



Energy Balance of Oeiras OEINERGE, Portugal

The energy balance of Oeiras was concluded in 2006. All forms of energy sold in the County were considered and, in parallel, all the energy consumed in Oeiras. Considering the revision of the Municipality Master Plan there was a great investment in this inventory, considered as a study that will support options/decisions. This study was divided in four main parts: The classic inventory, energy consumption in transportation, calculation of the energy saving potential in buildings (domestic and tertiary sectors) and a web portal about electricity consumption in the council. There was a great concern about the validation of the methodology in all phases.

End-user area

- New buildings
- Refurbishment of buildings
- Transport and mobility
- Financial instruments
- Industry
- Legal initiatives (regulations, directives, etc)
- Planning issues
- Sustainable communities
- User behaviour
- Education
- Other

Target Audience

- Citizens
- Households
- Property owners
- Schools and universities
- Decision makers
- Local and regional authorities
- Transport companies
- Utilities
- ESCOs
- Architects and engineers
- Financial institutions
- Other

Technical

- Energy efficiency
- Heating
- Cooling
- Appliances
- Lighting
- CHP
- District Heating
- Solar energy
- Biomass
- Wind
- Geothermal
- Hydro power
- Other

Context

By 2004, Oeiras' Master Plan was in need of reviewing, and this kind of planning instruments must be designed for the following 10 years. The first version of Oeiras' Master Plan was prepared without previous solid experience and with a great lack of information. At the present moment, Oeiras' Municipality wants to assemble all relevant information in order to avoid committing the same mistakes.

The Energy Balance of Oeiras, as well as Greenhouse Gas Emission Inventory, Water Balance, Air Quality Map and Noise Map will fulfil the former lack of information, and help decision makers to substantiate their options.

Objectives

This project was developed to characterize the energetic footprint of Oeiras' County, aware decision makers, optimize policies' orientation, identify the energy saving potential and inform citizens. It was considered all forms of energy sold in the County and, in parallel, all the energy consumed in Oeiras. As thoroughly as possible, the energy consumption was divided by sectors: domestic, tertiary, industry and transportation. To assess the evolution, a time line of 10 years was considered (from 1994 until 2003). Oeiras' County is acknowledged as being a leader in environmental best practices at national level. Energy could not be neglected considering oil's prices fluctuations and Kyoto's Protocol.



Process

This study was divided in four main parts: The classic inventory, energy consumption in transportation, calculation of the energy saving potential in buildings (domestic and tertiary sectors) and a web portal about electricity consumption in the county. At the beginning only the classic inventory was planned to be done. Energy providers and authorities were contacted in order to obtain all data required that was analyzed by OEINERGE's staff.

Transport sector was a critical one given that the fuel selling in the County doesn't represent the energy consumed by this sector. With the purpose of guarantying a solid and reliable study about Transport energy consumption within county's border, OEINERGE endorsed this to an acknowledged team from Instituto Superior Técnico expert team in energy, transports and environment. With data from Vehicles Executive Agency and using EMEP/CORINAIR methodology, this team calculated the energy consumption within county's boundaries of travels with origin/destination on Oeiras and crossover travels by road and rail transport; passenger and merchandise transport; light and heavy vehicles.

The other innovation was to calculate energy saving potential in buildings using Oeiras' Geographic Information System per kind of building and for each parish. Data collected to classic inventory was desegregated by type of energy users. This allowed calculating energy consumption for building categories for square meter, after determining the whole area per type of building. Comparing with reference consumption for each building category, it was determined the saving potential.

OEINERGE believes that this was the first time that this methodology was used, thus ensuing in unique results. As a final step, a Web portal that is easily updated (where users can consult tailor-made results) was developed, allowing the consulting of electricity consumption within Oeiras: per sector, per year, using a time line, different charts, with different units.

Financial resources and partners

The overall cost of the project was €20 000, fully supported by the Municipality. OEINERGE was responsible for the structuring of the project, its coordination, information compilation, data treatment and report production. Only transport energy consumption study was developed by Instituto Superior Técnico.

Results

The demand of energy in Oeiras increased about 4.7% per year. Considering Final Energy and the sells of energy in the county, 2003, Diesel has the major share (30%) followed by electricity (29%) and Petrol (25%). Regarding Primary Energy, electricity is the most important energy form (50%) followed by Diesel (21%) and Petrol (18%).

