activities	68
M	Consulting, scientific and technical activities	75
N	Administrative activities and support services	81
O	Public Administration and Defence; Compulsory Social Security	84
P	Education	85
Q	Activities of human health and social support	86+87
R	Art activities, theatre, sport and recreation	90+91+93
S	Other service activities	94+96
T	Activities of households employers of domestic personnel and production activities of households for their own use	98
U	International organizations and other extraterritorial institutions activities	99

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Thus:

- on the analysis carried out and wherever possible, in addition to being considered the total consumption was considered the partial consumption (resulting on the deduction of the 'Industry' consumption);
- on the disaggregated consumption analysis - either by sector or by category - was processed the total consumption (i.e. data related to 'industry' was included).

Consumption and Emissions

Electricity

The graph in Figure 1 reflects the evolution of the electricity consumption registered in the county of Paredes de Coura.

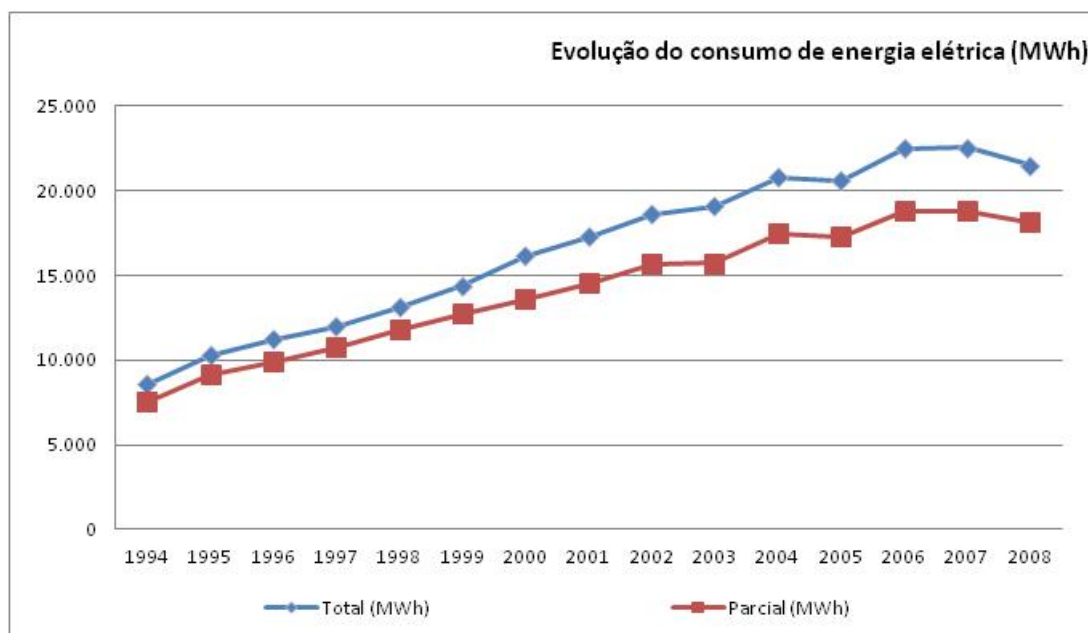


Figure 1 - Evolution of electricity consumption in Paredes de Coura (total and partial).

(Source: <http://www.dgeg.pt>)

Through analysis of the graph in Figure 1 it can be concluded that, with the exception of the year 2005, the total electricity consumption in the county of Paredes de Coura steadily increased until 2006 - year which registered the highest consumption level of this energy carrier - having slightly decreased since then. Moreover, comparing total and partial values one can perceive that the evolutionary trend is analogous and a gradual increase, until 2007, of the contribution of 'industry'.

Once split the total consumption of electricity by sector of activity, the graph in Figure 2 is obtained.

