

Rainha Dona Leonor renovation

Fighting energy poverty in Porto through deep renovation of buildings

A Covenant of Mayors 2016 Case Study

In a nutshell

The deep renovation of the neighbourhood of Rainha Dona Leonor resulted in a significant reduction of energy consumption, an increased production of renewable energy, reduction of CO₂ emissions and an increased quality of life for local residents.



Porto in numbers

Number of inhabitants in Porto: 240,000

Metropolitan area: 1.4 million inhabitants

CO₂ reduction target: 45% by 2020
(Baseline year 2004)

Energy efficiency target: 20% increase
by 2020

Number of Covenant of Mayors
signatories in Portugal: 112

Background

Porto is Portugal's second largest city and one of the political and economic pillars of the country. The city itself is home to nearly 240,000 inhabitants and is surrounded by a metropolitan area that accommodates 1.4 million people.

Porto was one of the first cities to commit to the Covenant of Mayors, back in 2008. The city considers the Covenant of Mayors as one of the cornerstones of its sustainable development policy.

Porto's Sustainable Energy Action Plan (SEAP) sets an ambitious objective to reduce CO₂ emissions by 45% by 2020 and increase energy efficiency by 20% compared to 2004 levels. The city council entrusted its energy agency, AdEPorto, with the design and implementation of the plan.

The deep renovation project

Rainha Dona Leonor is a neighbourhood of 150 multi-family dwellings built in 1953. The buildings, made up of concrete structure, brick walls and light weight slabs, had never been upgraded, which led to a profound state of degradation of the neighbourhood. The city council had to decide whether to undertake deep renovation works or to demolish the buildings.

In 2009, Porto's City Council opted for deep renovation and decided to reduce the total number of buildings in Rainha Dona Leonor from 150 to 90, by increasing the dwellings area and adjusting it to today's life patterns of its citizens. The total gross heated area that was renovated amounted to about 5,000 m². Renovation of the Rainha Dona Leonor neighbourhood was completed in 2014 and funded through Porto's own resources.



Improvements in energy performance

Even though energy consumption was not a main concern during the deep renovation process, the municipality of Porto had to comply with current thermal regulation. Therefore, new heating and cooling facilities, as well as domestic hot water systems based on solar thermal energy were installed, resulting in an improved energy performance of the building envelope.

Porto's measures resulted in an annual CO₂-emission reduction of 12.9 tons and yearly primary energy savings of 286.54 kWh/m².

In addition, the improvement of the building envelope and the control of infiltrations led to an annual reduction in energy needs of 49.78 kWh/m². The increased uptake of renewable energy by using solar thermal yearly contributes to 9.96 kWh/m² of the neighbourhood's energy consumption. Even though rents were increased in Rainha Dona Leonor following the renovation, this could be offset by a decrease of about 70% in energy costs for the residents.

Project numbers

Project duration: **2009-2014**

5,000m³ of heated area renovated

€17.3 million invested by the 4 municipalities

70% decrease in energy costs for the residents



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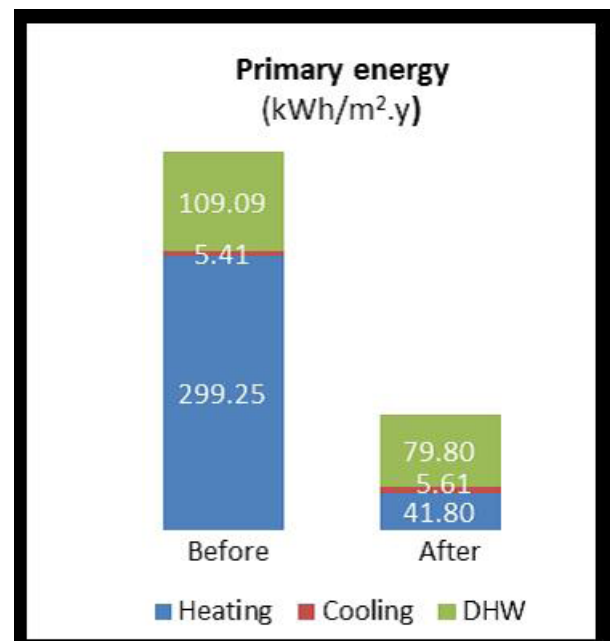
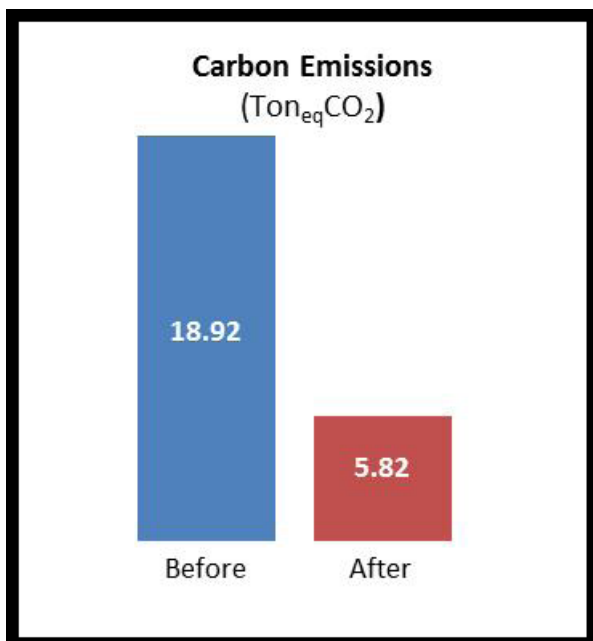


Figure: Reduction in carbon emissions and primary energy consumption after the project completion

For more information on the project, please contact:

Alexandre Varela, Technical Director at AdEPorto - Agência de Energia do Porto

Email: amv@adeporto.eu - Website: www.adeporto.eu - <http://www.cm-porto.pt>

Covenant of Mayors, press@eumayors.eu