

AGUEDA'S IMPLEMENTATION PLAN

Fund for Energy and Water Efficiency



This project is co-funded by the Intelligent Energy Europe Programme of the European Union

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1. Energy sustainability challenges

Climate change is increasingly important and citizens awareness on it is raising .The greenhouse gases, global change and extreme weather events are widely known. The introduction of a model of mass production and consumption has exhausted the assimilative capacity of our planet. Indeed, climate change is a paradigm of the effects that this model has had. It is not a phenomenon associated with any particular focus of our production system, but is a global form of appropriation of the resources that has been practiced.

Currently the world faces two challenges linked to the level of energy aspects. The first related to access to energy and poverty eradication: about 1.2 billion people worldwide, almost one in six, live without access to electricity. Almost double, 2.8 billion rely on wood, charcoal and animal waste for cooking and heating, resulting in serious impacts in terms of health namely from the effects of indoor smoke.

The second challenge is related with the urgent need to promote energy efficiency. Carbon dioxide and other pollutants are contributing to changes in climate.

Europe

As showed by recognized experts, if the world fails to reduce emissions of greenhouse gases, climate change will lead to exorbitant costs. The energy sector is directly involved as over 80% of its production comes from burning fossil fuels that produce carbon dioxide (CO₂), the main greenhouse gas. One of the great challenges that Europe faces is to reduce energy dependence, reducing the use of fossil fuels and increasing the use of sustainable energy sources.

To address these challenges the European Union adopted a roadmap to a low-carbon and competitive economy by 2050, and now has launched a debate on new targets for 2030. Also, various policies have been developed in order to ensure compliance with the objectives of renewables, energy efficiency and CO₂ emissions by 2020. European policies prioritize energy efficiency and the target of 20% energy savings by 2020, increased competition through an integrated system to save costs and further promote growth of the energy market in renewables. To reach and try to exceed the European Union energy and climate objectives, an initiative called “**The Covenant of Mayors**” was launched in 2008 by the European Commission.

The Covenant of Mayors is a voluntary initiative by which the signatory cities undertake to exceed the target of 20% reduction of CO₂ emissions in their territories by 2020. This goal should be achieved through increased energy efficiency and cleaner production and use of energy, as set out in the EU Measures Package on Climate Change and Renewable Energy.

The Covenant of Mayors is one of the most important and ambitious European initiatives in the context of fighting climate change. The commitment to go beyond the goal set by the Covenant of Mayors signatories is accomplished through the implementation of **Sustainable Energy Action Plans (SEAP)**.

After the delivery of the SEAP, the signatories undertake to submit every two years a report on their implementation. With these implementation reports, the objective is to compare the preliminary results with the objectives set out in terms of measures implemented towards reducing CO₂ emissions. The main goals achieved are published on the Covenant website in its Signatory profile.

The objectives of the implementation report are the monitoring of the main achievements and continuous improvement of the measures applied in the SEAP. The signatories commit themselves to regularly submit a progress report to show the results achieved, both in terms of implemented measures such as CO₂ emissions.

In parallel with The Covenant of Mayors, the European commission launched in 2014 the new Initiative “**Mayors Adapt**” in order to, besides reducing greenhouse gas emissions, to mitigate climate change, also reinforcing its resilience to the inevitable impacts of climate change, now and for the future.

Cities that adhered to the initiative commit to the overall aim of the EU Adaptation Strategy, to develop local adaptation strategies within the first two years of signing and to monitor the outcomes every two years.

The municipality of **Águeda** has already signed a commitment with both Initiatives mentioned above.

In order to comply with the Covenant of Mayors, It was developed a Sustainable Energy Action Plan (SEAP) in which energy sustainability measures were defined.

Portugal

Based upon the commitment made by EU countries under the Kyoto Protocol, Member States were mobilized towards adopting energy models to achieve a better performance in the sector and Portugal is no exception. As all countries of the European Union, Portugal has been developing specific plans and programmes aimed at boosting measures and implementing them more effectively.

Portugal’s energy policy is based on two fundamental pillars, *economic rationality* and *sustainability*, advocating for that with energy efficiency measures, the use of energy from renewable sources and the need to reduce costs.

Broadly objectives of this policy are:

- Significantly reduce emissions of gases with greenhouse effect in a sustainable manner;
- strengthen the diversification of primary energy sources, contributing to structurally increase security in energy supply ;
- increase energy efficiency of the economy, particularly in the public sector, contributing to the reduction of public spending and efficient use of resources;
- contribute to increased competitiveness of the economy by reducing fuel consumption and costs associated with the operation of enterprises and the management of the domestic economy, releasing resources to boost domestic demand and new investments.

As part of a policy that promotes a rational and sustainable energy model, without compromising the competitiveness of enterprises or the quality of life of citizens, programmes and plans that contribute to specific objectives and will allow boosting measures at all levels were developed:

PNAEE - National Action Plan for Energy Efficiency

PNAER - National Action Plan for Renewable Energy

ECO.AP - Energy Efficiency Program for Public Administration. The first step was the review of PNAEE - National Action Plan for Energy Efficiency for the period 2013-2016 (Strategy for Energy Efficiency - PNAEE 2016) and PNAER- National Action Plan for Renewable Energy for the period 2013- 2020 (Strategy for Renewable Energy - PNAER 2020), through Resolution of the Council of Ministers No. 20/2013 of April 10th.

The integration of PNAEE and PNAER - which so far have been treated independently-allows concerted action for the achievement of national and European goals while minimizing the investment required and increasing national competitiveness. Integrated review of PNAEE and PNAER has thus based on the alignment of respective objectives in terms of primary energy consumption and the required contribution of the energy sector to reduce emissions of greenhouse gas.

In this review, the difficult measures to quantify or lower impact have given way to more effective new measures, reinforcing existing measures to lower cost and ease of implementation.

For Bodies and Public Administration Services ECO.AP Programme was launched aiming to achieve a level of energy efficiency in the public sector of around 30% by 2020.

Through a solid and effective energy policy which results in the implementation of these plans and programmes, Portugal has the ambition to head the list of countries with good energy performance.

In order to make the implementation of these plans and programmes turn to concrete results, strategic tools were also created for assessing and monitoring the impact of the measures implemented.

About the financing plan, Portugal has defined a set of measures for energy sustainability and all are integrate in this plan.

So that businesses and citizens can give their input engaging actively in the Energy Strategy which aims to implement the support means were created:

Energy Efficiency Fund (ESF) to finance measures included in PNAEE.

Innovation Support Fund (FAI) to finance innovation projects/technology development and technology demonstration projects in the areas of renewable energy and energy efficiency.

These funds are available to all those who would like to invest in energy efficiency and sustainability.

2. Águeda

a) Characterization

The city of Águeda is located in the Central region (NUTS II) and sub-region Beira Litoral (NUTS III). The municipality extends over an area of about 335 km², bounded on the north by the municipality Sever do Vouga, northeast of Oliveira de Frades and Vouzela, east of Tondela, to the south by Mortágua and Anadia, southwest by Oliveira do Bairro, Aveiro and west by northwest of Albergaria-a-Velha. The Municipality of Águeda has about 47,127 inhabitants (year 2013), in eleven parishes: União das freguesias de Barrô e Aguada de Baixo, Aguada de Cima, Fermentelos, União das freguesias de Recardães e Espinhel, União das freguesias de Travassô e Óis da Ribeira, União das freguesias de Belazaima do Chão, Castanheira do Vouga e Agadão, União das freguesias de Águeda e Borralha, União das freguesias de Trofa, Segadães e Lamas do Vouga, União das freguesias do Préstimo e Macieira de Alcoba, Valongo do Vouga, Macinhata do Vouga.

Águeda has a population density of 141 inhabitants/km² (2013) higher than the average population density of the country (113 inhabitants/km², 2013), reflecting the urbanization of the municipality.

The actions developed by the municipality of Águeda in environment and sustainability include a set of relevant actions and efforts that extend environmental education to technological innovation and put the municipality in the national agenda for sustainability.

Environmental awareness is another area that the Municipality of Águeda values, to the extent that implements various actions with schools and population in general, aimed at the development of ecological awareness.

The municipality has invested in the protection of nature and biodiversity, in actions such as the support to the regeneration of native forests and the upgrading and enhancement of Pateira of Fermentelos, one of the largest natural lakes in the Iberian Peninsula and is located between the municipalities of Águeda, Aveiro, Oliveira do Bairro, before the confluence of Cértima Rio with Rio Águeda. Pateira of Fermentelos early became a system in which human activities are perfectly integrated in its dynamics, thus allowing maintenance of the pond. For the rehabilitation was developed a set of actions framed in the Polis Litoral Ria Aveio program,, such as cleaning the pond funds and the reconstruction of the weir in the Águeda's river, which allowed an improvement of the environmental condition of the area of high ecological value and the optimization of occupancy for its population. With this effort a result has emerged, the recognition of Pateira pond of Fermentelos and valleys of the rivers Águeda and Cértima as a Wetland of International Importance - Ramsar Convention.

But the challenges for environmental management are enormous, and the goals to be achieved also cover the awareness of the values and principles of sustainable development in a participatory process. The existence of proactive and environmentally responsible citizens is one of the essential pillars of sustainability and Águeda can rely on the citizens in this issue.

At the level of local governance, the municipality has acted to ensure the existence and maintenance of a network linking stakeholders including private institutions, schools, citizens and

their associations and the private sector, mobilized and able to promote actions that are integrated into regional scope of initiatives. In this way the municipality has showed that mobilizing capacity has allowed synergies which have been proving to be critical advantage of opportunities at a regional national and European level.

b) Baseline emissions inventory

The energy baseline of Águeda characterizes the local energy consumption and the evolutionary trends by providing the information needed to quantify CO₂ emissions from energy consumption in the territory and allowing the evaluation of developments comparing to the year 2002.

The energy mix is also an evaluation tool for the potential development of the energy system of the municipality and a main tool for the definition of energy and environmental strategies. The provisional analysis allows acting proactively in the management of demand and supply, to promote energy sustainability in the region.

In the present analysis scenarios are proposed of energy demand for a timeframe ending in 2030.

The scenarios are calculated using a mathematical model which is based on projections available through international organizations and agencies responsible for planning and prospective study. These forecasts refer to macroeconomic and demographic variables. In addition it is considered the national energy system evolution scenarios.

The macroeconomic scenario and energy proposed by the European Commission in 2013 on "EU Energy, transport and GHG emissions trends to 2050" stands out among the elements considered as a reference of the proposed scenarios. These scenarios used as a resource the PRIMES model, supported by some more specialized models and databases, such as those focusing for predicting the evolution of international energy markets.

Yet, it is considered as a reference, the POLES model of the world energy system, the GEM-E3, and some macroeconomic models.

In annex I, the baseline inventory is presented.

SEAP: Obtained results so far

In a context of high prices for energy supplies, an economy with high energy intensity and greenhouse gas emissions is subject to an increased risk of negative differentiation from competing markets. The severity of price increases for energy goods imposes urgency in the development of policy solutions to break the vicious circle of energy-intensive and greenhouse gas emissions. In addition, continued exposure to fluctuation and eventual growth of energy prices:

Withdraws purchasing power to households and threatens the quality of life of economically weaker households;

Exacerbates inequality of opportunity between regions as far as it imposes additional costs to more dispersed territorial structures and more dependent on intra and inter-regional links;

Threatens the sectoral diversity of the economic fabric, in that it weakens the energy-intensive companies and therefore threatens the resilience of the economic fabric, the stability of sectoral clusters and employment; Undermines the competitiveness of Brazilian exports, especially those whose supply chain is less efficient or to design their products to more distant markets, negatively affecting the living conditions of the population;

It promotes the economic speculation, to the extent that frequent and severe fluctuations in price structure disadvantage consolidating consolidated market alternatives;

Increases public spending in that energy costs are a significant item of current public expenditure indirectly affecting the social benefits;

Thus the relationship-oriented solutions to reduce energy consumption and GHG emissions promote improved quality of life, sustainability, economic competitiveness and equal opportunities.

By following this vision, the Municipality of Águeda promotes the sustainable development of the municipality and the region through the implementation of the Sustainable Energy Action Plan. In this context the council has promoted numerous initiatives, developing and monitoring the creation and implementation of projects and energy efficiency measures and renewable production. Noteworthy is likewise the work of the municipality in terms of population and involvement of social, institutional and economic entities in meeting targets for reducing energy intensity and emission of gases with greenhouse effect. By analyzing the current energy baseline is already evident progress in terms of reducing consumption, particularly in the public sector (public buildings and street lighting), contrary to the growing trends of energy use in this sector. The transport sector emerges as one that has a greater need for organization and management, due to the increasing complexity and change in mobility patterns, supported the intensification of motorization rates, especially in urban areas. It is therefore necessary to reverse this trend by fighting the waste of space, time and energy, increasing the efficiency of alternatives and simultaneously reduce investment and operating costs - making it more sustainable. To accomplish this goal, the municipality is collaborating with CIRA in the development of Intermunicipal Plan for Mobility and Transport of the region of Aveiro (PIMTRA). The PIMTRA's main objective is the implementation of an instrument of action and awareness, fostering the links between the different transports as well as the implementation of an integrated mobility system that supports minimizing investment and operating costs.

Besides mobility, the city of Águeda will further improve its energy efficiency and promote the use of renewable energy sources. To do this, the municipality is aware and in line with the challenges and opportunities of Portugal in 2020, especially in terms of POSEUR- Operational Programme sustainability and efficient use of resources. In this programme are provided measures that allow a greater energy efficiency in the city, namely: energy efficiency, intelligent energy management and use of renewable energy; Efficiency and energy diversification in the collective public transport and promoting the use of green transport and sustainable mobility; Low-carbon strategies; Climate change adaptation and prevention and management of risks associated with climate; Investments in the water and waste sector. In 2013, the state of implementation of sustainable energy measures under SEAP and increasing renewable sources of energy sources rate in the national energy mix allowed to achieve a reduction of about 32% CO₂ emissions. This value is already very close to the planned targets of 33% reduction of CO₂ emissions of the city by 2020.