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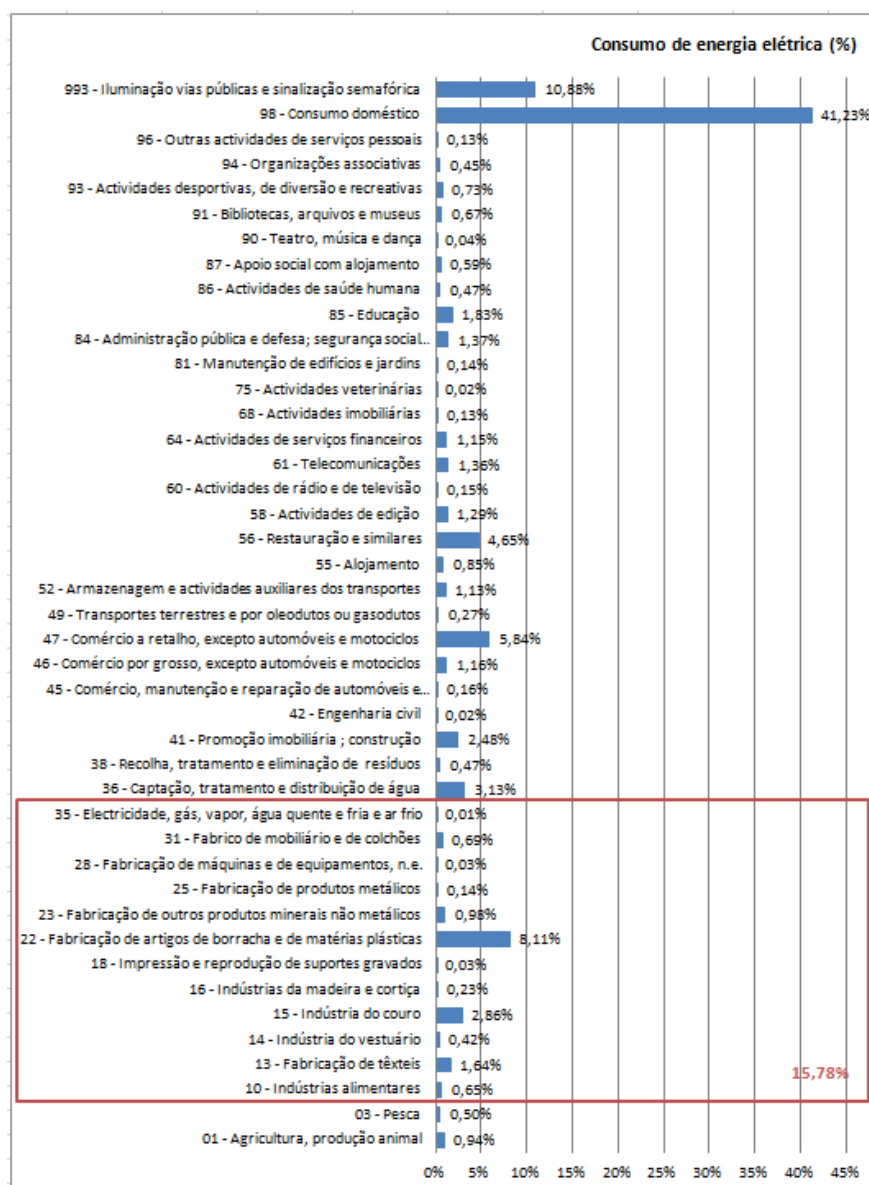


Figure 2 - Distribution of electricity consumption percentage by sector of economic activity.

Comparing each sector's energy consumption, it is possible to perceive that in Paredes de Coura in 2008 the sector which registered the highest values was '98 - Domestic consumption'; followed by '993 - Public lighting and traffic lights' and then by '22 - Manufacture of rubber and plastic products' - with percentages of, respectively, of 41.23, 10.88 and 8.11%.

Splitting the consumption values for the energy carrier in question and for the year 2008 by category yields the following percentage distribution (see graph in Figure 3).

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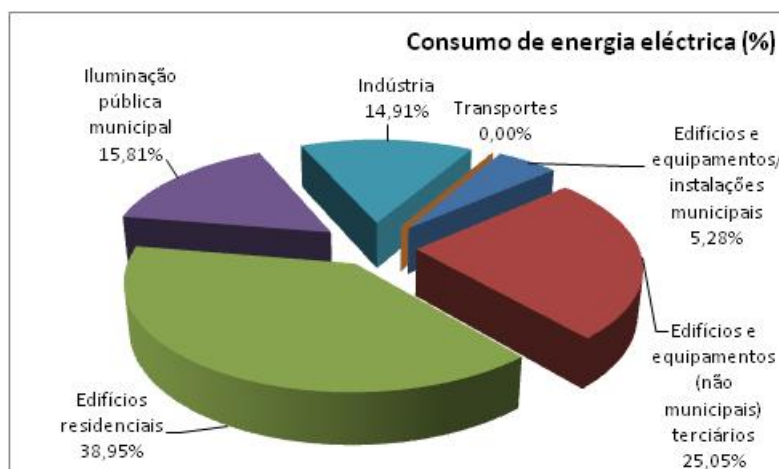


Figure 3 - Disaggregation of electricity consumption, registered in 2008 and in Paredes de Coura, by category.

As expected, in the county of Paredes de Coura in 2008, the most electricity consuming category corresponds to 'Residential buildings'. It should also be stated that the percentage of the category 'Municipal public lighting' is greater than that of the 'Municipal buildings, equipment/facilities' – 15.81 and 5.28% respectively.

Table 4 summarizes the disaggregation, by category, of the registered electricity consumption and its associated CO₂ emissions.

Table 4 - Final energy consumption and its associated CO₂ emissions, for the energy carrier 'electricity', disaggregated by category.

Category	Final Energy Consumption (MWh)	CO ₂ Emissions (t)
Municipal buildings, equipment/facilities	1201.24	443.26
Tertiary (non municipal) buildings, equipment/facilities	5700.08	2103.33
Residential buildings	8864.14	3270.87
Municipal public lighting	3598.97	1328.02
Industry	3393.22	1252.10
Transport	0.00	0.00

A further comment to reference that, in determining the CO₂ emissions associated with energy carrier 'electricity', the emission factor used was 0.369 t CO₂/MWh.

Natural Gas

In 2008 there was no natural gas consumption in the county of Paredes de Coura, therefore, for the year in question and for this county, the CO₂ emissions associated with the use of this energy carrier are non-existent.

Fossil fuels

In the particular case of fossil fuels, it should be noted that once crossed the information available on the websites of DGE and of INE, the values for the indicators 'Fuel Consumption by Municipality (tonnes)' and 'Sales of liquid and gas (tonnes) of the companies by location and type of fuel' are equal, so it can be inferred that those institutions have considered, for statistics purposes, that:

- all the fuel acquired in Paredes de Coura was consumed in Paredes de Coura;
- all the fuel consumed in Paredes de Coura was acquired in Paredes de Coura.

