

# Energy Transitions in the City: Lisbon from 1854 to 2006

**Sofia Teives Henriques**

Cities are concentrated centers of human activity and consumption that need inflows of energy and materials from their surrounding environments in order to survive. Two-thirds of humanity will be living in cities by 2050, a steep increase from 1950, when only one-third of the world population was urban, according to the United Nations 2014 [World Urbanization Prospects: Highlights](#). Urbanization has been associated with increased prosperity, mobility, and social transformation, but also with strong environmental pressure due to the ever-increasing demand for energy services. To ensure that the environment is impacted in the least harmful way, a thorough understanding of how and why energy transitions happen at the urban level is necessary.

My project contributes to the environmental and energy history of urban areas by focusing on the analysis of the transition from a low energy and biomass-based energy regime towards a high energy and fossil-fuel-based regime in Lisbon, the capital city of Portugal, over the period 1854–2006. Using standard methods of energy flow accounting from the energy literature, and a variety of primary and secondary historical sources (such as those dealing with a city toll on the consumption of food and biomass products, registers of import of fuels through the port of Lisbon, or draught animal numbers), the first aim of this project is to construct a primary energy database that will allow for the characterization of such a transition. The goal is then to understand not only the main phases of this transition, which can be assessed by indicators such as energy consumption per capita or the increasing/decreasing share of a determined energy carrier in the system, but also how the spatial relationships between the city and the resource supply hinterland changed with changes in urban energy consumption. Which regions were the main suppliers of food, firewood, and fuels to the city of Lisbon? How did the relationship between city and supply areas change with the transition towards fossil fuels and the transport revolution? How large was the environmental footprint of the city of Lisbon in different periods of the energy transition?

A second aim of this project is to compare the long-term energy transition of Lisbon with that of other European cities (Vienna or Paris), and with Portugal as a whole. Lisbon is an interesting case compared with Vienna or Paris due to its geographical location (easy access to the sea), and different climate and economic development. These aspects led to different transition timings, but also to complex relations between Lisbon and its hinterland, since Lisbon distributed imported fossil fuels, materials, and goods to the rest of the country. For the same reasons, energy transition in Lisbon was probably much faster and more environmentally intensive than in the country as a whole.