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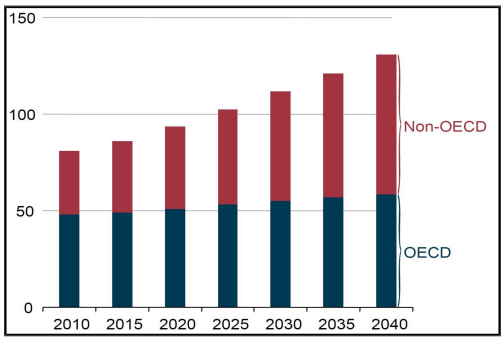
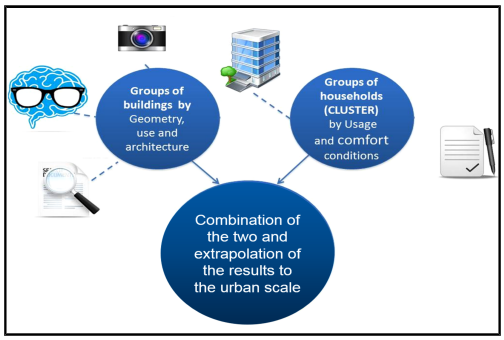
Topic	Environmental Engineering
Projektpartner	UPC Barcelona

Statistical reverse modeling

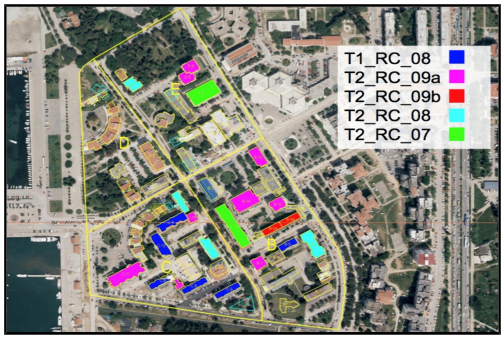
Methodology for energy diagnostics in neighborhoods based on clustering and classification of buildings



World buildings sector delivered energy consumption (quadrillion Btu, source: EIA)



Visualization of the applied methodology



Classified neighborhood of Bar, Montenegro

Introduction: The energy demand of buildings has constantly grown in the last years and even is starting to exceed the two other main sectors, mobility and industry. To counteract to this development, big efforts have been dedicated in recent years to identify and to better understand the complex interactions of the main factors determining the energy use of buildings. Results of energy simulations still have to be treated with caution because of their high complexity and the variety of factors influencing the real energy use in buildings.

Objective: This study has the goal to define a new methodology for energy diagnostics at urban level. The methodology proposes a combination of building classification and innovative statistical methods for clustering of survey information. Groups of buildings and neighbourhoods can hereby be analyzed according to their building and dwelling characteristics as well as their real energy consumption. By interpretation of the results, appropriate improvement scenarios to increase energy efficiency for different building and dwelling groups can be developed. This approach is implemented in analysis of a district of the city of Bar (Montenegro).

Result: The new methodology is the base for a simple, fast and economic method for preliminary identification of hot spots in neighbourhoods. The method is mainly based on existing data and, after some further work, can become a convenient tool for practical users like urban planers and authorities who want to create sustainable energy action plans, plan refurbishment on neighbourhood level or need information about promising approaches for awareness campaigns. Analysis of the district of Bar led to a classification of the buildings into 5 different groups. For each group, different measures are purposed according to the available improvement potential.