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Although this does not reflect necessarily the reality of Paredes de Coura, in the absence of other reliable information - which allowed a more rigorous way to measure the real consumption of this energy carrier and allocate it to the various sectors - in order to prepare the IRE_PCR was used the data corresponding to "Fuel Consumption by Municipality - 2008", from DGEG.

The graph in Figure 4 reflects the evolution of fuel consumption, total and disaggregated by fuel, registered in the county of Paredes de Coura in the period 1990-2008.

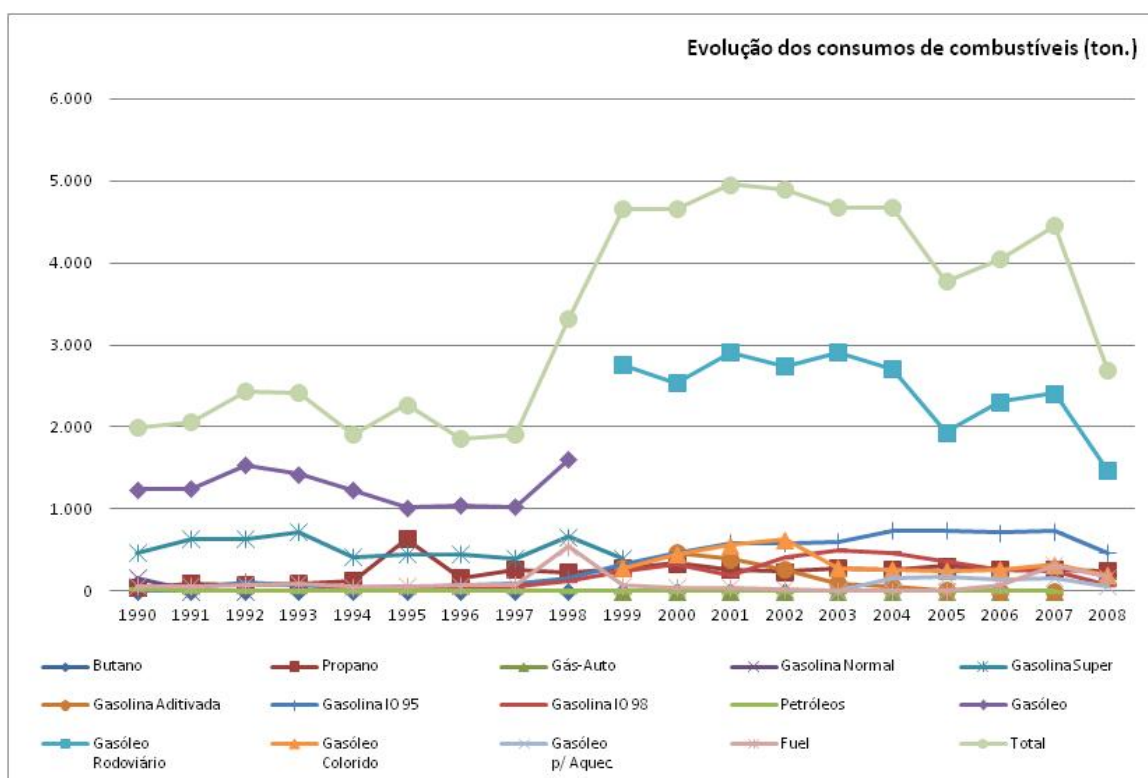


Figure 4 - Evolution of fossil fuels consumption registered in the county of Paredes de Coura (total and disaggregated by type of fuel.)
(Source: <http://www.dgeg.pt>)

The analysis of the information in the graph in Figure 4 shows that:

- there is a significant variation in the consumption of petroleum products during the period 1990-2008;
- the year that has registered the highest consumption of fossil fuels (liquid and solid) was 2001, followed by 2002 and after 2004;
- regardless of the year in question, the fuel more consumed in the county of Paredes de Coura was diesel;
- the oscillation registered on the total fossil fuel consumption was mainly driven by the variations which occurred in the consumption of diesel fuel - maximum and minimum peaks corresponding, respectively, to the years 2003 and 1995.

Proceeding to the percentage breakdown of the amount of fossil fuels sold in Paredes de Coura in 2008 it is noticeable, as would be expected, the predominance of 'diesel' sales, followed by 'IO 95 gasoline' and 'propane', with percentages of, respectively, 54.09, 17.24 and 9.23% (as confirmed in Figure 5).