The figure illustrates, for the year 2013, the state of compliance with the commitment of the 33% reduction in municipal CO₂ emissions occurring on their territory by 2020.



3. Revolving Funds

a) Framework

‘Revolving Fund’ is an economic and financial strategy that provides resources through credit without regard to fiscal-year limitations, and that is rotating with the recovery of loans, returning to the Fund to provide resources to another person or to the same users: expanding the capital to strengthen independently of the needs financing partners, which means being self-sufficient and sustainable.

The only possibility for a revolving fund to really function is guarantying continuity. It could be possible attaining effectively by means of an independent Revolving Fund or through a Revolving Fund associated with existing institutions.

Revolving funds have to be designed in function of the activity to which they are intended and according to the particular context.

Having a credit regulations and adhere to the established not only facilitates loan approval but especially its recovery.

Financing of Revolving Fund

The fund will take time to become fully established if it depends on small injections of funds in the form of contributions, which may be voluntary or compulsory, savings, deposits or phased donor financing. Obtaining contributions from outside the fund’s target group is termed as ‘external financing’ such as donor funds.

In most cases, the involvement of the users in enabling the fund to be financed by them is minimal or non-existent. Experiences show that the financial involvement of the target group is a major precondition for successfully achieving the aim of the fund. It can be involved either voluntarily or compulsorily.

How to participate in the Revolving Fund may be through interest-free advances, loans, grants, combinations of any of these and guarantees. Dependence on donor funding should be transitory and be gradually phased out. Advances and loans to the Revolving Fund, the multi-year financial prognoses relating to the fund should indicate when repayment will be possible and the schedule for phasing out guarantees

Legal status

It is essential for the Fund to obtain legal status for a clear relationship between the fund, its financiers and the users, which can be possible by giving the fund itself a legal status or by attaching the fund to an existing body that will administer the fund under the terms of agreement.

When a fund acquires legal status, it shall be catalogued as a fund with appropriate public authority. In addition to the condition of legal status, it will also be ordered to comply with the statutory requirements.

Road to Self-Sufficiency through the Revolving Fund

Two methods for using the Revolving Fund are distinguished:

- "Make available to users of fund capital" (it depends on the frequency of loans and repayments).
- "Providing users with a deposit made with the fund" (this means that the fund's capital is not directly available to users, and only is available the return on investment of capital).

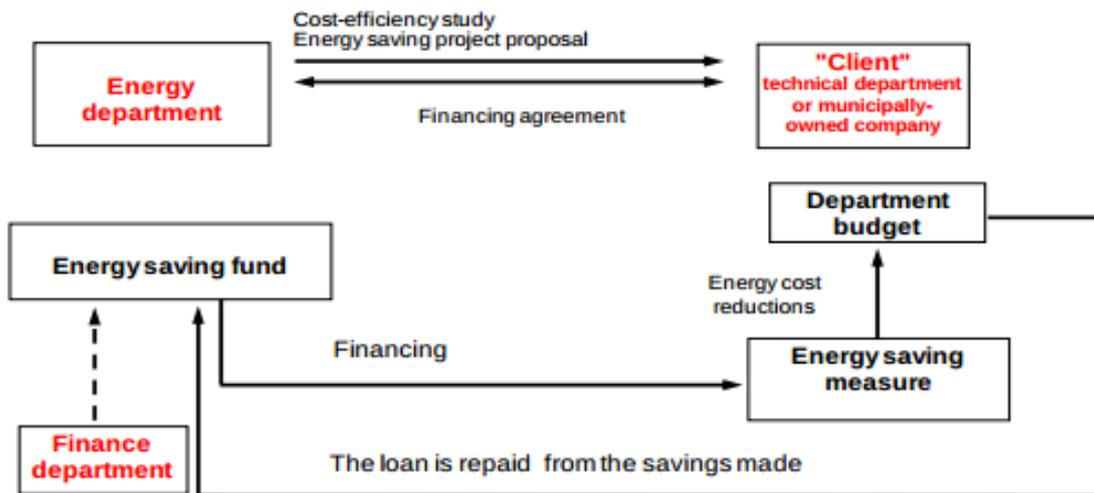
With this, the fund is not depleted and the interest received by the fund can be lent to users and even part of these loans is subsequently returned to the fund.

The maximum guarantee that can be provided will be determined by the amount of capital that the fund has.

Sustainability of Revolving Fund

After an initial period, it is expected that the Revolving Fund becomes self sufficient. If no additional funding is expected to fail to make capital remains at a constant level. The factors that affect the operation of a Revolving Fund are the interest rates (for lending and/or borrowing), levels of premiums; administrative expenses; payments/repayments; inflation and the liabilities.

Below, there is an example on the methodology for the revolving funds.



b) Benchmarks

Ten cases of benchmarks were identified and explained below with the main characteristics, in order to learn and get a more concrete idea on lessons learned that can be applied to FEWE. These benchmarks integrate funds that have already been implemented as well as studies in which different models have been considered however with no implementation at the moment.

The thai efficiency revolving fund

- Country # Thailand.
- Legislation # ENCON Act The Energy Conservation Promotion Act.
- Objectives # to stimulate financial sector involvement in energy efficiency projects and to simplify project evaluation and financing procedures.
- Results: Total Investment for the Measures implemented, which received loans from the Energy efficiency revolving fund in June 2005, was 2,622.13 million baht from which it managed to save 1,267.37 million baht per year and the total average of Payback was 2.07 years.
- Lessons Learned:
The Fund was established to overcome specific barriers to energy efficiency which included:
 - Lack of awareness of energy-efficiency opportunities.
 - The low priority given to energy costs in management decision-making.
 - Limited access to capital due to the 1997 economic crisis in Thailand.
 - Excessive bureaucracy and paperwork associated with the energy audit and reporting requirements under the ENCON Act.

The establishment of the Fund tackled these barriers by:

- Supplementing mandatory obligations with voluntary programs.
- Shifting primary responsibility for implementation away from DEDE.
- Allocating risk away from the Government.
- Simplifying procedures and expediting program implementation.

The armenian efficiency revolving fund

- Country # Armenia
- Legislation # Armenia's Law on Energy Saving and Renewable Energy (ES&RE).
- Objectives # Its local objective is to reduce the energy consumption of social and other public facilities; its global environmental objective is to decrease greenhouse gas emissions by facilitating the implementation of EE investments in the public sector.
- Results: The total estimated cost of the 19 projects is US\$2.35 million (World Bank 2014b). Assuming a 20-year useful life of the project investments, the estimated lifetime energy savings are 32.3 GWh and GHG reductions are 7,930 tons of CO₂e. Actual energy savings for completed projects varied from 41 to 53 percent, with actual payback periods of six years or less.

- Lessons Learned:
 - Power sector reforms and development of renewable energy should be part of an integrated strategy.
 - The institutional structures should be in place and the general policy framework should be clear and supportive of the long-term sustainability of renewable. Provisions should be incorporated to level the playing field between conventional and renewable energy technologies.
 - Renewable energy development involves a lot of “learning by doing”, which among others highlights the importance of good project monitoring systems and the flexibility to learn and adjust financing and project implementation mechanisms.
 - Developing partnerships between public-private organizations and involvement of a wide range of stakeholders throughout the project cycle are critical for success.
 - Procurement and disbursement rules for equipment should match the situation on the ground; often, procurement rules are too elaborate and cumbersome, increasing transaction costs and extending the project schedule, hence discouraging private entrepreneurs to be involved.
 - Financial due diligence early in the project is important to achieve financial closure in minimum time.
 - Clear exit strategy should exist from the beginning.

Ospedaleniguarda ca-granda revolving fund

- Country # Italy.
- Legislation # Italian framework.
- Objectives #established a Revolving Fund for managing investments in the hospital real estate.
- Results:
 - Annual energy savings amount to 5.700 Euro/Year and total savings including maintenance and power to 7.900 Euro/Year.
 - The high efficiency plant actually installed provides annual savings of roughly of close to 57 MWh/year.
- Lessons learned:
 - Identifying seed funding for realizing energy efficiency improvements was more difficult than expected. The total cost of the refurbishing amounts to several hundred thousand Euro. Though funds were made available to improve the lighting system and additional improvements to reduce solar gains, they could not be funded.
 - There are always conflicting demands on resources, but considering that to some degree the restructuring provided a show case action for energy efficiency at the hospital, the inability to identify funds indicates that there work still needs to be done to increase its priority within the organization.

-Higher priority obligations of hospital staff meant that work programme slipped occasionally. The delays were worsened by the continual problem in finding funds for the retrofit. The delays created problems for Scientific Coordinator who subject to contractual obligations with the Commission was nevertheless obliged to complete analysis and reports on the basis of hypotheses and then later repeat these as effective detail became available. Generally the cost of the managing the project for the Scientific Coordinator was higher than original budgeted and in future it would be wise to include a margin for possible delays of the kind experienced.

Ontario revolving fund

- Country # Canada.
- Legislation # Merger of Infrastructure Ontario and OSIFA loan program.
- Objectives #to offer affordable infrastructure financing for seven key municipal priorities:
 - Clean water infrastructure
 - Sewage treatment facilities
 - Waste management infrastructure
 - Municipal roads and bridges
 - Public transit
 - Municipal long-term care facilities
 - Municipal social housing
- Results:
 - Over \$2.8B in loan commitments for more than 1,200 local projects.
 - 81% of our loan clients are municipalities.
 - Over 55% of loans are for water and sewer projects.
 - More than a third of Ontario's 445 municipalities have participated in the municipal loan program.
 - Most municipal clients have populations under 100,000.
 - More than 9 million Ontario residents stand to benefit from affordable, longer-term financing.

Salix finance Ltd

- Country # England/Scotland (United-Kingdom).
- Definition # is an independent, not-for-profit company funded by The Department for Energy and Climate Change
- Objectives #Salix and HEFCE have formed a partnership to release funding to support energy efficiency and carbon reduction projects in universities through Revolving Green Fund (RGF). The funding is intended to accelerate investment in energy efficiency technologies which will reduce carbon emissions and create financial savings.
- Model of implementation # Intracting.
- Results To date, Salix Finance has funded over 9,000 projects with 661 public sector bodies, valued at £194m (€220m), saving the public sector £56m (€65m) annually and £750m (€881m) over project lifetimes and delivering CO₂ emission savings of 340,000 tonnes per annum and 4.5m tonnes over the lifetime of the projects.

- Lessons learned:
 - Intracting evolved to finance larger-scale measures with longer paybacks, but to be used by universities and local authorities, requires:
 - A suitable environment (for example an energy department with qualified staff capable of carrying out missions requiring specific energy skills).
 - Knowledge in energy monitoring and control (develop its own know-how).
 - Acquire better knowledge of its energy needs and become more independent in the choice of its equipment and use of its facilities.
 - The university or city will thus become a true energy player, assume its function as a role model and help society progress toward energy transition.

Bulgarian energy efficiency revolving fund

- Country # Bulgaria
- Legislation # Energy Efficiency Act of 2004.
- Objectives # Its main objective is to support the identification, development and financing of viable EE projects, resulting in substantial reduction of greenhouse gases (GHGs).
- Results:
 - By the end of the World Bank project in March 2010:
 - The fund had awarded 81 loans (with another 4-5 loans being in the process of final approval). The total loan volume was US\$16 million, and the total investment financed by these loans was US\$24 million.
 - The lifetime energy savings from these loans were 0.09 mtoe, and the GHG-savings at 0.9 mt CO₂e.
 - The average simple payback period was 4.7 years. The typical loan size was US\$250,000-500,000.
 - The fund had also:
 - Contributed to EE financing for public sector projects in local municipal governments and other public institutions for which commercial banks were unwilling to finance.
 - Contributed, along with a number of other initiatives by EBRD and others, to an increase in the number of ESCOs from 14 to 38 and the number of banks extending loans to EE projects from 2 to 13.

Romanian energy efficiency revolving fund

- Country # Romania
- Legislation # The Romanian Energy Efficiency Fund (Fondul RomânpentruEficiențaEnergiei, or FREE). Relevant legal framework was adopted at the end of 2001.
- Objectives # enable companies in the industrial sector and other energy consumers to adopt and use energy-efficient technologies, financed under commercial criteria by FREE and co-financiers.

Results:

-During the five-year implementation period of the GEF grant, FREE signed 20 loan contracts, of which 18 proceeded to implementation with a commitment of US\$11.4 million from the fund, for a total investment of US\$34.19 million. Three commercial banks offered a total of US\$18.2 million for four large projects.

-By the end of 2008, 16 projects had been completed, with an estimated energy savings of 36,533 toe (tons of oil equivalent) from the completed projects. These resulted in annual CO₂e savings of 183,237 tons. The GHG reduction resulting from these 16 completed projects, aggregated over their lifetimes, was estimated to be 2.18 million tons of CO₂ e (World Bank 2009).

The Indonesian revolving fund

- Country # Indonesia.
- Legislation # Indonesian National Action Plan (RAN-GRK).
- Objectives # to encourage the utilization of energy-efficient technologies, to stimulate the involvement of the financial sector (banking institutions) in order to support the government's energy efficiency programs, to increase potential energy savings (reduction of electricity consumption in the industrial sector) to reduce the amount of energy subsidies, to decrease greenhouse gas emissions (GHG).
- Model of Implementation: It has not yet been implemented

Pilot pico project in Jordanów

- Country # Poland.
- Legislation # Polish framework, It presents a problem for the implementation of the pure structure of PICO. (In public entities the unspent money cannot be transferred to the next budget year.)
- Objectives #to transfer, promote, test and disseminate the PICO concept and adapt it to local conditions and to analyze the overall public procurement process of lighting and other building energy end-use technologies.
- Model of Implementation: It has not yet been implemented.

