



**Politecnico
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Honors Thesis

**Master of Science
Territorial, Urban, Environmental and Landscape Planning**

Abstract

2.5d maps supporting energy policy in Turin

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The present thesis works on the concept of energy transition, providing analyses aimed to orient energy policies in a portion of the City of Turin. In particular, it focuses on the building sector, recognising its high impact and the potential for renovation. It takes advantage of 2.5D data, which include elevation information in a bidimensional representation, but keeps the option of tridimensional representations open. The work aims to provide a theoretical background to the concepts of digital cartography and energy transition before going into the practical application. This is structured along two axes, one about energy renovation and the other concerning photovoltaic potential. Different combinations are explored to find the most balanced scenario, potentially mitigating the investments with proportioned savings. The first step is energy classification, carried out by analysing thermal dispersion; then, alternative retrofitting scenarios are analysed, comparing the savings not only in terms of kilowatt-hour but also computing the CO₂ emissions which can be prevented. Solar radiation is calculated through a tool in ArcGIS Pro software for assessing the potential photovoltaic productivity, considering three alternative technologies (monocrystalline, polycrystalline, thin film). Finally, an electrification scenario integrates the two sections about renovation and solar potential to define an optimal reference. The thesis demonstrates that integration is the key for improving the sustainability of the building sector, targeting the least performing buildings and the most productive roofs for renovation and photovoltaic panels installation, respectively. Considering the dated building stock and the good amount of solar radiation, both solutions have a high potential, it is the policymakers' job to define a suitable strategy for balancing social, economic and environmental costs and benefits.



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