#	**Evangelos Bellos** (Mechanical Engineer, Ph.D.)	

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Presentation title:	**Evaluating Retrofitting Scenarios Through Energy Efficiency, Thermal Comfort and Cost Performance**

The objective of the present investigation is the determination of the optimal retrofitting scenarios using energy, thermal comfort and economic indexes through a multicriteria analysis. Specifically, a typical uninsulated building with a floor area of 100 m^2, located in Athens (Greece), is used as the case study (baseline scenario). The studied retrofitting actions are the addition of external insulation, the windows replacement with triple-glazed windows, the addition of shading in the openings during the summer period, the application of cool roof dyes, the use of a mechanical ventilation system with a heat recovery unit and the installation of a highly efficient heat pump system. The aforementioned interventions are studied separately and as combinations by emphasizing the application of external insulation (it is applied in the majority of the studied scenarios). In total, 26 different retrofitting scenarios are studied through dynamic simulation. The evaluation of these scenarios is conducted by using three main criteria and goals named as: i) maximization of the energy savings, ii) minimization of the life cycle cost (LCC), and iii) minimization of the mean yearly predicted percentage of dissatisfied (PPD). The multicriteria evaluation procedure uses the three aforementioned criteria and also applies a global objective function with the same weights among the criteria. The final evaluation indicates that the global optimal renovation scenario includes the addition of external insulation, the installation of highly efficient heat pumps and the use of shading in the openings during the summer period. In this scenario, the energy savings were calculated at 73.9% compared to the baseline scenario (existing situation), the LCC was found at 32.7 k€, the simple payback period of the investment at 6.3 years, the yearly CO2 emissions avoidance at 4.6 tn_{CO2} and the PPD at 9.7%. All the aforementioned evidence is promising and thus the suggested renovation scenario is a feasible solution for the multi-vector improvement of the building.

Short CV:

Dr. Evangelos Bellos is an Assistant Professor in the Department of Mechanical Engineering at the University of West Attica. He is also an associate editor in Elsevier journals “Sustainable Energy Technologies and Assessments” and “Thermal Science and Engineering Progress”. His scientific field is focused on thermodynamics, energy systems, renewable energies and energy in buildings.

CV:	

Dr. Evangelos Bellos is an Assistant Professor of “Thermodynamics and Thermal Power Plants” in the Department of Mechanical Engineering at the University of West Attica, Greece.

He graduated from the School of Mechanical Engineering at the National Technical University of Athens (NTUA) in Greece with a grade of 9.61/10 in 2012. Moreover, he finished his Ph.D. in the Thermal Department of NTUA in 2016 and he received the “Dimitrios Chorafas Prize” for the best Ph.D. at NTUA. The next step in his career was the post-doctoral activities in the “Laboratory of Refrigeration, Air-Conditioning and Solar Energy” of NTUA, gaining two scholarships, one from the Bodossaki Foundation (2017-2019) and one from the State Scholarships Foundation IKY (2019 – 2021). Moreover, we worked on research National and European projects at NTUA in the following years. He was an Adjunct Lecturer in the Department of Mechanical Engineering Educators, in the School of Pedagogical and Technological Education, Greece, for three years (2020 – 2023) and also worked on European research projects (HORIZON) at the research center CPERI - CERTH (2022 -2024).

Dr. Bellos is the author of more than 250 research papers in Journals, of about 60 papers in Conference proceedings, and he has written some book chapters. His h-index is 71 according to the Scopus database, with more than 14000 citations and it is 80 according to the Google Scholar database, with more than 17000 citations. He is an Associate Editor in the Elsevier Journals "Sustainable Energy Technologies and Assessments" and "Thermal Science and Engineering Progress - Elsevier". Also, he belongs to the Editorial Board of several Journals, such as below: "Solar Energy Advances - Elsevier", "Applied System Innovation - MDPI" and "Sci - MDPI". He has gained numerous awards in his career, and he belongs to the top 2% of scientists with the most influential work from 2019 up to today.

His research field can be described by the following keywords: Thermodynamics, Power cycles, Refrigeration, Solar energy, Concentrating solar collectors, Organic Rankine Cycle, Absorption chiller, Energy in buildings, Exergy analysis, Heat pump, Waste heat recovery, Energy system modeling, Heat exchangers, Optimization.