Pilot pico project in Salzburg

- Country # Austria.
- Legislation # Austrian legislation
- Objectives # saving costs and improving comfort through energy-efficient lighting procurement in public buildings.
- Model of implementation # Intracting was studied.

- Results:

Economic Expected Results:

-It is estimated and guaranteed, that the annual heat costs for heat will be reduced by about 30 % or about 71.000 m³ Gas. This will be a cost reduction by about 30.000 Euro / year.

-There will be also a reduction of the electricity consumption of about 4 % according new circulation pumps (high efficient circulation pumps). This 4 % are about 22,5 MWh per year or about 2.200 Euro per year.

Ecological expected results: According the contract the energy consumption will be reduced by about 72.000 m³ gas. The electricity consumption will be reduced by about 22.500 kWh/ year. All in all about 820.000 kWh of primary energy will be saved. The CO₂ emission of gas and electricity will be reduced by about 21 % or 164 t CO₂.

4. Investment Funds in Portugal

A **mutual fund** is a savings instrument in which many participants make money contributions to be earmarked for a number of assets. The mutual fund consists in a financial product that brings together a large number of people willing to invest their money.

a) Characteristics defining investment funds

Taxation

It is an interesting investment from the tax point of view because there is a possibility to sell and buy funds without any tax. That is, only taxed once the money has been deposited in our bank account again. It is one of the great unknowns of investment funds, and that the investor can transfer their savings from one fund to another untaxed although the transfer is to another management entity and be sold by another custodian.

Profitability

It is the aspect of greatest interest to investors. Called guaranteed funds are the only ones that provide insight into the profitability that the investor will receive in the event to ensure the yield. For this reason and to get an idea about the possible return, it is necessary to observe the historical returns (for the last five years for example) and be aware of the evolution that has taken the price of assets in which it invests. However it has also to be taken into account the Commissions Management companies charge as remuneration for their services, as well as the Custodian.

Operation investment fund

When an investor acquires shares or participates in a mutual fund Management Company takes the money, it integrates into the fund, and invests in shares, bills, derivatives ... depending on the investment policy of the management.

When investors purchase shares to make contributions to the fund, buy a bottom portion, and it is as if it were a small identical to the fund.

Once is running an investment fund, this may increase or decrease by two foothold. For the entry or exit of participants or by variations in the market value of the assets that comprise it. The first reason for variation of the fund will not affect our investment, vary the price of our shares up or down depending on the subscriptions or redemptions. The variations in the market value of the assets of the fund are those that determine the achievement of positive or negative results by the fund.

If the investment fund consists of securities that pay dividends or coupons, these are reinvested in the fund, and the investor makes a profit when selling the shares.

b) Types of funds

The best way to distinguish the funds is based on the values invested:

- Cash or treasury
- Bond funds
- Equity funds
- Mixed funds
- Flexible funds
- Funds of funds
- Special investment funds
- Fund retirement savings (known as PPR)
- Guaranteed capital funds

Below, some current national funds distinguished by their category are listed:

Bond funds

Securities with floating rates

- Securities with fixed rates

Equity Funds

- National Shares
- European Shares
- International Shares

Mixed funds

- Treasury Funds
- Retirement Savings Plans

Property Funds

5. Fund for Energy and Water Efficiency (FEWE)

FEWE was created with the purpose of financing investments that will modernize the Municipality and increase its energy and water efficiency by reducing the consumption of electric power, gas and water.

All the services of the Municipality may present proposals to be included as an eligible investment in energy and water efficiency, and the Division of Environment and Sustainability (hereafter DV-AS).

FEWE will be funded by:

- A value corresponding to water and energy savings - the positive difference in the overall energy consumption (electricity, gas and water).
- Additional appropriations made by the Municipality and defined budget.
- Reimbursement of Community funds associated with eligible investments in energy and water efficiency. Other income that is associated with the eligible investment (ex. sale of energy).

Internal performance contracting - Intracting

Intracting is a financing tool used to implement certain measures in the area of water and energy-savings. The first time to be implemented was in Stuttgart in 1995.

The principal idea about intracting is that the initial investment costs are recouped through the cost savings achieved by implementing energy-saving measures.

This is based on the “Contracting” concept but the main different is that the saving measures are not planned, financed and realised by external third party but is entirely financed from municipal budget funds:

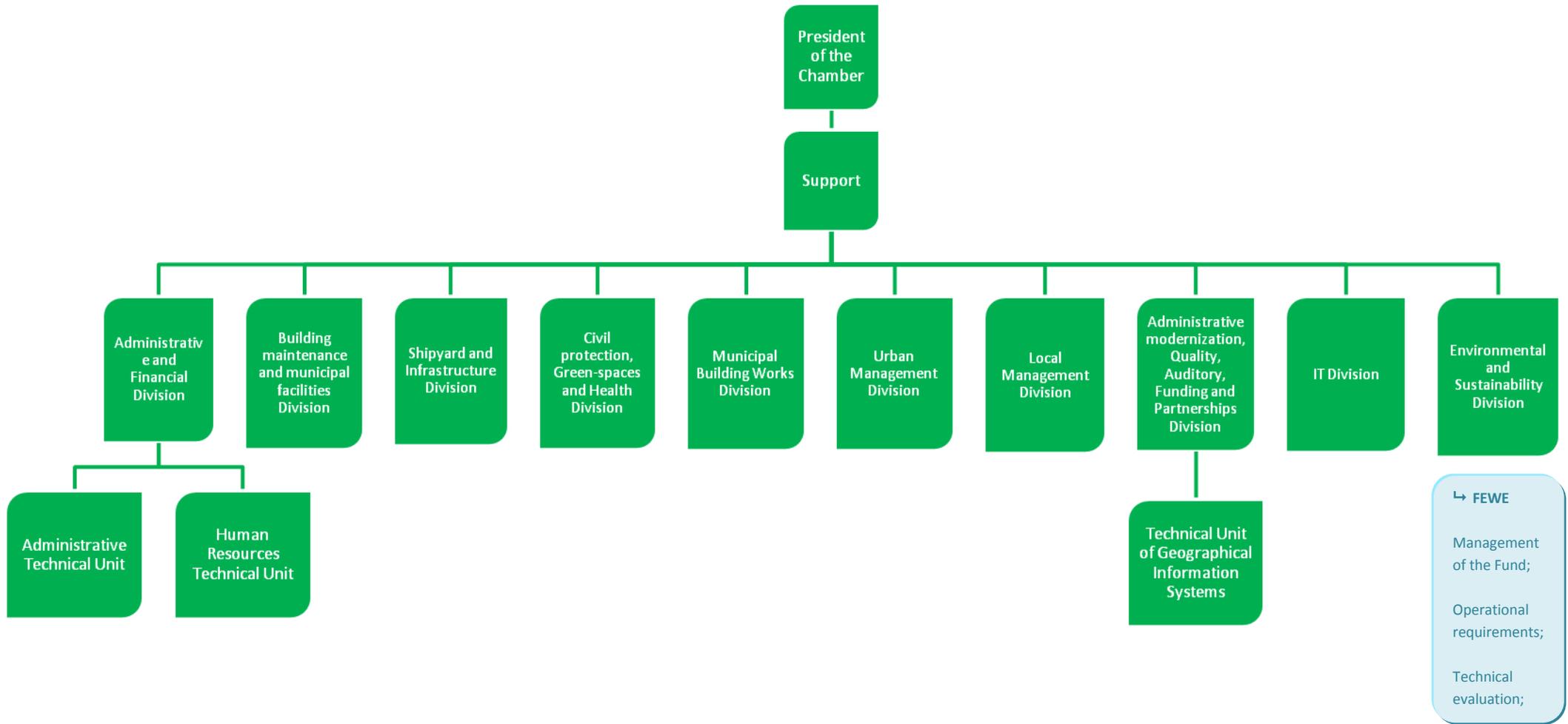
- The energy department finances cost-efficient energy and water saving measures.
- The savings made by the technical department or municipally-owned company on their energy bill are used to repay the energy department until full recovery of the investment capital.
- The technical department or municipally-owned company then can freely dispose of the savings.

The energy department therefore provides zero-interest loans to finance specific measures or packages of measures with no increase charged for risks, rewards or ROI.

An operation scheme is represented bellow to demonstrate how the Municipality’s Revolving Fund will work.



This fund will apply only to municipal projects. Therefore it is relevant for all municipality departments. They interact as shown below. Based on the structure of the Agueda's Municipal Services as amendments determined at a meeting of the Municipal Executive of 02/18/2014, the following chart was prepared:



a) Pre-audit

A pre-audit on the building can be made in order to assess the following aspects:

- Characterization of the building and solutions to be implemented
- Global energy consumptions of the building
- Possible reduction of the energy consumption
- Investment costs
- Annual energy costs reduction
- Payback
- CO₂ emissions reduction

Also a first financial feasibility analysis can be made in order to specify:

- Type of project
- Investment
- Funding
- Profitability indicators (VAL, TIR, PRC, B/C)

b) Criteria for project analysis

The projects to be funded by FEWE will be analysed in two stages:

1st stage

The projects will be evaluated in the framework of the following measures:

Street lighting

- ≡ Replacement of incandescent light bulbs with compact fluorescent lamps (CFLs) or tubular;
- ≡ Replacement of inefficient ballasts with more efficient, including ballasts that allow better management of energy flow/light on PL.

Leds lamps and efficient

- ≡ Replacement of inefficient lighting fixtures by LED technology.

Energy audits, efficient building and building certification

- ≡ Conduct audits in buildings, utilities and industries to assess the degree of energy_efficiency in it and identify the potential improvement;
- ≡ Promote a gradual of household renewal equipment consumers of energy inefficiently_by other top-class energy, especially home appliances.

Open systems energy management

- ≡ Available technologies that enable smart metering of energy consumption water data collection, electricity and gas, aiming to create a more efficient use of resources examined.

Equipment modernization

≡ Gradual equipment renewal, choosing more efficient equipment in particular driving forces equipment.

Solar power

≡ Installing solar thermal collectors and electricity production using photovoltaic systems in municipal buildings.

Ventilation systems and climate

≡ Install heat pumps and/or efficient management systems in municipal buildings.

Efficient boilers

≡ Renew/replace boilers using more efficient systems;

≡ Convert gradually heat consumer equipment to natural gas, biomass or solar thermal collectors.

Biomass and forest residues

≡ Promote the use of forest biomass and forest residues as fuel for the sustainable production of various forms of final energy: electricity, heat and combined heat and electricity.

Biofuels and alternative energy sources in transport

≡ Promote the use of biofuels and alternative energy sources as main fuel or blended with other fuels.

Electric mobility

≡ Purchase of electric vehicles and creating a network to supply them;

≡ Providing the municipality a vehicle charging infrastructure.

Supply improvement and transport network

≡ Study and create new routes for transport network, with more and better linkages between them and study population displacement flow;

≡ With an increasing in offer on public transportation which is responsible for serving population, there is a greater increase in moving people from starting point to destination also permitting gradual improvement of urban mobility system.

Increased "pedestrian" and use of bicycle

≡ Create a network that allows making the city more pedestrian and cycling.

Energy optimization and climate policy aspects of urban planning and municipal

≡ Municipality Master Plan (PDM) reviews considering energy sustainability as a core element in planning decision.

Water management

≡ Improve the current model of demand management and water consumption, to search for better energy efficiency.

Urban renewal and roads improvement

≡ Develop a plan to understand the needs of collective transportation of new urbanizations in order to improve urban access through rehabilitation and urban network improvement.

Waste management

≡ Designing or improving the model of waste management, achieving maximum efficiency in energy use;

≡ In Portugal is produced daily on average 1.4 kg of household waste per inhabitant, it is important to raise awareness and education for prevention of waste production.

Fleet management distribution

≡ Conceive a plan for improving transport network in distribution and urban support services and better manage their fleets;

≡ Realization and implementation of integrated plans for mobility in public transportation level should be adaptive for workers and customers of business establishments in county.

Integrated renewable generation

≡ Promote and encourage investment in small power generation projects and other energy-producing projects using renewable energy sources for consumption or for sale.

Small hydroelectric

≡ Promoting and implementing small hydroelectric projects for the production of electricity or other purposes such as storing water for domestic and industrial supply, irrigation or flood control.

If the projects match one or more of the above identified typologies, a second stage analysis will be performed.

2ndstage

The following criteria will be analysed:

- i. Payback (ROI)
- ii. Energy savings
- iii. CO₂ emissions reduction
- iv. Contribution to SEAP's / Mayor's Adapt objectives
- v. Innovation

Based upon this second stage assessment a score will be obtained and the projects will be implemented according to that score and funds availability:

- i. Payback (ROI) - 35%
- ii. Energy savings - 30%
- iii. CO₂ emissions reduction - 15%
- iv. Contribution to SEAP's / Mayor's Adapt objectives - 10%
- v. Innovation - 10%

c) Implementation and technical requirements

The implementation of the project must have a tender document validated by the municipality, specifying all technical aspects of the measure considered.

Also, the selected company must comply with the legislation 18/2008, 29th of January regarding public procurement requirements.

d) Monitoring of results

Through an accurate monitoring of the results achieved with the implementation of measures, a funds flow can be achieved through the savings.

Águeda has available tools that allow an effective assessment on savings, assuring the sustainability of the revolving fund.

e) Buildings certification

The buildings certification allows verifying if the buildings are complying with the current legislation. Through buildings certification a better assessment on the measures towards a better energy performance is made

The national certification system is named “Sistema de Certificação Energética dos Edifícios (SCE)” and follows the legislation 118/2013 20th of August.