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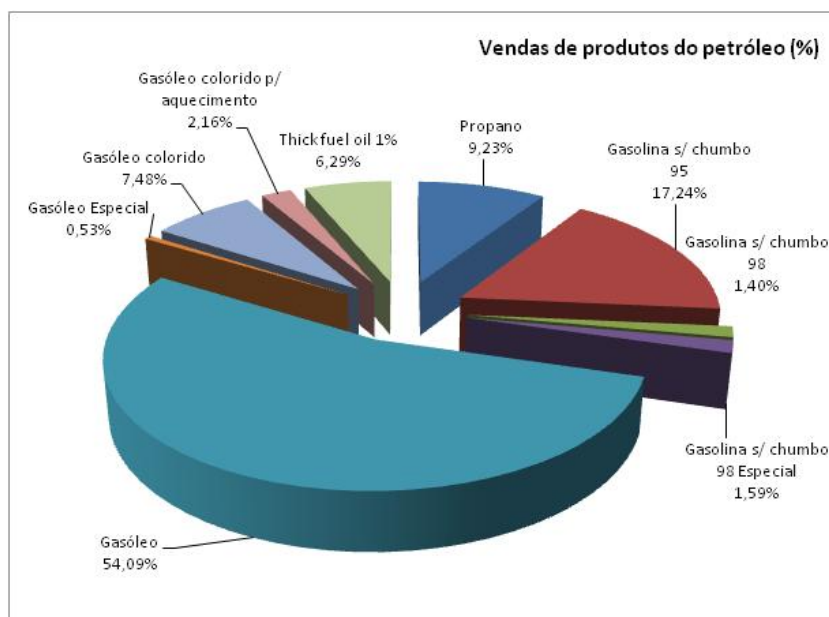


Figure 5 – Disaggregation of fossil fuels consumption, registered in 2008 and in Paredes de Coura, by product.

As for the disaggregation of the sales of petroleum products in the domestic market by sector of economic activity, the information is available only for the year 2008 - hence it is not possible to carry out an evolutionary analysis by sector of economic activity. For the same reason it is also impossible to quantify with accuracy which energy consumption is associated to which economic sector of activity for the county and the reference year in question.

After processing the information related to fossil fuel sales in Paredes de Coura in 2008, with and without 'Industry' (total and partial, respectively) it is possible to obtain the graph in Figure 6.

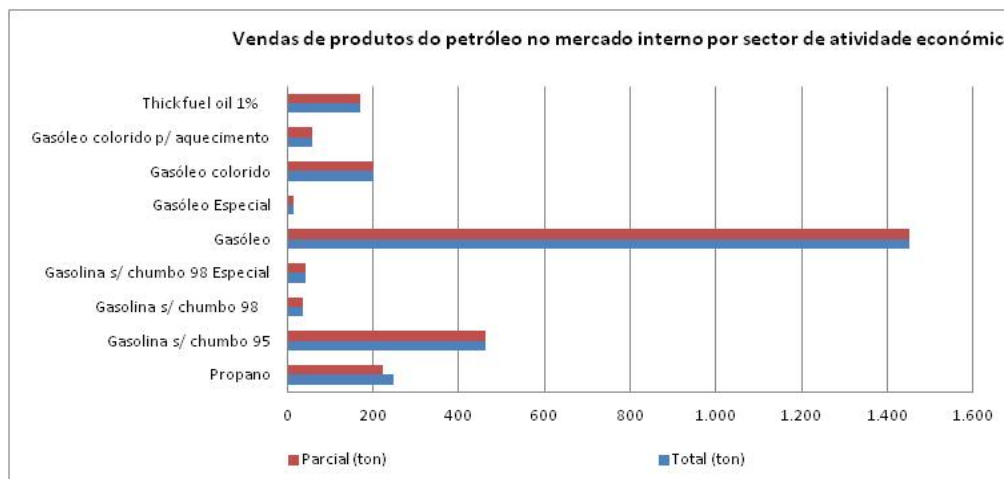


Figure 6 - Fossil fuels consumption in 2008 on the county of Paredes de Coura (total and partial).

(Source: <http://www.dgeg.pt>)

Through interpretation of the information expressed in Figure 6 it is clear that the contribution of 'Industry' for the total fossil fuel sales recorded in the county of Paredes de Coura, in 2008, is insignificant, with a little contribution from 'propane'.

Once split the total petroleum products sales for the year 2008 in Paredes de Coura by economic sector of activity, the graph in Figure 7 is obtained.

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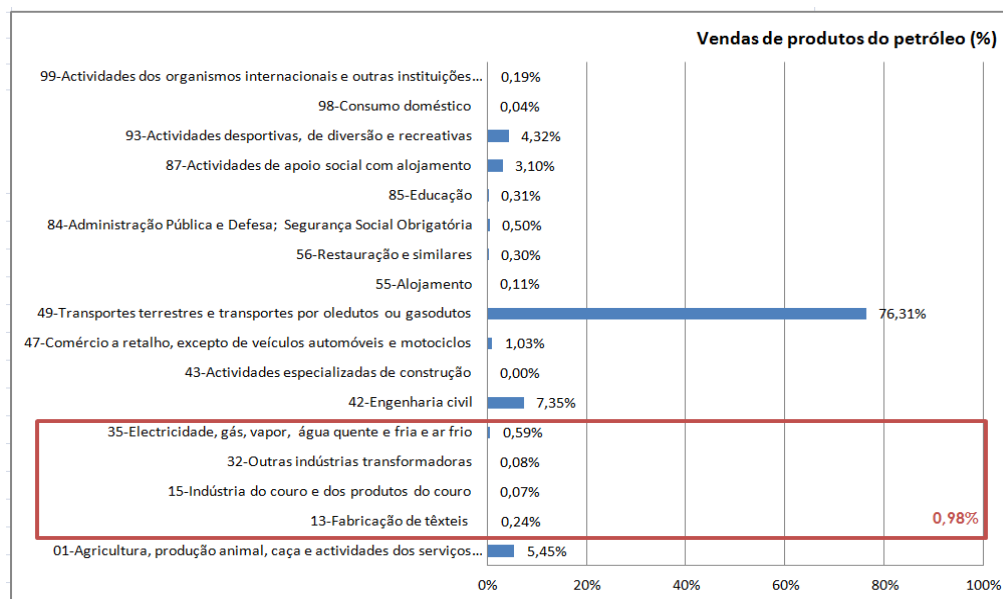


Figure 7 - Distribution of the percentage of fossil fuel consumption per economic sector of activity.

