A BOTTOM-UP METHODOLOGY FOR BUILDINGS ENERGY DEMAND CALCULATION TO SUPPORT GRID BASED ENERGY SYSTEMS IN URBAN AREAS

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The work is part of the research activities of the European transnational project IDEE (Network of Research Institutions for Planning Efficient Energy Systems in Urban Areas) funded by the Interreg IV Italy-Austria programme.

The aim of the project IDEE is to develop a standard and shared procedure to support the design and optimization of district heating systems – based on centralized renewable energy production or on heat recovered from industrial processes – to be adopted at urban scale.

PAPER OBJECTIVES

The paper describes methods and outcomes of an experimental procedure for calculating the energy demand of urban areas and buildings using a bottom-up approach

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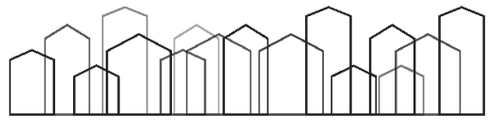
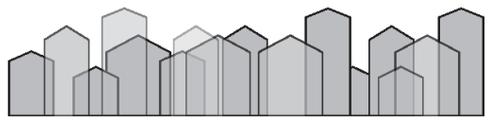
EXTRACTION OF GEOMETRIC PARAMETERS OF BUILDINGS

cadaster data → GEO-PROCESSING → GEOMETRIC PARAMETERS



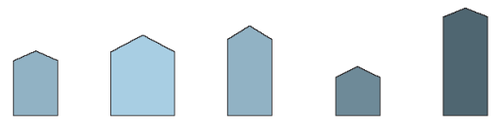
DEFINITION OF AGE OF BUILDINGS

census data → GEO-PROCESSING → BUILDING AGE



DEFINITION OF ENERGY CHARACTERISTICS OF BUILDINGS

Tabula project literature → ANALYSIS AND COMPARISON OF DATA → TYPICAL THERMAL TRANSMITTANCE according to BUILDING AGE

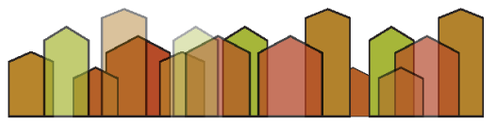


thermal transmittance → DYNAMIC ENERGY SIMULATIONS → TYPICAL ENERGY LOSS/GAIN VALUES according to BUILDING AGE

$$Q_{H,nd} = (Q_{H,tr} + Q_{H,ve}) - \eta_{H,gn} (Q_{in} + Q_{sol})$$

standard UNI TS 11300-1, Italian version of the EN ISO 13790

FINAL EQUATION → ENERGY DEMAND OF BUILDINGS



CALCULATION OF ENERGY DEMAND OF URBAN AREA

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PRELIMINARY RESULTS

City of Feltre
annual energy demand of buildings

- to 10000 kWh/year
- 10000 - 25000 kWh/year
- 25000 - 50000 kWh/year
- 50000 - 100000 kWh/year
- 100000 - 200000 kWh/year
- more than 200000 kWh/year

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THANK YOU FOR ATTENTION

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