Between 1994 and 2003 the electricity demand increased about 76% (7% per year). Looking upon the various sectors considered over the time line, the tendency reflects the policy of the municipality: in 1994 both domestic and tertiary sectors were responsible for the electricity consumption of 37%, while in 2003 the tertiary sector was responsible, by itself, for 52%. Nevertheless, in the domestic sector electricity demand increased, in these 10 years, with about 50%. This boost isn't justified only by the augment of population; this also reflects different patterns on electricity consumption in domestic sector (air conditioner usage generalization, and other equipments).

In the transports study, considering only Oeiras' origin/destination travels, the main consumption is from road transport: 92% in opposition to 8% rail transportation. In these, light passenger vehicles are responsible for 66% of that amount of energy spending, followed by cargo vehicles with 23%.

Comparing only passenger/cargo transportation energy consumption, passenger transport is responsible for 75%. Regarding this portion, 83% is individual transport in opposition to 17% from collective transport. This reflects the insufficient offer in public transport and the dependence on individual transport.



Contrasting travels with origin/destination in Oeiras and crossover travels, in a medium scenario, crossover travels are responsible for 56% of energy transport consumption in Oeiras.

This occurs mainly because of geographic reasons: Oeiras is a Council just next to the Capital, Lisbon, and people have to cross Oeiras to reach the main employing centre; its roads are also another good alternative to other congested ones (e.g. some Sintra inhabitants rather cross Oeiras, longer way, to travel through Complementary Itinerary 19, always with traffic congestion).

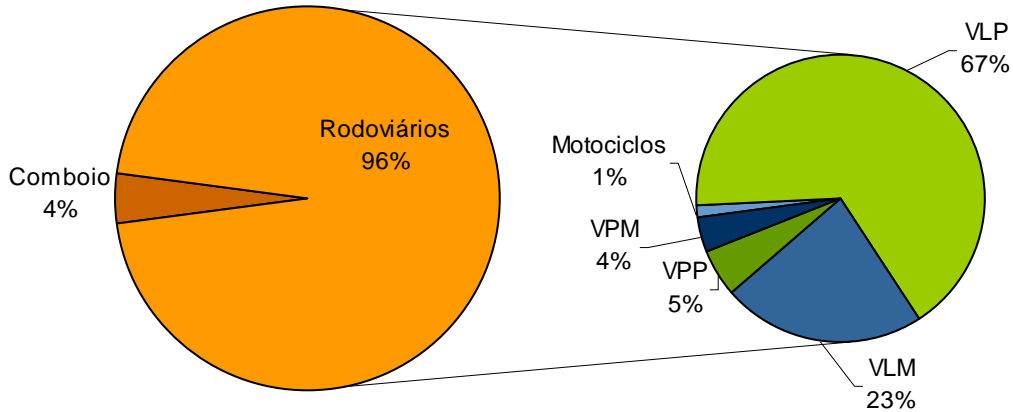


Figure 1. Energy consumption for transport category.

The principal results of Energy Saving Potential are that the tertiary sector is the one with more potential, and Carnaxide, Porto Salvo are the Parishes where the action plans should begin (have a greater potential). The domestic sector has a bigger potential in Oeiras/S. Julião da Barra and Algés.