The evaluations of performance are made according to the methodology defined under the “Regulamento de Desempenho Energético dos Edifícios de Comércio e Serviços (RECS)” that integrate the legislation above identified.

By implementing a certification process, the following elements are produced/gathered:

- Energy certificate;
- Analysis on measures for improvement;
- Photographic report;
- Technical catalogues of materials and equipments.

6. Local studies

The local studies identified below we selected for the fund.

SWMMING POOL - Savings and investment						
N°	Designation	Savings (natural gas)	Savings (electric power)	Total	Project Investment	Simple Payback
		euros	euros	euros	euros	years
1	Placing of thermal panels for DHW	1.361	-	1.361	13.550	10,0
2	Replacement of the boilers	16.299	-	16.299	34.650	2,1
3	Optimizing the operating schedule of the New Air Processing Unit (NAPU) spas	2.608	132	2.739	600	0,2
4	Optimizing the operating schedule of the powerful return pumps for clean, hot water and heat	995	30	1.024	1.485	1,4
5	Optimizing the operating schedule of the pool's water circulating pumps	-	1.816	1.816	660	0,4
6	Installation of Isothermal cover in the pools	4.740	-	4.740	15.840	3,3
7	Optimizing the operating schedule of the sauna and Jacuzzi facilities	-	902	902	660	0,7
8	Replacement of the Lighting Systems	-	480	480	2.690	5,6
Total		26.003	3.358	29.361	70.135	2,4

Public lighting - Savings and investment						
N°	Designation	Number of luminaires	Savings (anual)	Total	Project Investment	Simple Payback
			<i>euros</i>	<i>euros</i>	<i>euros</i>	<i>years</i>
1	Replacing public lighting to LED(*)	53	2425,86	2425,86	5854,80	2,4
	Total		2425,86	2425,86	5854,80	2,4

Average consumption 12h LED - 22,26 kWh

Average cost consumption 12h LED – 2,45 €

School Fernando Caldeira - Savings and investment

N°	Designation	Savings (water)	Savings (natural gas)	Savings (electricity)	Total	Project Investment	Simple Payback
			<i>euros</i>	<i>euros</i>	<i>euros</i>	<i>euros</i>	<i>years</i>
1	Optimization of operating hours of some lighting circuits	-	-	83	83	0	0
2	Installation time switches on electric storage water heaters	-	-	213	213	100	0,5
3	Optimize operating hours of the circulation pumps of sanitary hot waters	-	-	155	155	0	0
4	Checking of parameterization of condensers batteries	-	-	66	66	0	0
5	Set up the solar thermal system for domestic hot water (DHW)	-	2.188	-	2.188	0	0
6	Installing photovoltaic systems	-	-	2.355	2.355	18.100	7,7
7	Replacement of taps by timed taps with application rate of anti-theft saving of 3l/min	276	-	-	276	580,8	2,1
8	Replacing the existing mechanisms of cisterns of toilet bowls for dual flush mechanisms	99,6	-	-	99,6	53,8	0,5
Total		375,6	2.188	2872	5.459	19.416	2,7

Library - Savings and investment

N°	Designation	Savings (natural gas)	Savings (electricity)	Total	Project Investment	Simple Payback
		<i>euros</i>	<i>euros</i>	<i>euros</i>	<i>euros</i>	<i>years</i>
1	Optimize operation of air conditioning equipment	-	1.002	1.002	0	0
2	Replacement of lighting systems	-	94	94	587	6,3
3	Changing the set-point of the air conditioning unit	-	90	90	0	0
4	Adjustment of the boiler firing conditions	71	-	71	209	3,0
5	Installation of lighting control system by photoelectric cell	-	223	223	2.200	9,8
Total		71	1.409	1.480	2.996	2,0

Municipal Stadium - Savings and investment

Nº	Designation	Savings (water)	Savings (natural gas)	Savings (electricity)	Total	Project Investment	Simple Payback
			<i>euros</i>	<i>euros</i>	<i>euros</i>	<i>euros</i>	<i>years</i>
1	Optimizing the working hours of HVAC equipment	-	-	200	200	660	3,3
2	Replacement of lighting systems	-	-	453	453	5.367	11,9
3	Optimization of thermal plant operation system	-	1.064	499	1.564	3.410	2,2
4	Application of caudal economizer of 3l/min	661,3	-	-	661,3	566	0,9
5	Application of caudal economizer of 6l/min in sink	57	-	-	57	43,6	0,8
Total		718,3	1.064	1.152	2.934	10.047	3,8

Municipal Youth Forum - Savings and investment

N°	Designation	Savings (natural gas)	Savings (electricity)	Total	Project Investment	Simple Payback
		<i>euros</i>	<i>euros</i>	<i>euros</i>	<i>euros</i>	<i>years</i>
1	Replacement of incandescent lighting in the area of circulation	-	32	32	115	3,6
2	Optimization of consumption and the level of lighting in Mediateca room	-	135	135	2.244	16,7
3	Replacement of lighting systems	-	215	215	1.594	7,4
Total		-	382	382	3.953	10,4

ANNEX 1

Energy Vectors

Figure 1 shown below illustrates the energy consumption by energy vector for the years 2013, 2020 and 2030. Consumptions are distributed by the following vectors: electricity/power, natural gas, butane, propane, gasoline and auto-gas, diesel, coloured diesel (agricultural diesel and heating oil) and other industrial fuels (fuel oil, petroleum and petroleum coke). This way, you can see the evolution of the proportion of consumption in each energy vector in total consumption of energy consumed.

In 2013 there was a relatively diverse use and distribution of energy vectors used in the municipality. Diesel consumption was 32%, natural gas 21% and electricity was 26%.

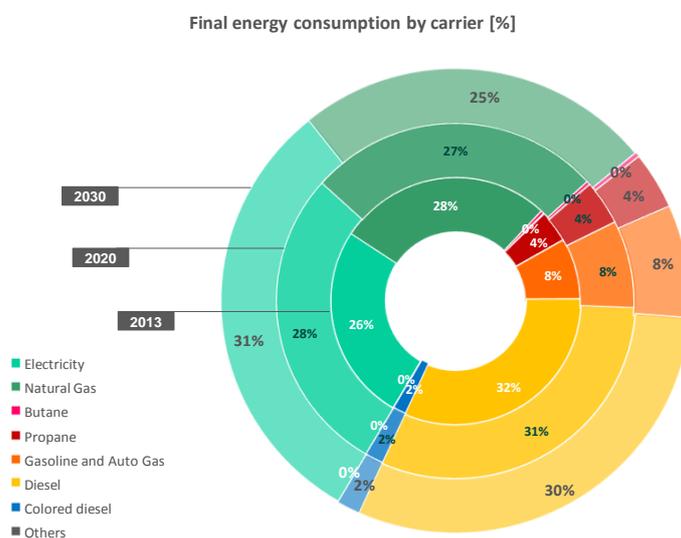


Figure 1 - Final consumption by carrier for the years 2013, 2020 and 2030 [%]

Consumption by activity sector

The figure 2 shown below illustrates the electric power consumption by activity sector for the years 2013, 2020 and 2030. The power consumption presented the main sector of power consumers: domestic, industrial, agriculture, services, water services, tourism and public lighting. It is therefore possible to observe the evolution of the proportion of energy each sector in total consumes of electricity in each county over the projection period.

The graph represented in figure 2, on the power consumption by sector in 2013, provides evidence of the high electrical needs of the industry sector and domestic 53% and 22% respectively of the total electrical energy used in county. The services sector also presents a very significant consumption (14%).

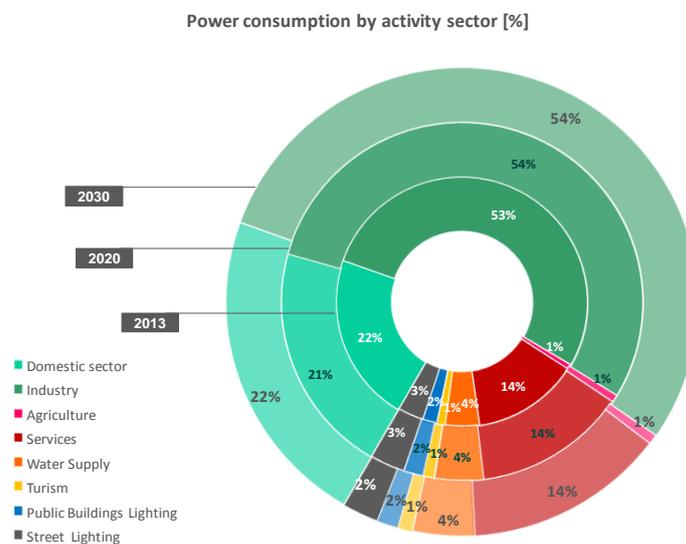


Figure 2 - Electric power consumption by sector for the years 2013, 2020 and 2030 [%]

The figure 3 illustrates the petroleum fuel consumption by activity sector for the years 2013, 2020 and 2030. The intakes represented are the main sector consumers of such fuels, in particular domestic sectors, industrial, agriculture, services and transport. It is therefore possible to observe the evolution of proportion of demand for petroleum fuels in each sector in total consumption of the county over the projection period.

Looking at the graph, year 2013 (figure 3), it is possible to see the predominance of demand in the transport sector, which represents 53% of total consumption, followed by the domestic sector, which accounts 41% of consumption.

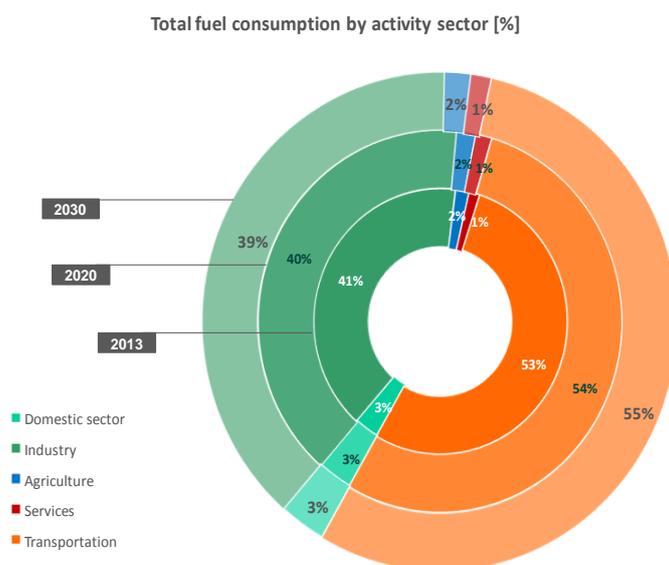


Figure 3 - Total fuel consumption by activity sector for the years 2013, 2020 and 2030 [%]

The figure 4 shows total energy consumption by activity sector for the years 2013, 2020 and 2030. The total energy consumption is presented regarding the main energy consuming sectors, including domestic sectors, industrial, agriculture, services and transport. It is possible to observe the evolution of the proportion of energy each sector in total energy consumption of the county, over the analyzed period.

Looking at the graph shown in figure 4, there is a predominance of energy demand in the industry sector in 2013, representing 44% of energy demand, followed by transports and domestic sectors, with 40% and 8% of consumption, respectively. As regards the energy consumption of the tertiary sector, it corresponds to 7%.

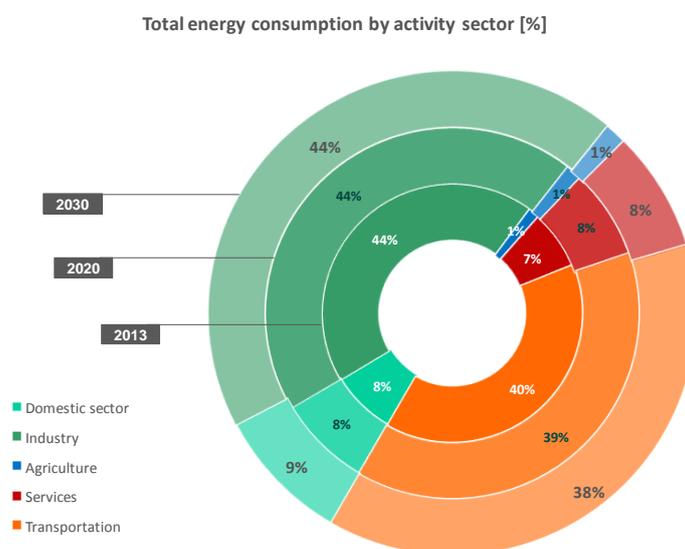


Figure 4 - Total energy consumption by activity sector for the years 2013, 2020 and 2030 [%]

Indexes and Indicators of Energy Intensity and Density

In this chapter some of the main energy indexes and indicators calculated for the Municipality of Águeda are presented. The following graphs intend to illustrate the evolution of the energy utilization in the municipality for period 2000 to 2030.

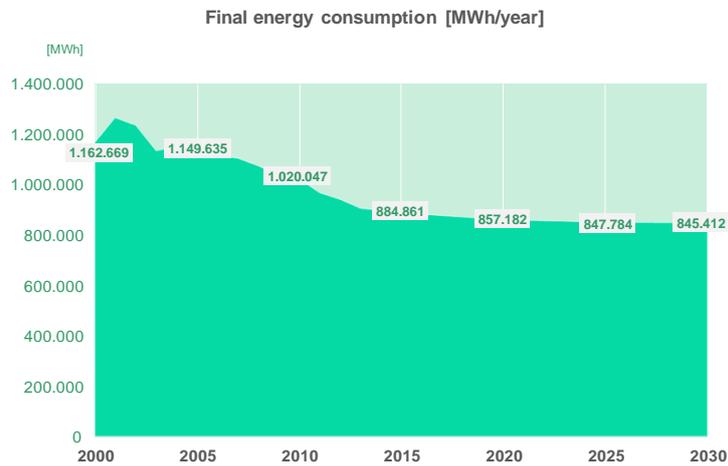


Figure 5 - Final energy consumption [MWh/Year]

figure 5 shows the variation of final energy consumption during the considered period. The consumption represented the sum of all energy consumption in the county, regardless energy source and consumer sector. Thus, for the calculation of final energy consumption proceeded to the sum of the local consumption of electricity and oil fuels, for each year.