By analysing the information contained in Figure 7, it can be seen that fossil fuel sales in Paredes de Coura can be allocated, mainly, to four economic sectors of activity, namely, in descending order of importance: '49 - Land transport and transport via pipelines', '42 – Civil engineering', '01 - Agriculture, hunting and related service activities', '93 - Sports, amusement and recreational activities – with percentages of around 76.31, 7.35, 5.45 and 4.32%, respectively.

It should be stated that the amounts corresponding to '98 – Domestic consumption' only aggregate information regarding the gases propane and butane - in other words, it does not include fuel used by families to travel in motor vehicles (which are allocated, for statistical purposes, to the sector '49 - Land transport and transport via pipelines').

By disaggregating the values of fossil fuel sales in 2008 by category the following percentage distribution is obtained (see Figure 8).

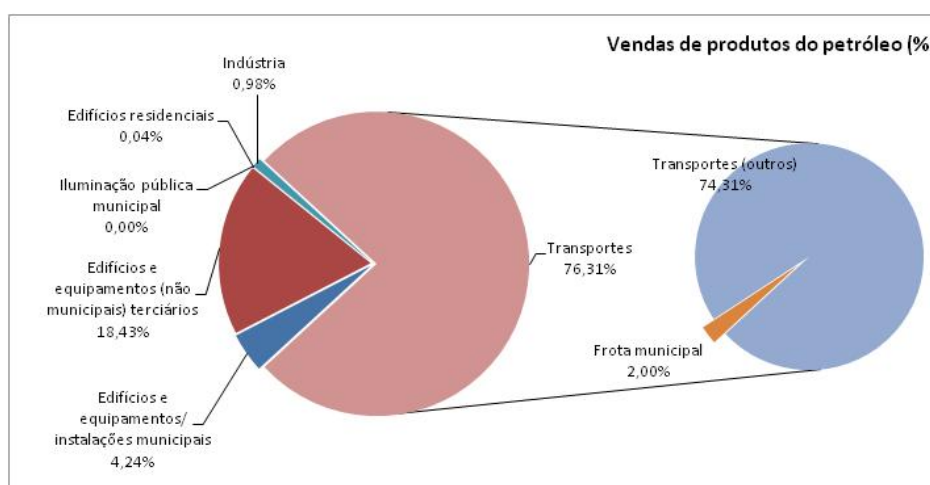


Figure 8 – Disaggregation of fossil fuel consumption, registered in 2008 and in Paredes de Coura, by category.

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As expected approximately 76.31% of fossil fuels consumption correspond to the component 'Transport', followed by those relating to 'Tertiary (non municipal) buildings, equipment/facilities' and 'Municipal buildings, equipment/facilities', with percentages of 18.43 and 4.24%, respectively.

Table 5 summarizes the disaggregation by category of 'fossil fuels' consumption, in the county of Paredes de Coura in the year 2008, and its associated CO₂ emissions.

Table 5 - Final energy consumption and its associated CO₂ emissions for the energy carrier 'fossil fuels', disaggregated by category.

Category	Final Energy Consumption (MWh)	CO ₂ Emissions (t)
Municipal buildings, equipment/facilities	1359.94	308.49
Tertiary (non municipal) buildings, equipment/facilities	5917.06	7963.65
Residential buildings	13.32	3.02
Municipal public lighting	0.00	0.00
Industry	315.85	71.65
Transport	24494.63	6420.57

An additional comment to refer that, in determining the CO₂ emissions associated with energy carrier 'fossil fuels', the emission factors used were:

- Liquefied gas - 0.227 t CO₂/MWh;
- Heating oil - 0.267 t CO₂/MWh;
- Diesel - 0.267 t CO₂/MWh;
- Gasoline - 0.249 t CO₂/MWh;
- Thick fuel oil - 0,279 t CO₂/MWh.

Renewable energy

Until 2008, from a statistical point of view, there are no records of renewable energy consumption and, in 2008, there are only those related to sales of biodiesel. By analysing the statistical data provided by DGEG it is possible to conclude that in 2008 and in Paredes de Coura there are no records of biodiesel sales hence the CO₂ emissions associated with the use of this energy vector are non-existent.

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Overall Balance

Table 6 consists of a summary of the IRE_PCR and Figure 10 shows the distribution of the percentage of the final energy consumption, in the county of Paredes de Coura and in 2008, disaggregated by energy carrier.

Table 6 - Final energy consumption and its associated CO₂ emissions, referring to all energy carriers, disaggregated by category.