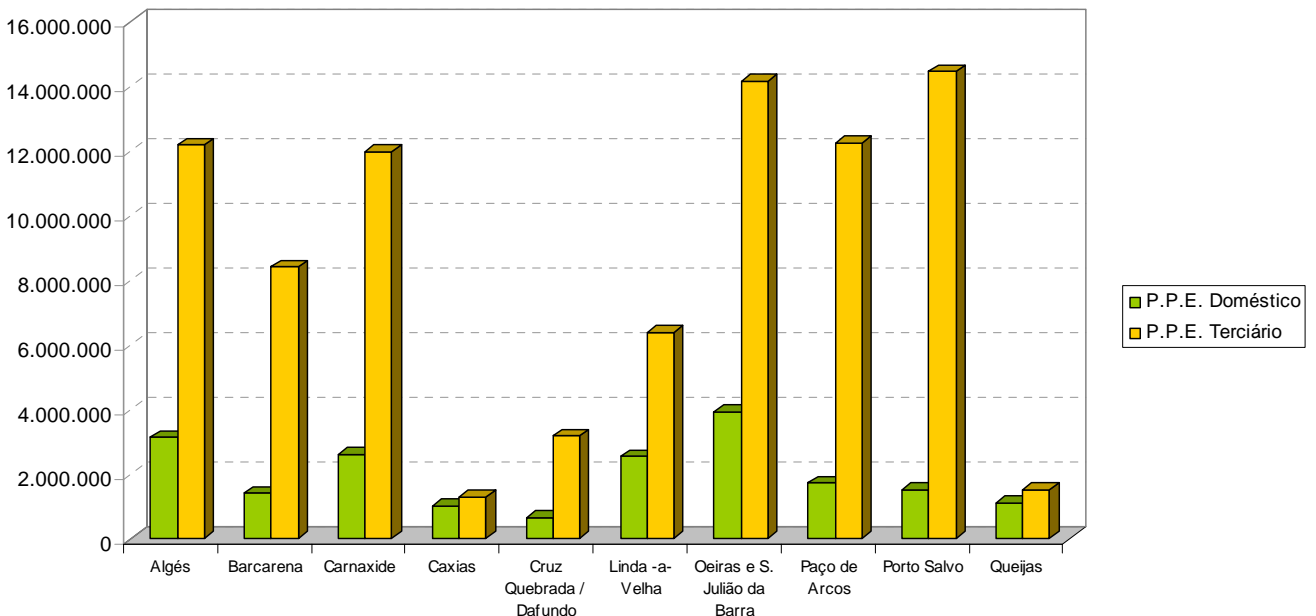


Figure 2. Energy saving potential by domestic and tertiary sector and by parish.



The web-portal is a tool that provides classic inventory results; however, it treats automatically all data by a simple data upload.

The screenshot shows the OEINERGE web-portal interface. At the top, there is a navigation menu with options like 'Inicio', 'Anos', 'Setores', 'Consumidores', and 'Energia Fronteira'. The main content area displays a table titled 'Listagem dos consumos por Código de Actividade Económica'. The table has columns for 'CAE', 'Descricao', and 'Total (kWh)'. The data is filtered for the year 1994 and units in kWh. The table lists various economic activities and their corresponding energy consumption values.

CAE	Descricao	Total (kWh)
1110	AGRICULTURA E PECUARIA	102.155
2100	EXTRACÇÃO DO CARVÃO	75.276
2901	EXTRACÇÃO PEDRA ARGILA AREIA	273.855
2909	EXTRACÇÃO O/MINE./METALICOS	181
3111	ABATE DE ANIMAIS, PREPARACÇÃO E FABRICO DE CONSERVAS DE CARNE	105.326
3112	INDUSTRIA DE LATICINIOS	563.819
3117	PADARIA, PASTELARIA, DOÇARIA, FAB. DE BOLACHAS, BISCOITOS E MASSAS ALIMENTICIAS	5.313.008
3121	O/INDUSTRIAS ALIMENTARES	5.561.361
3122	ALIMENTOS COMPOSTOS P/ANIMAIS	1.727
3131	BEBIDAS ESPIRITUOSAS	1.035
3132	INDUSTRIA DO VINHO	249
3134	INDÚSTRIA DAS BEBIDAS N/ALCOOLICAS E DAS AGUAS GASEIFICADAS	4.127.407
3213	FABRICAÇÃO DE MALHAS	9.091
3219	O/INDUSTRIAS TEXTEIS	42.785
3220	VESTUARIO EXCEPTO CALÇADO	163.296

Figure 3. Auto-Matrix's Layout.

Lessons learned and repeatability

The classic inventory is a generalized kind of study that can be developed by any County that has information available. Despite all efforts collecting data, it is OEINERGE's opinion that this kind of study should be mandatory and guidelines should be distributed by European Authorities.

As long as the information is available and Geographic Information Systems are well designed, the Energetic Saving Potential in Buildings is feasible by any County that desires to. This spatial characterization enables decision makers to orient their policies in space, optimizing resources and time.

The Web-Portal can be replicated by any Portuguese County because the Energy Authority has the same information format for each one. This tool was offered in a public conference to any Energy Agency that wants to use. All the results enable decision makers' optimization on planning and orienting policies regarding energy efficiency and accomplish compromises taken by signing Kyoto's protocol.

Contact for more information:

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Printed reports or other literature available:

Title: "Matriz Energética de Oeiras" (PT) (Property of OEINERGE and CMO)

Cost: n/a