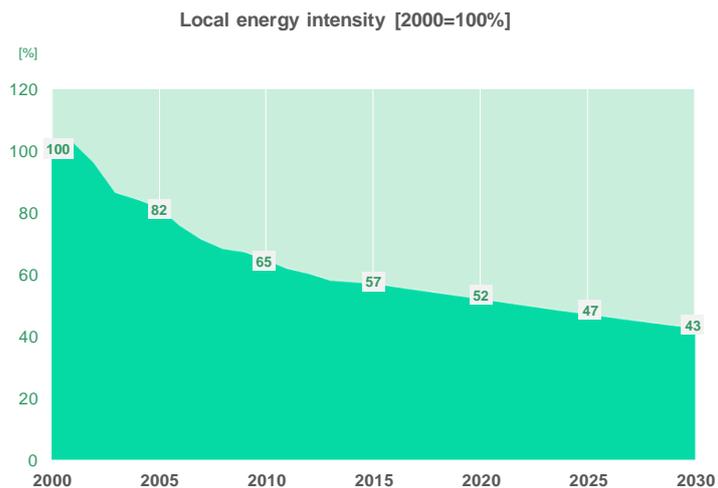


Figure 6 - Local energy intensity [2000=100%]

The graph shown above represents the evolution of energy intensity in Águeda.

The energy indicator is defined by the ratio between energy consumption and local GDP (Gross Domestic Product). The energy intensity was determined by considering the final energy and not the primary energy.

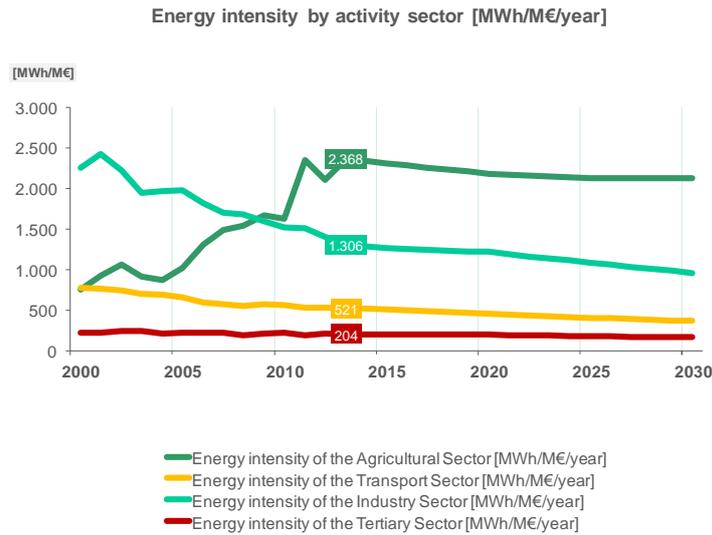


Figure 7 - Energy intensity by activity sector [MWh/M€/year]

In the figure above is illustrated the variation in energy intensity by sector over the period 2000 to 2030. Energy intensity in the industrial, services and agriculture sectors corresponds to the ratio of the sector energy consumption by the respective sector GVA. The energy intensity of transport sector is determined by the ratio between the energy consumption of the sector and the local GDP.

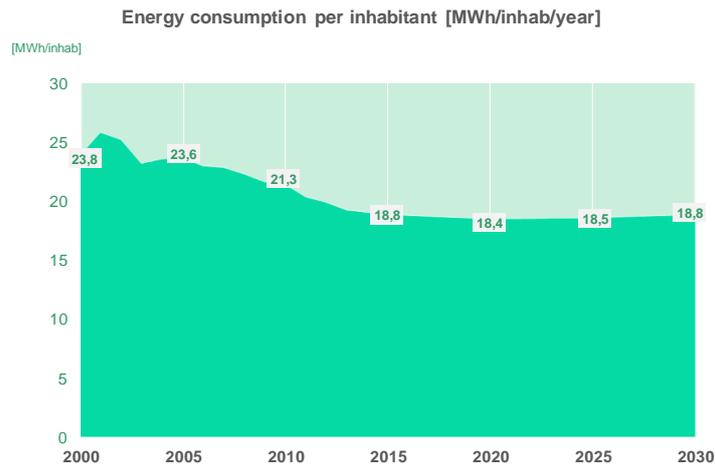


Figure 8 - Energy consumption per inhabitant [MWh/inhab/year]

The graph shown above (figure 8) illustrates the final energy consumption per inhabitant. This energy indicator was determined by dividing the final energy consumption by the population of county.

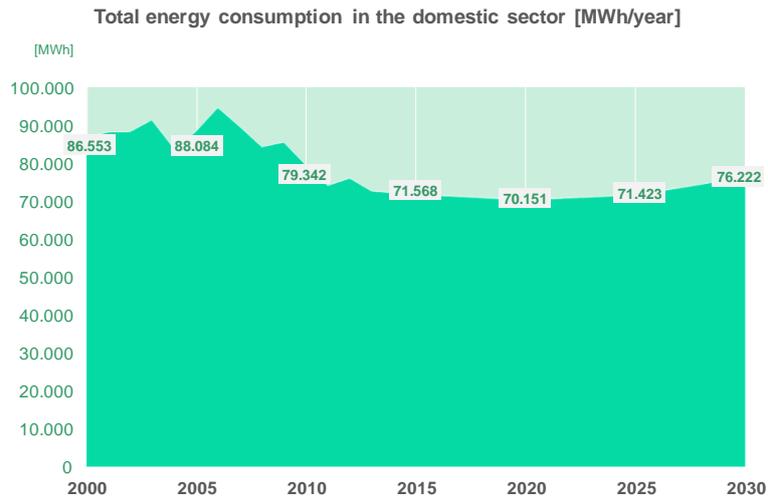


Figure 9 - Total energy consumption in the domestic sector [MWh/year]

Figure 9 shows the total final energy consumption in domestic sector, which results from the sum of domestic consumption of electricity, natural gas and fuels of petroleum origin, for each year of the period under analysis.

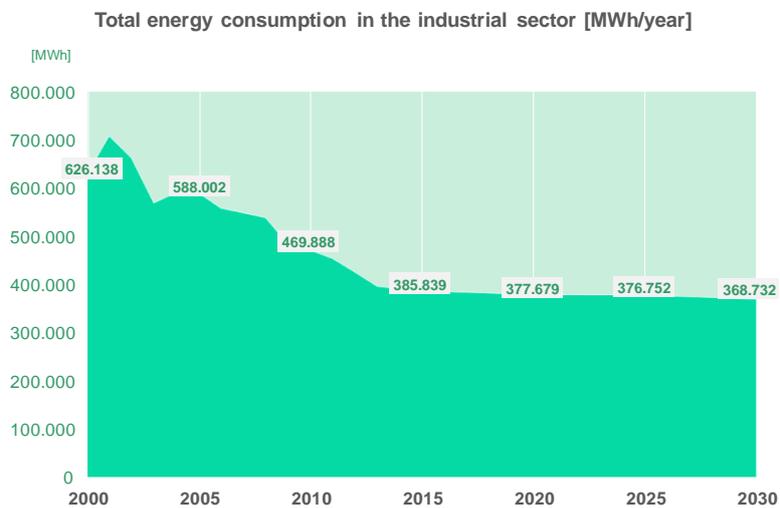


Figure 10 - Total energy consumption in the industrial sector [MWh/year]

The graph represent total energy consumption in the industry sector, having been obtained by summing the consumption of electricity, natural gas and fuel oil source in industry sector.

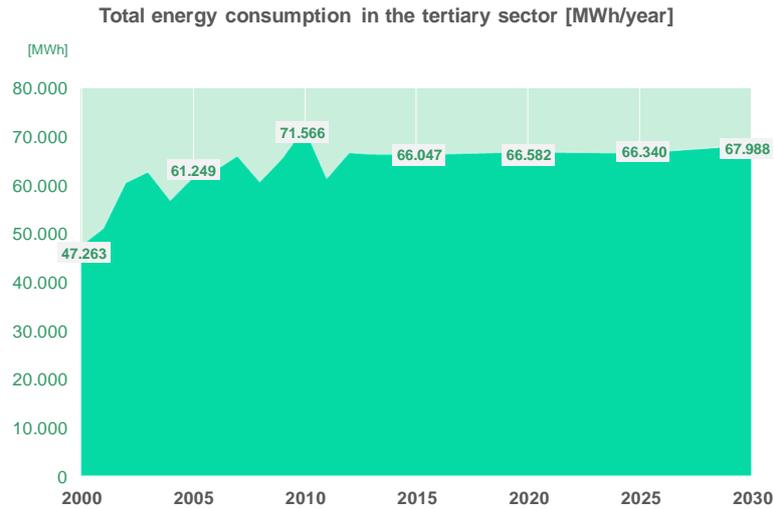


Figure 11 - Total Energy Consumption in the Tertiary Sector [MWh/year]

The figure above shows the energy demand for services sector, this consumption refers to the sum of consumption of electricity, gas and fuels of petroleum origin, for each year.

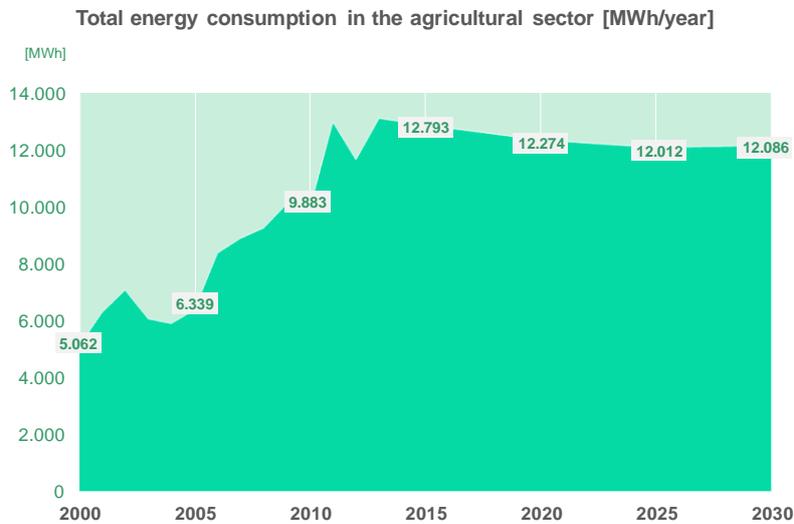


Figure 12 - Total Energy Consumption in the Agriculture Sector [MWh/ year]

On figure above, the evolution of total energy consumption in agriculture sector for the period from 2000 to 2030 is illustrated. The curve was obtained by determining the sum of annual consumption of electricity, gas and fuels from oil for the sector.

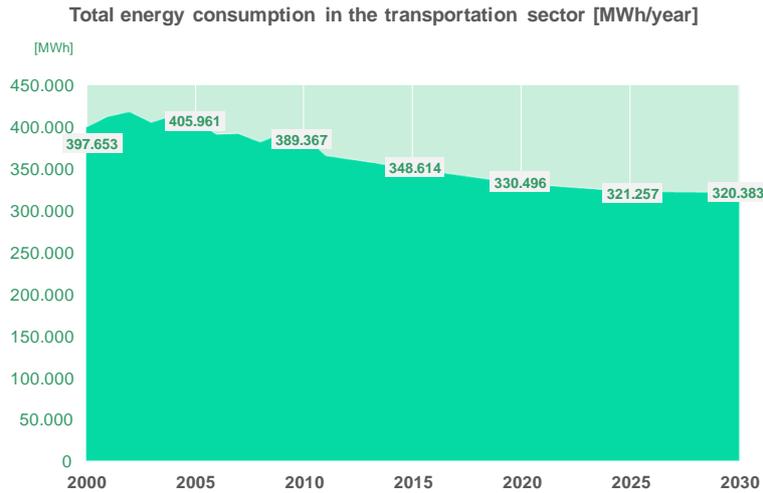


Figure 13 - Total Final Energy Consumption in Transportation [MWh/year]

figure 13 illustrates the total energy consumption of transport sector, representing the sum of the annual consumption of electricity and fossil fuels.

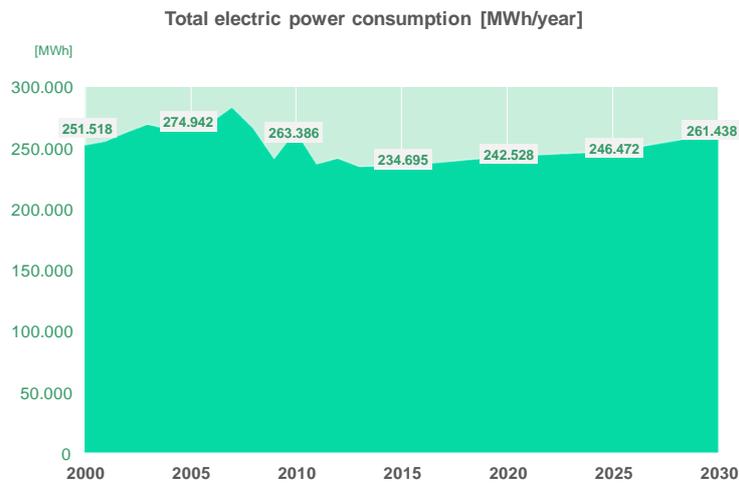


Figure 14 - Total Electric Power Consumption [MWh/year]

Figure above shows the total power consumption in Águeda, defined as the sum of power consumption in all sectors.