Category	Final Energy Consumption (MWh)	CO ₂ Emissions (t)
Municipal buildings, equipment/facilities	2561.18	751.75
Tertiary (non municipal) buildings, equipment/facilities	11617.14	3646.41
Residential buildings	8877.47	3273.89
Municipal public lighting	3598.97	1328.02
Industry	3709.07	1323.75
Sub-total	30363.82	10323.81
Municipal fleet	641.93	171.03
Public transport		
Private and commercial transport		
Sub-total	24494.63	6420.57
Total	54858.45	16744.39

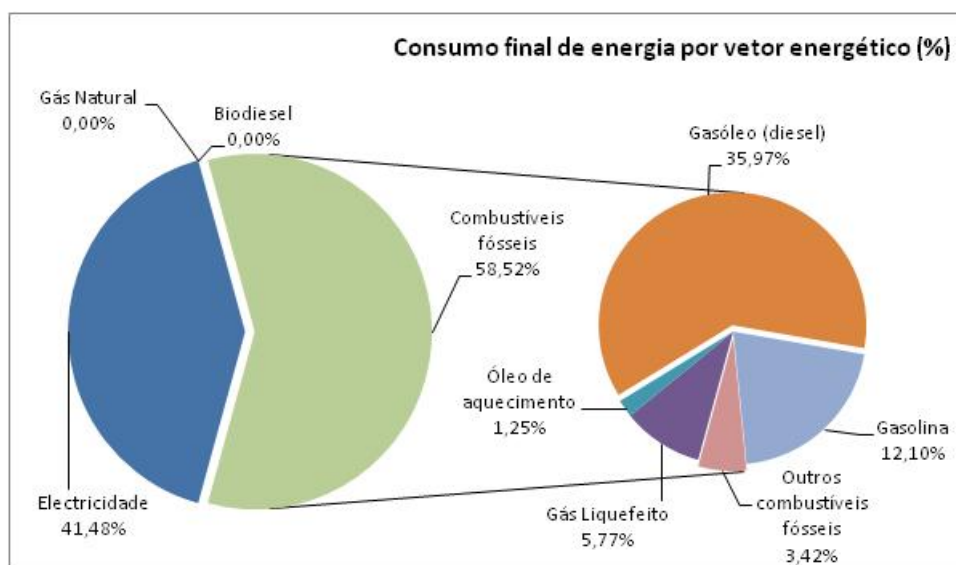


Figure 9 - Disaggregation of final energy consumption, in 2008 and in Paredes de Coura, by energy carrier.

By interpreting the figures in Table 6 it is possible to perceive that, in terms of components, the component 'Buildings, equipment and facilities' is more energy consuming than 'Transport' (55.35 versus 44.65%). Regarding the categories themselves and having in mind that due to lack of information it is impossible to disaggregate, by category, the energy consumption related to the component 'Transport', the category which registered the highest energy consumption and, subsequently, led to greater CO₂ emissions was 'Tertiary (non municipal) buildings, equipment/facilities'.

The analysis of Figure 9 shows that the most consumed energy carrier in the county of Paredes de Coura in 2008 corresponds to 'fossil fuels', followed by 'electricity'. As far as 'fossil fuels' are concerned, it is important to highlight the consumption recorded by diesel and gasoline – with contributions of around 35.97 and 12.10%, respectively.

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Planned actions and measures for the full duration of the plan

Towards 2020

In order to implement an action plan and aiming to enhance the success of its implementation, it is necessary to establish and detail the measures that need undertaking, translate them into indicators, which should then defined accordingly to the resources available and be implemented within an adequate timeframe. Moreover, to each measure should be assigned a person responsible for its implementation as well as set a realistic budget.

Embodying, too, a strategy of action, this time aiming to improve the energy and environmental performance of the county of Paredes de Coura, the PAES_PCR could not elope from these guidelines. Therefore, in accordance with the content of the document 'INSTRUCTIONS: How to fill in the Sustainable Energy Action Plan template?', were listed and grouped by fields of action (such as 'Municipal buildings, equipment/facilities'; 'Residential buildings'; 'Municipal public lighting'; 'Public transport'; 'Training and education', among others) a set of measures/actions whose implementation will lead to the reduction, by 20% in 2020 and in the territory of Paredes de Coura, of the CO₂ emissions. Furthermore, for each measure/action: was allocated, at least, one entity responsible; was defined a timing for implementation; was quantified, whenever reasonable, the estimated the cost associated with its implementation and was quantified energy savings and production and respective CO₂ emissions reduction.

Regarding the 'municipal component' despite the final energy consumption and the CO₂ emissions corresponding to the categories 'Municipal buildings, equipment/facilities' and 'Municipal Fleet' being small, it was considered important to include, in the PAES_PCR, a set of actions of the responsibility of the MPC.

Foreseen actions

The strategy of action to be undertaken in Paredes de Coura in order to reduce CO₂ emissions by 20% in 2020 is as described in Tables 7, 8, 9, 10 and 11.

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Table 7 - Measures to be adopted for the sector 'Buildings, equipment/facilities & industries'.

