16TH CONFERENCE ON SUSTAINABLE DEVELOPMENT OF ENERGY, WATER AND ENVIRONMENT SYSTEMS

October 10–17, 2021, Dubrovnik, Croatia

BOOK OF ABSTRACTS

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INTERNATIONAL CENTRE FOR SUSTAINABLE DEVELOPMENT OF ENERGY, WATER AND ENVIRONMENT SYSTEMS

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Improvements of Simplified Hourly Models for the Energy Assessment of Buildings: the Application of En Iso 52016 in Italy

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Abstract

The issue of improving the building energy efficiency led to the development of many calculation methods for the energy performance assessment of buildings. To overcome the low accessibility to detailed input data, the EN ISO 52016-1 technical standard introduced an hourly calculation method that is based on reference assumptions and simplifications, chosen so as to allow a sufficient accuracy in the outcomes with a low amount of input data required and an unambiguous calculation flow chart. Moreover, to enhance flexibility in modelling choices, boundary conditions and input data, EN ISO 52016-1 lets individual countries to introduce different methods or default parameter's values in the national annexes. This is the case of the Italian National Annex (NA), currently at the drafting stage, which introduces improved methods regarding different aspects of the building energy performance assessment. In particular, an improved modelling procedure that takes into account the component layer's characteristics and mass distribution has been introduced for the R-C nodes determination. Moreover, hourly variation of the sky temperature and of the total solar energy transmittance of the glazed components have been introduced. The coupling of the thermally conditioned zones has been also discussed. The present study thus attempts to investigate the increase in the model accuracy related to the introduction of improved methods and assumptions. Moreover, the opportunity to expand the Italian NA is addressed through the evaluation of other improved methods and assumptions, provided in literature. The best trade-off between the achieved accuracy and the simplicity of the assessment is sought as well. Both the EN ISO 52016-1 original model and its improved variations have been applied to a residential building sited in different Italian climatic zones. The resulting accuracy has been evaluated through the comparison with the results of a detailed dynamic simulation (performed with the EnergyPlus simulation engine) in terms of heating and cooling thermal loads, and energy needs. The analysis shows that the simplified hourly method's improvement allows for a more accurate prediction of the building thermal behaviour, while guaranteeing the simplicity of the assessment.