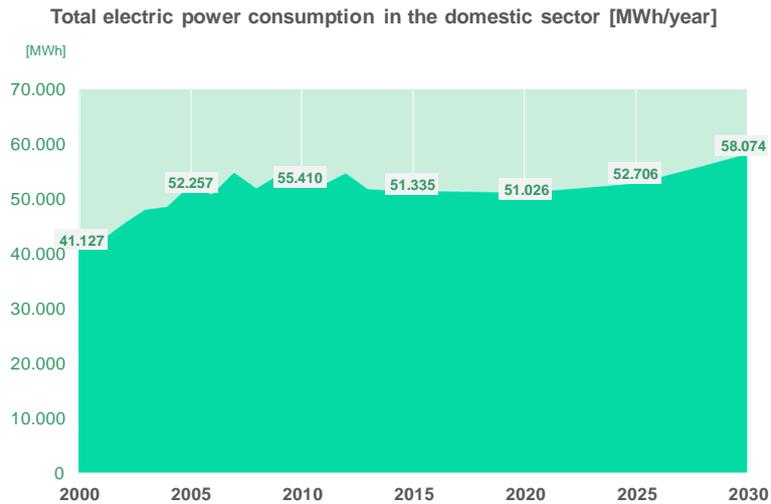


Figure 15 - Total Electric Power Consumption in the Domestic Sector [MWh/year]

figure 15 shows the expected evolution of power consumption in domestic sector for the period 2000 to 2030.

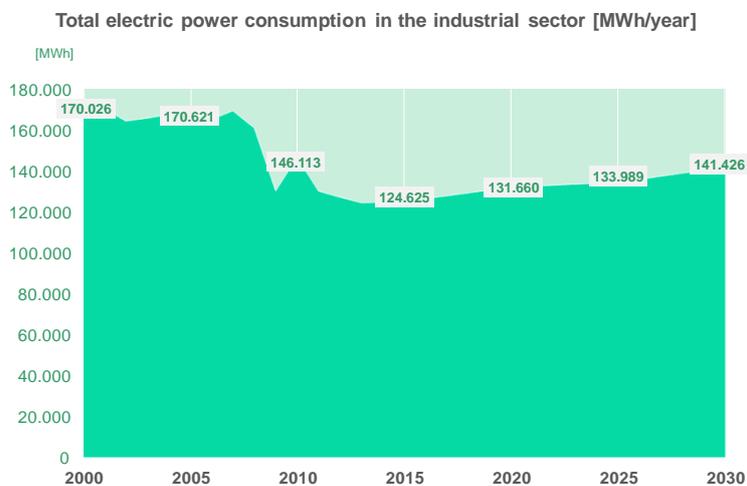


Figure 16 - Total Electric Power Consumption in the Industrial Sector [MWh/year]

In this figure is presented the expected evolution of electric power consumption in domestic sector for the period 2000 to 2030.

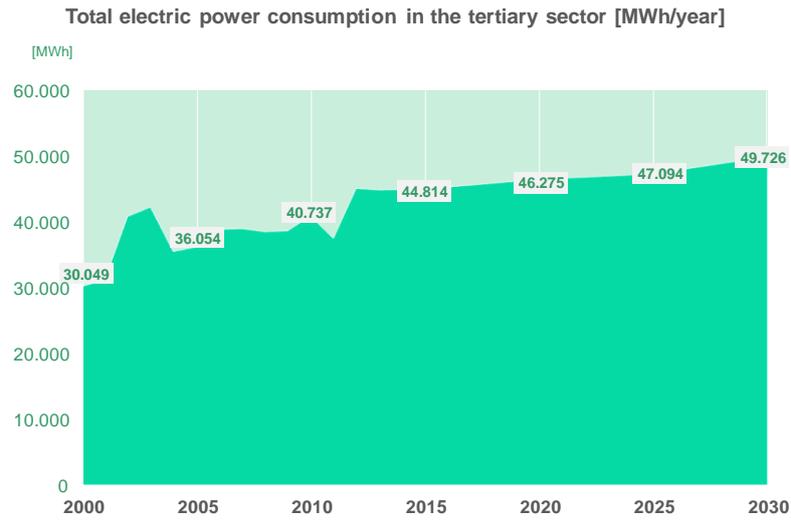


Figure 17 - Total Electric Power Consumption in the Agricultural Sector [MWh/year]

Figure shown above illustrates the evolution of power consumption in agricultural sector for the period 2000 to 2030.

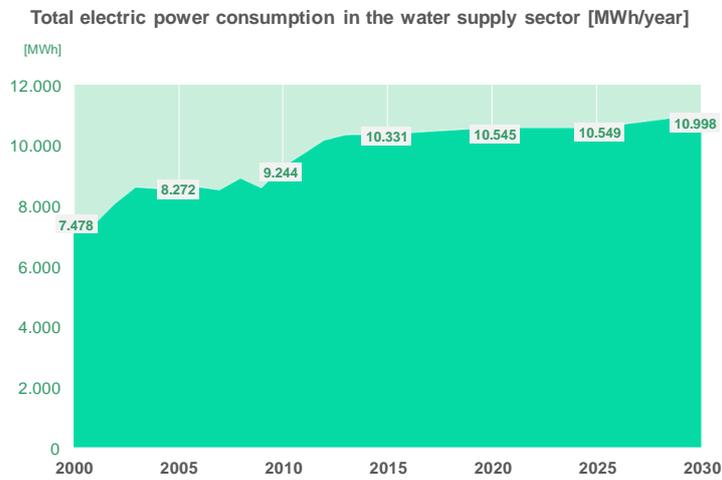


Figure 18 - Total Electric Power Consumption in the Water Supply Sector [MWh/ year]

The graph above illustrates the total power consumption in water supply services.

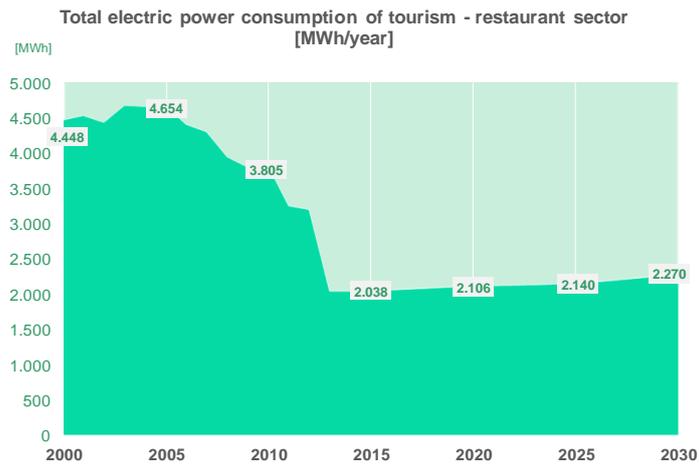


Figure 19 - Total Power Consumption of Tourism - Restaurant Sector [MWh/ year]

The figure above shows the expected evolution for power consumption in tourism sector, particularly in restaurants.

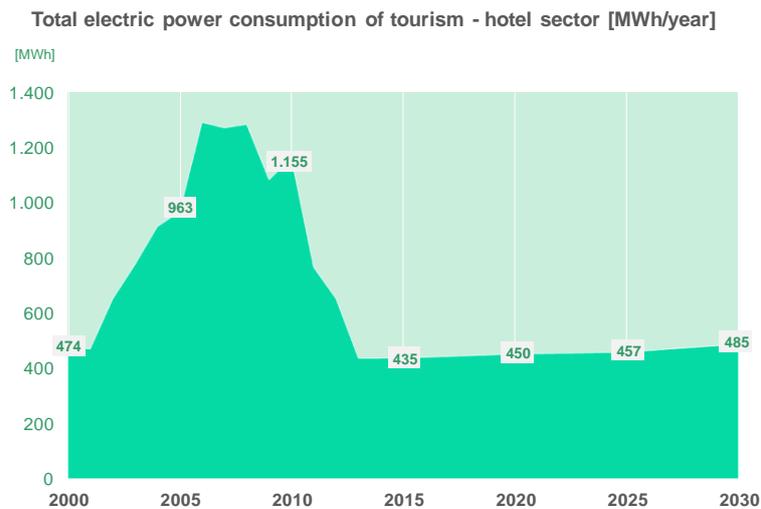


Figure 20 - Total Power Consumption of Tourism - Hotel Sector [MWh/ year]

The figure above shows the expected power consumption in the tourism sector, particularly in hotels.

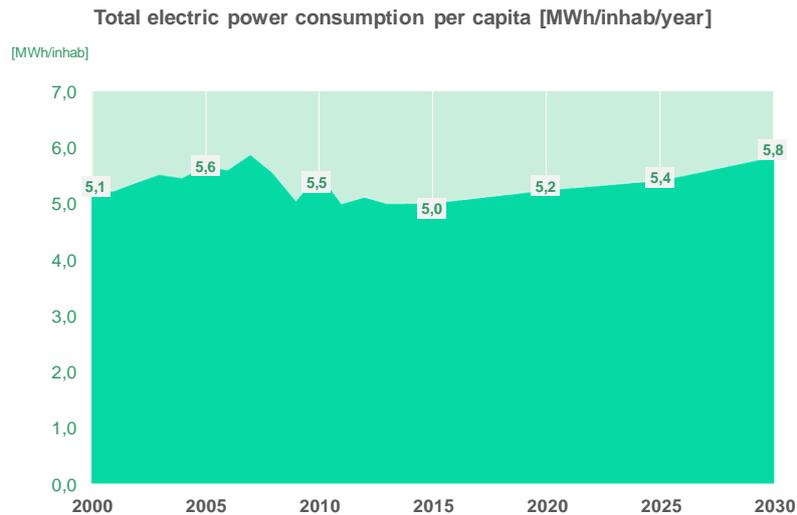


Figure 21 - Total Electric Power Consumption per capita [MWh/inhab/year]

The graph shown in figure 21 illustrates the evolution of total power consumption per inhabitant. This indicator is defined by the energy ratio between the total consumption of electricity in county and the number of local residents.

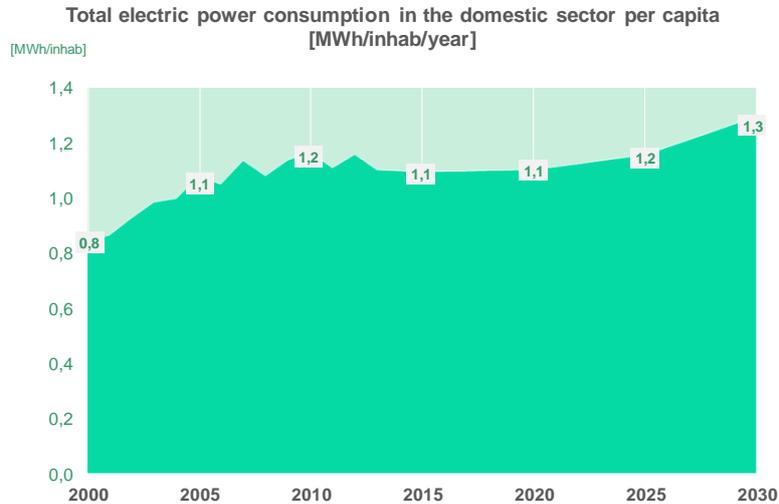


Figure 22 - Total Electric Power Consumption in the Domestic Sector per Capita [MWh/inhab/year]

figure 22 shows the evolution of total power consumption in domestic sector per inhabitant. This indicator results from energy ratio between the total power consumption in county domestic sector and the number of local residents.

On graph, it appears that domestic power consumption per inhabitant increases progressively from 2000 to 2030.

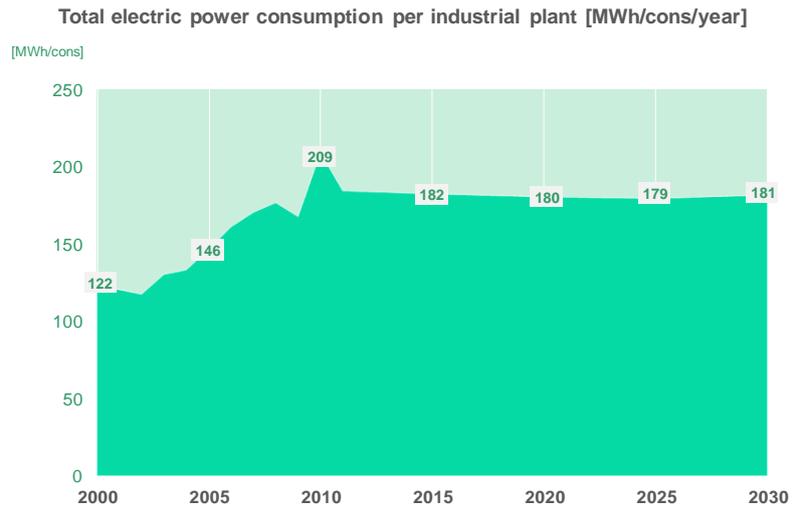


Figure 23 - Total Electric Power Consumption per Industrial Plant [MWh/cons/year]

The figure above shows the evolution of power consumption per industrial plant, for the period 2000 to 2030.