Fields of action	Designation	Description	Responsible department/entity	Implementation period	Energy saving (MWh)	Energy production (MWh)	Reduction of CO ₂ emissions (ton)
Municipal buildings, equipment / facilities	Sports facilities energy performance upgrade	Implementation of energy efficiency measures in municipal sports facilities.	MPC	2013-2020	109.27	-	27.02
	Rehabilitation of large municipal buildings	Implementation of energy efficiency measures in large municipal buildings, except sports facilities.	MPC	2013-2020	10.13	-	3.74
	Municipal buildings energy performance upgrade	Implementation of energy efficiency measures in municipal buildings, except sports facilities and large municipal buildings.	MPC	2013-2020	0.69	-	0.23
	Certified municipal buildings	Energy certification of municipal buildings.	MPC	2013-2020	-	-	-
	Efficient schools	Realization of energy diagnosis and implementation of the proposed measures.	MPC	2009-2020	4.19	-	1.54
	Renovation of office equipment	Gradual replacement of office equipment by others more efficient.	MPC	2012-2020	2.43	-	0.90
	Standby e off-mode consumption elimination	Behavioural change of the use of office equipment by the workers in the municipal buildings/equipment and facilities.	MPC	2012-2020	0.17	-	0.06
	Efficient interior lighting	Gradual replacement of incandescent light bulbs with others more efficient.	MPC	2012-2020	62.72	-	23.14
	Efficient heating/cooling systems	Implementation of a set of measures aiming to improve the energy performance of heating/cooling systems.	MPC	2012-2020	5.93	-	2.14
	Management and monitoring of energy	Implementation and operation of an energy monitoring and management system in municipal buildings.	MPC	2012-2020	22.66	-	8.36

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Tertiary (non municipal) buildings, equipment/facilities	Building rehabilitation	Implementation of energy efficiency measures in buildings aiming to improve their energy and environmental performance.	Private	2009-2020	27.06	-	8.64
	Office equipment renovation	Gradual replacement of office equipment by others more efficient.	Private	2009-2020	10.46	-	3.86
	Renewal of electrical equipment in hotels	Replacement of inefficient appliances by others more efficient (Class A or higher).	Private	2009-2020	12.33	-	4.55
	Renewal of electrical equipment in restaurants and coffee shops	Replacement of inefficient appliances by others more efficient (Class A or higher).	Private	2009-2020	59.99	-	22.14
	Efficient lighting	Implementation of a set of measures aiming to improve the energy performance of lighting systems.	Private	2009-2015	229.93	-	84.85
	Eco-AP implementation	Promotion of a set of energy efficiency measures that will allow the public administration buildings to reduce their energy consumption by 20%.	Public administration	2009-2020	115.73	-	35.26
	Efficient heating/cooling systems	Implementation of a set of measures aiming to improve the energy performance of heating/cooling systems.	Private	2009-2020	55.22	-	19.39
	Solar DHW	Installation of solar thermal collectors in the tertiary sector buildings.	Private	2009-2020	8.25	-	2.87
	Management and monitoring energy systems	Implementation and operation of an energy monitoring and management system in the tertiary sector.	Private	2012-2020	74.85	-	27.62

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Residential buildings	Home renewal	Adoption of energy efficiency measures in housing, including interventions in glazed openings and insulation (walls, floors and ceilings).	Private	2009-2020	87.89	-	32.41
	Certified buildings	Residential buildings energy certification.	Private	2009-2020	-	-	-
	Replacement of inefficient equipments	Replacement of inefficient appliances by others more efficient (Class A or higher).	Private	2009-2020	279.22	-	103.03
	Phase-out of incandescent lamps	Gradual replacement of incandescent light bulbs with others more efficient.	Private	2009-2020	655.24	-	241.78
	Intelligent lighting	Implementation of a set of measures aiming to improve the energy performance of residential indoor lighting (except incandescent light bulb replacement).	Private	2009-2020	15.96	-	5.89
	Solar DHW	Installation of solar thermal collectors in the residential sector.	Private	2009-2020	292.07	-	107.71
	Efficient heating/cooling systems	Implementation of a set of measures aiming to improve the energy performance of residential heating/cooling systems.	Private	2015-2020	68.36	-	25.21
	Monitor and manage energy consumption	Replacement of the existing electricity counters by intelligent ones. Introduction of equipment that enables the optimization of electricity consumption in the residential sector.	Private	2013-2020	138.50	-	51.11
Industry	Energy efficient industries	Adoption of energy efficiency measures in industry.	Private	2014-2020	165.38	-	60.74
Municipal public lighting	Optimized set time	Adjustments in the operating hours of municipal public lighting.	MPC/EDP Distribuição	2010-2011	647.81	-	239.04
	Efficient public lighting	Implementation of a set of energy efficiency measures in municipal public lighting (ex. installation of dimmers; electronic ballasts; LED lighting, etc.).	MPC/CIM Alto Minho	2011-2013	260.99	-	122.67
	Geo-referencing municipal public lighting network	Survey and geo-referencing of all the components that integrate Paredes de Coura's municipal public lighting network.	MPC/CIM Alto Minho/AREA Alto Minho	2013	-	-	-

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Table 8 - Measures to be adopted for the sector 'Transport'.