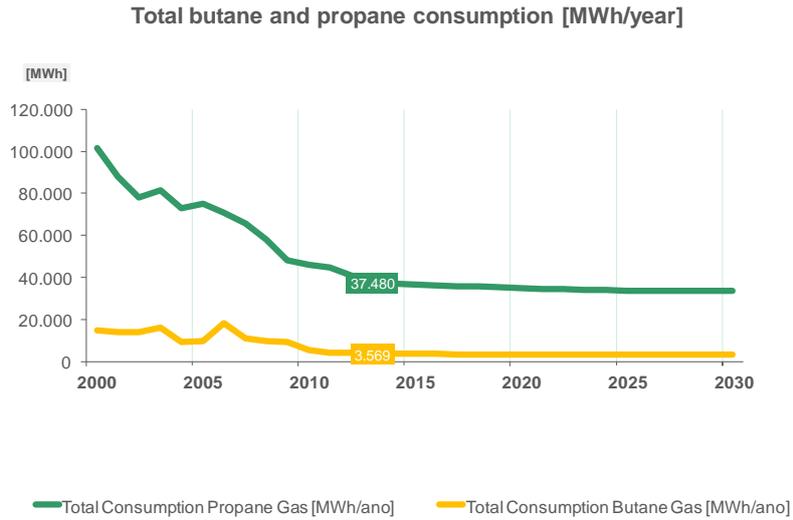


Figure 24 - Total Butane and Propane Consumption [MWh/year]

In figure 24 demanding evolution for butane and propane gas throughout the period considered can be compared.

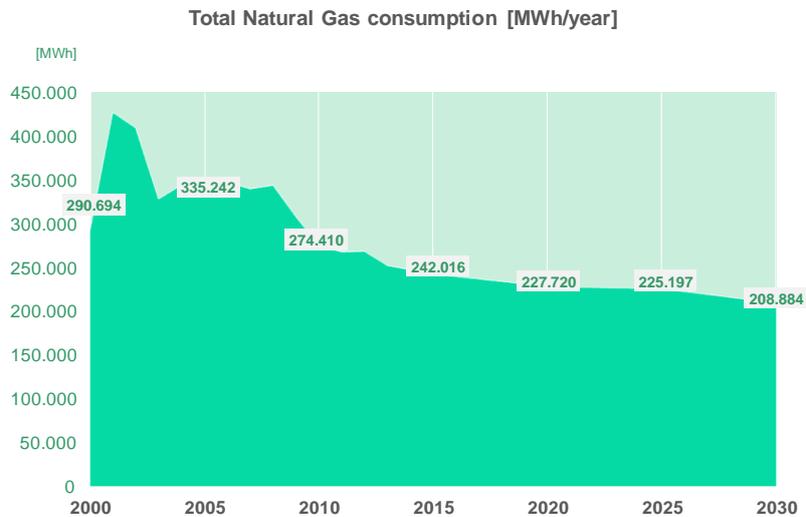


Figure 25 - Total Natural Gas Consumption [MWh/year]

In Figure 25 demanding evolution for natural gas throughout the period considered can be compared.

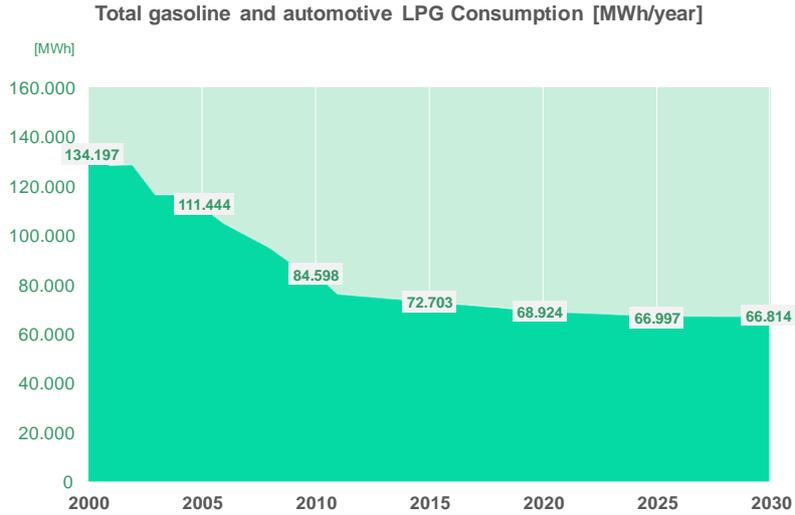


Figure 26 - Total Gasoline and Automotive LPG Consumption [MWh/year]

The curve shown in figure 26 refers to the total gasoline and automotive LPG consumption in Águeda and it refers to the sum of total consumption of gasoline and the total consumption of automotive LPG. The total gasoline consumption includes unleaded 95, unleaded premium and 98 gasoline consumption.

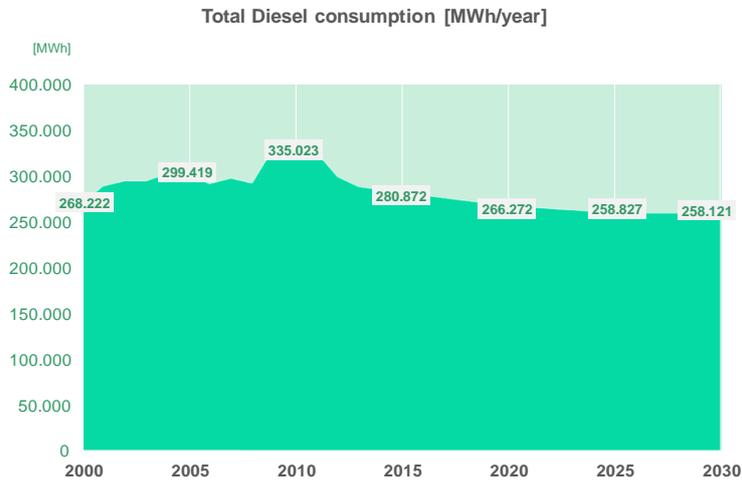


Figure 27 - Total Diesel Consumption [MWh/year]

Figure 27 graph illustrates the evolution of diesel consumption occurred in the surrounding area of Águeda's municipality.

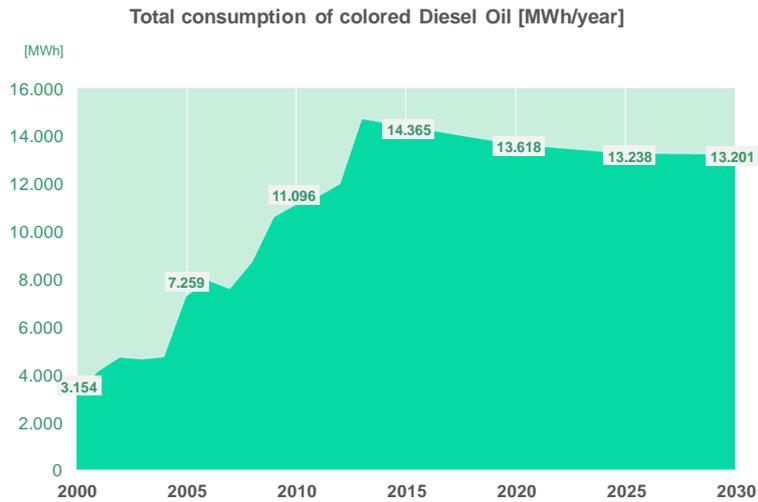


Figure 28 - Total Consumption of Colored Diesel Oil [MWh/ year]

figure 28 illustrates the expected colored diesels oils consumption for the period 2000 to 2030.

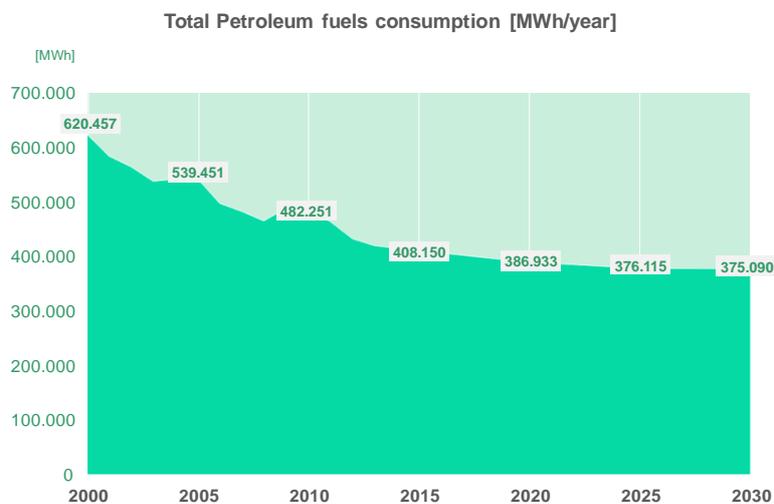


Figure 29 - Total Petroleum fuels consumption [MWh/year]

The figure above corresponds to a graphical representation of total petroleum fuels consumption in municipality of Águeda, which results from the sum of energy vectors consumption: butane, propane gas, auto gas, petrol, diesel, other petroleum diesel and other fuels (fuel oil and oil).

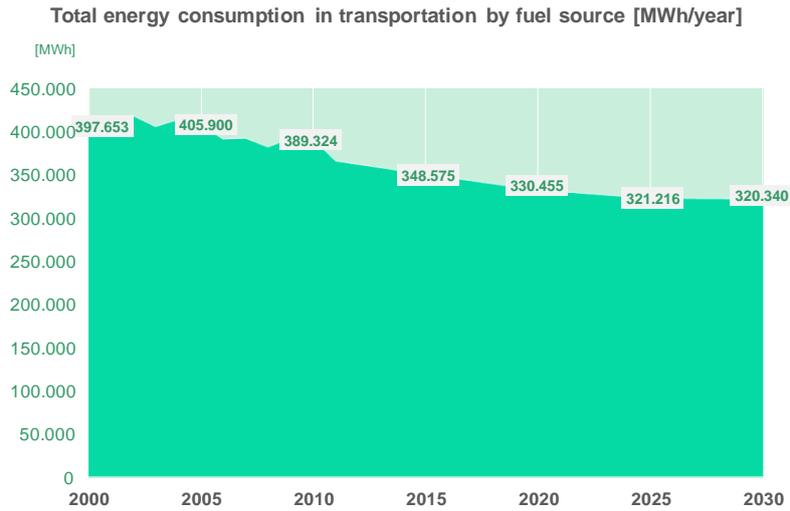


Figure 30 - Total energy consumption in transportation by fuel source [MWh/year]

In figure above there is a graphical representation of total energy consumption of transportation by fuel source.

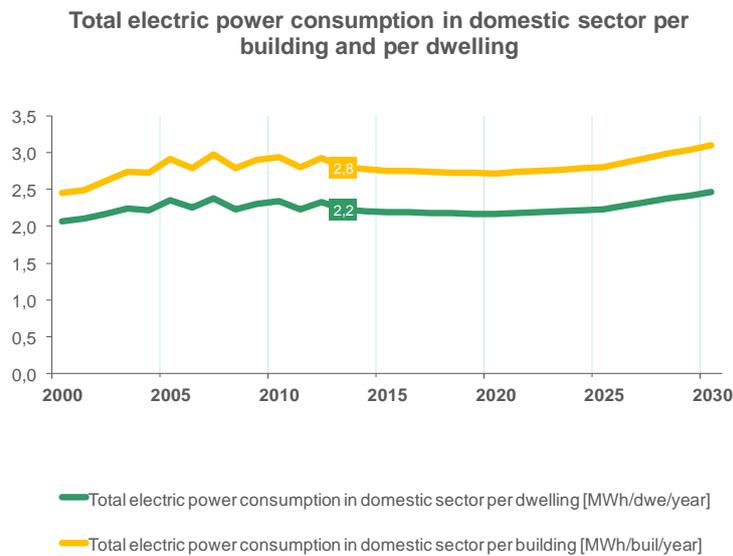


Figure 31 - Total energy consumption in domestic sector per building and per dwelling

figure 31 shows the variation of the total consumption in domestic sector per building and per dwelling.

Energy indicators presented are defined by the ratio between the total energy consumed by domestic sector and the number of buildings and dwelling, respectively.

Total energy consumption in domestic sector per building and per dwelling

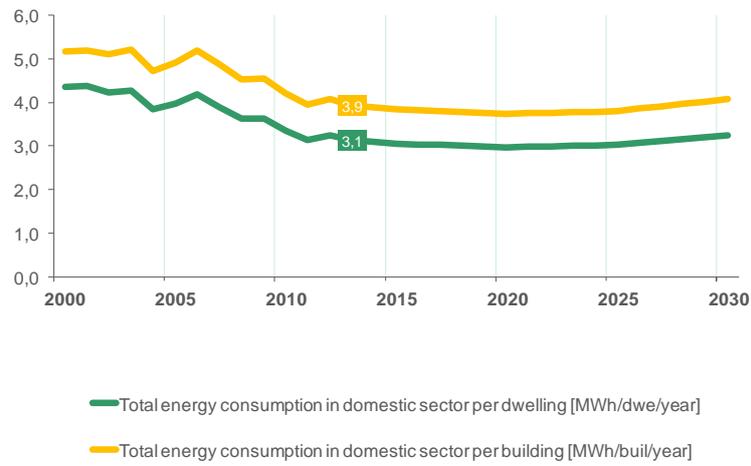


Figure 32 - Total energy consumption in domestic sector per building and per dwelling

Analyzing the above figure you can compare the evolution of total energy consumption in domestic sector per building and per dwelling.