Fields of action	Designation	Description	Responsible department/entity	Implementation period	Energy saving (MWh)	Energy production (MWh)	Reduction of CO ₂ emissions (ton)
Municipal fleet	Municipal fleet renewal	Gradual replacement of the municipal fleet by more energy efficient vehicles, hybrid or electric.	MPC	2009-2020	117.80	-	31.37
	Bio fuel incorporation	Incorporation of bio fuel (B20) in the municipal fleet.	MPC	2012-2020	-7.55	-	13.44
	Right tire	Use of tires with low rolling resistance in the municipal fleet, verification and, if necessary, pressure correction.	MPC	2012-2020	31.41	-	8.37
	Travel planning and coordination	Adopting measures in order to promote car sharing among municipality's employees (ex. municipal fleet management).	MPC	2011-2020	0.52	-	0.14
	Incorporation of monitoring systems	Incorporation into the municipal fleet of monitoring systems (on-board computer, cruise control, GPS, etc.).	MPC	2012-2020	39.27	-	10.46
Private and commercial transport	Improvement of mobility and transport systems and networks	Restructure public transport network and enhance the use of public transports.	MPC/Private	2012-2020	734.84	-	192.62
	Vehicle replacement	Renewal of the fleet through the purchase of more efficient and less polluting vehicles.	Private	2009-2020	2204.52	-	586.85
	Right tire	Use of tires with low rolling resistance, verification and, if necessary, pressure correction.	Private	2009-2020	587.87	-	154.09
	Driving efficiently	Incorporation of monitoring systems (on-board computer, cruise control, GPS, etc.).	Private	2009-2020	1285.97	-	337.08
	Bio fuel incorporation	Incorporation of bio fuel (B20).	Private	2013-2020	-26.78	-	47.68
	Cycling routes and footpaths	Building infrastructures which enhance sustainable mobility (such as cycling routes and footpaths).	MPC	2009-2020	36.74	-	9.63
	On-line services	Making available on-line services, using new information and communication technologies (NICT), thus decreasing the number of 'mandatory' travels needed.	Public Administration	2009-2020	122.47	-	32.10

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Table 9 - Measures to be adopted for the sector 'Land use planning'.

Fields of action	Designation	Description	Responsible department/entity	Implementation period	Energy saving (MWh)	Energy production (MWh)	Reduction of CO ₂ emissions (ton)
Strategic urban planning	Incorporation of energy related issues in strategic urban plans (namely Paredes de Coura's PDM)	Incorporation, in the revised PDM, of solutions that potentiate a reduction of the energy consumption and associated CO ₂ emissions (like: limitation, to the minimum, of the expansion of urban areas; promotion of a greater mixture of uses and proximity of services at consolidated urban zones; definition of new green corridors, cycling routes and footpaths; etc.).	MPC	2009-2020	-	-	-
Transport/mobility planning	Transport and mobility planning	Definition of solutions aiming to improve mobility and increase the accessibility provided by the county's public transportation system, ensuring the economic sustainability of all agents involved.	MPC/CIM Alto Minho	2011-2013	-	-	-
Standards for refurbishment and new development	Pro-energy efficiency standards	Revision of the existing municipal regulations in order to incorporate issues related with energy efficiency in buildings and in public lighting (urban regeneration and new developments).	MPC	2011-2013	-	-	-

Table 10 - Measures to be adopted for the sector 'Public procurement of products and services'.

Fields of action	Designation	Description	Responsible department/entity	Implementation period	Energy saving (MWh)	Energy production (MWh)	Reduction of CO ₂ emissions (ton)
Energy efficiency requirements/standards	Enhancing municipal green procurement	Implementing public procurement laws in the municipality of Paredes de Coura.	MPC	2013-2020	0.15		0.045
	Enhancing green procurement	Implementing public procurement laws in the municipality of Paredes de Coura's public administration buildings.	Public Administration	2008-2020	0.03		0.011

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Table 11 - Measures to be adopted for the sector 'Working with the citizens and stakeholders'.

Fields of action	Designation	Description	Responsible department/entity	Implementation period	Energy saving (MWh)	Energy production (MWh)	Reduction of CO ₂ emissions (ton)
Advisory services	Advice on energy issues addressing the municipality	Advise in order to promote both energy efficiency and use of renewable energy sources.	MPC/AREA Alto Minho	2012-2020	385.46	-	113.27
Awareness raising and local networking	Raising awareness towards energy related issues in schools	Promotion of energy and environmental awareness actions addressing Paredes de Coura's schools (production and distribution of informative material; organization of contests of ideas, among other events).	MPC/AREA Alto Minho	2012-2020	26.72	-	9.86
	Raising residents awareness towards energy related issues	Promotion of energy and environmental awareness actions addressing Paredes de Coura's citizens (ex. production and distribution of informative material).	MPC/AREA Alto Minho	2013-2020	399.49	-	147.33
	Awareness raising on energy related issues within the tertiary sector	Promotion of energy and environmental awareness actions addressing Paredes de Coura's tertiary sector (production and distribution of informative material; award organization; contests of ideas, among other events).	MPC/AREA Alto Minho/ Business association	2013-2020	163.87	-	58.64
	Awareness raising on energy related issues within the industry sector	Promotion of energy and environmental awareness actions addressing Paredes de Coura's industries (production and distribution of informative material; award organization; contests of ideas, among other events).	MPC/AREA Alto Minho/Business association	2013-2020	165.38	-	60.74
	Training on Eco Driving	Implementation of eco-driving awareness actions addressed to Paredes de Coura's citizens.	MPC/Private	2012-2020	734.84	-	192.62
Training and education	Training on Eco Driving addressed to municipality's employees	Implementation of training on issues related to eco-driving, for municipal vehicle users.	MPC	2013-2020	62.82	-	16.73
	'Greener' driving schools	Incorporation of educational content on the topic of eco-driving at driving schools.	Private	2008-2015	244.95	-	64.21