Total electric power consumption in street lighting [MWh/year]

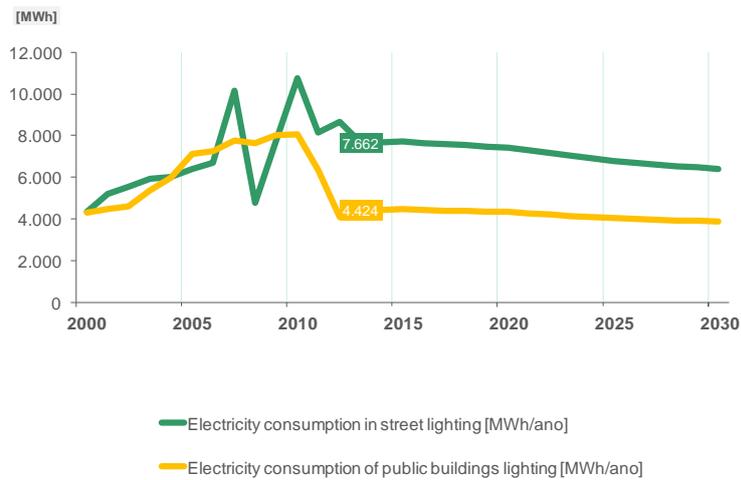


Figure 33 - Total electric power consumption in street lighting [MWh/year]

The chart illustrates the evolution of electric energy in street lighting, distinguishing between two curves, one relating to electricity consumption of public buildings lighting and the other the consumption of electricity in street lighting. This distinction is justified by the fact that there are significant differences between public buildings lighting and public roads, such as the conversion technology, rigidity of use, costs, correlation with spatial planning and interconnection with other priorities - security in case of public roads, attractiveness, in case of public buildings.

By analyzing the graphs, it is possible to conclude that electricity consumption for public buildings lighting is lower than public roadway.

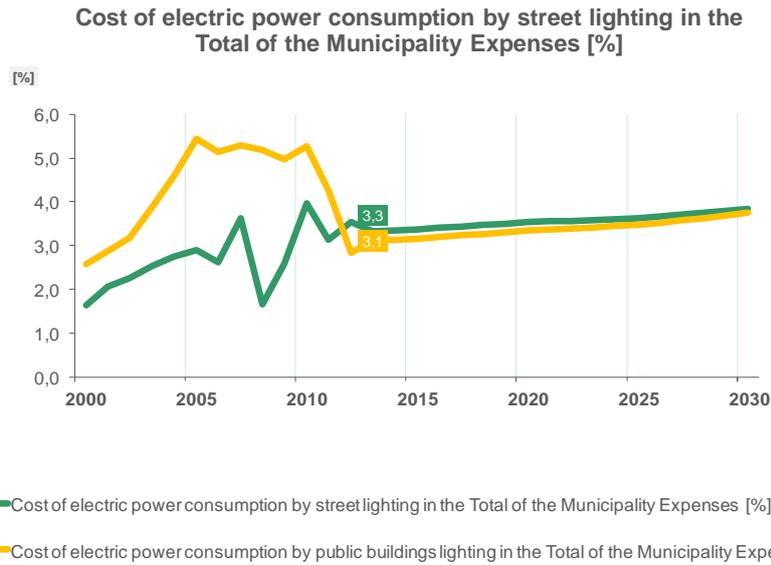


Figure 34 - Cost of Electric Power Consumption by Street Lighting in the Total of the Municipal Expenses [%]

In the figure 34 is shown the total cost of electric power consumption by street in the total of the municipality expenses.

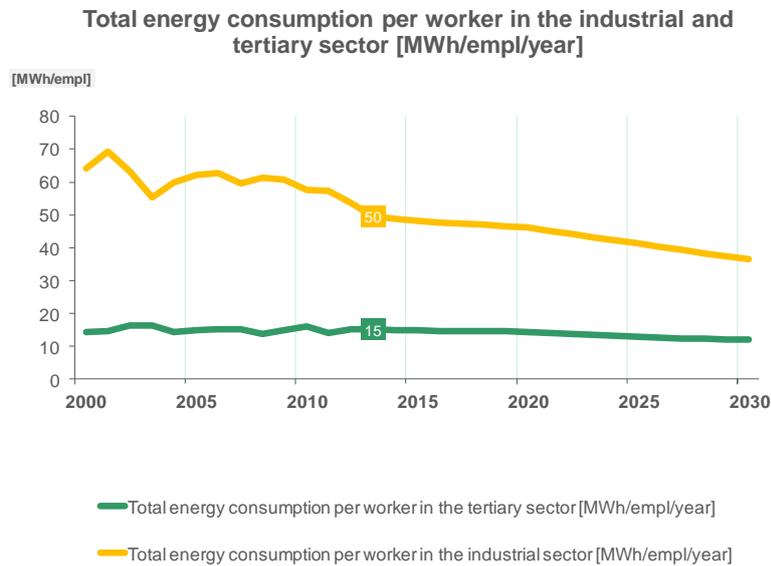


Figure 35 - Total energy consumption per worker in the industrial and tertiary sector [MWh/empl/year]

Figure above shows the evolution of total energy consumption per worker in the industrial and tertiary sector. Both energy indicators are obtained by the ratio between the total energy consumption of respective sector and the number of workers employed person in each activity sector.

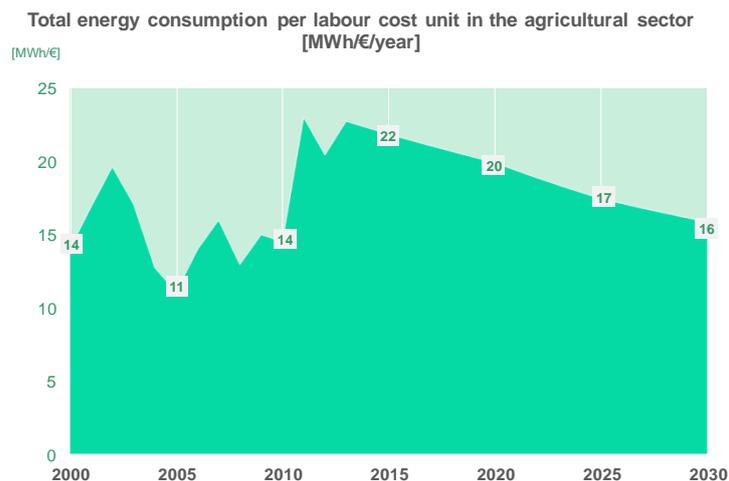


Figure 36 - Total energy consumption per labour cost unit in the agricultural sector [MWh/€/year]

This figure shows the evolution of energy consumption per labour cost unit in the agricultural sector.

The graph shows fluctuations of consumption in 2000 to 2011 period. Over the considered period a slight downward trend is expected.

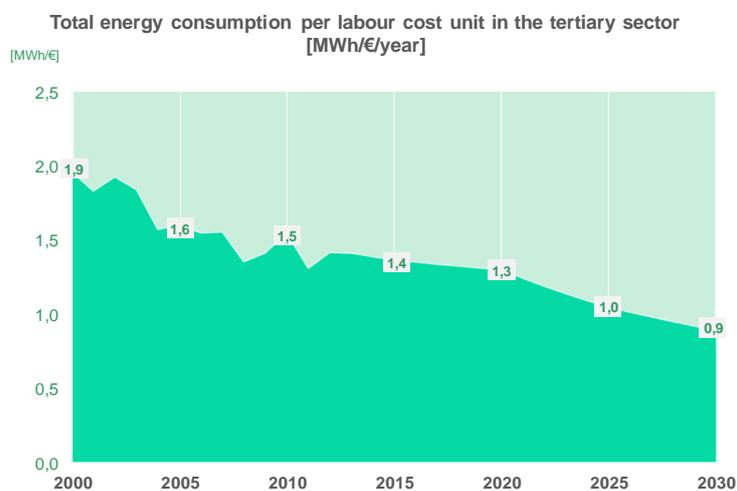


Figure 37 - Total energy consumption per labour cost unit in the tertiary sector [MWh/€/year]

In figure 37 the total energy consumption per labour cost unit in tertiary sector is represented.

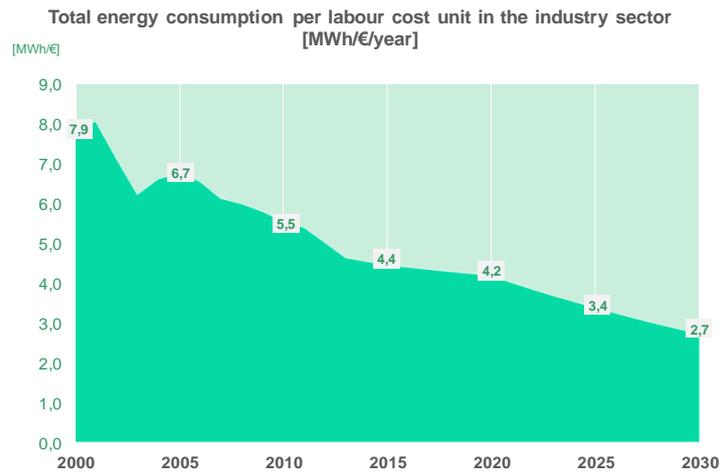


Figure 38 - Total energy consumption per labour cost unit in the industry sector [MWh/€/year]

This figure shows the total energy consumption per labour cost unit in industry sector.

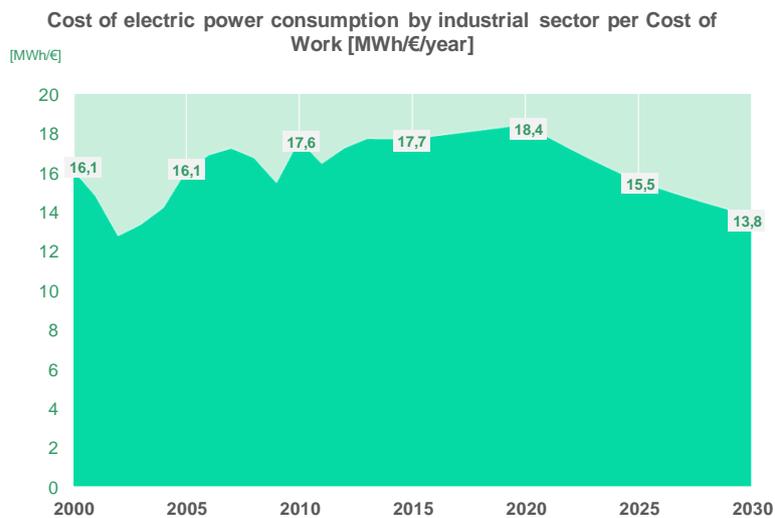


Figure 39 - Cost of electric power consumption by industrial sector per Cost of Work [MWh/€/year]

In figure above the energy consumption per labour cost unit in industry sector is represented.

Emissions baseline

CO₂ baseline is the main result of emissions reference inventory, to quantify CO₂ emissions from energy consumption occurred in geographical area of Águeda County and identify the main sources of these emissions.

Methodological Note

Determination of CO₂ emissions methodology is based on recommendations from the Joint Research Centre for the implementation of Sustainable Energy Action Plans. Presented scenarios are determined by applying emission factors to the scenarios resulting from energy baseline implementation, having been chosen by using standard emission factors, in line with IPCC principles.

In baseline implementation emission scenarios for the evolution of energy demand and emissions to a respective 2030 time horizon are proposed.

Sectorial Emissions

The figure 40 is related with CO₂ emissions by activity sector for 2013, 2020 and 2030. Presented emission values are related to sectors: domestic, industrial, agricultural, services and transport. Thereby, it is possible to observe CO₂ values for each sector having regarded the total energy consumption over projection period.

According to the graph represented in figure 40, there is emission demand predominance in transport by 2013, representing 40% of emissions demand, followed by industrial and services sectors, with 39% and 11% of emissions, respectively.

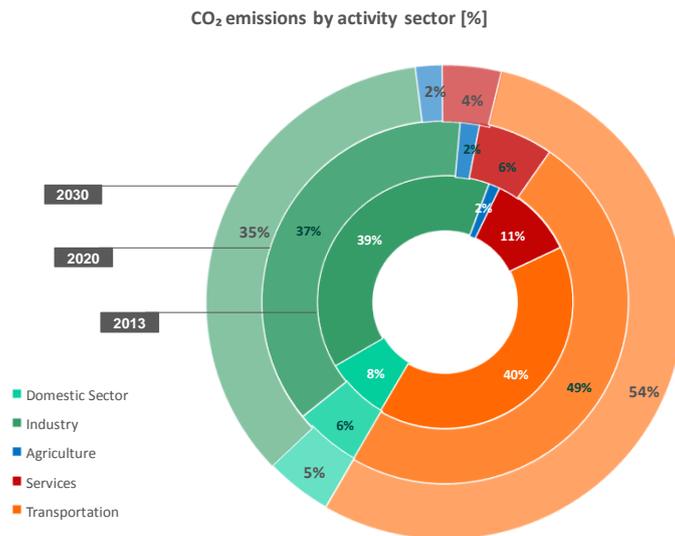


Figure 40 - CO₂ emissions by activity sector [%]

Emissions by Energy

Thus, according the figure 41, there is emission demand predominance in diesel consumption, by 2013, representing 34% of emissions demand, followed by electricity consumption and natural gas, with 29% and 23% of emissions, respectively.

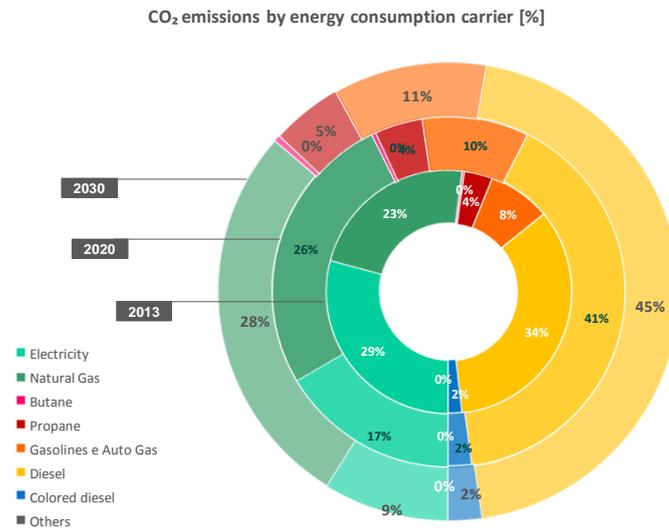


Figure 41 - CO₂ emissions by energy consumption carrier [%]

