

Event:

Energy in Buildings Athens Conference 2026

Date:

Saturday October 24, 2026

Place:

Divani Caravel Hotel Athens, Greece



#	Tryfon Roumpedakis Dr.-Ing. Mechanical Engineer, Assistant Professor	
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Presentation title:	Experimental Assessment of an Electric Underfloor Heating with a Hydronic Benchmark System	
This paper presents a full-scale experimental assessment of an electric underfloor heating at the National Technical University of Athens Living Lab, using a heat-pump-driven hydronic underfloor system in adjacent rooms as an observational reference. The electric installation serves a 32 m² room, with approximately 27 m² of heated floor and 2.10 kW of installed cable capacity. Dedicated electricity metering, indoor air-temperature measurements at multiple positions and outdoor weather monitoring were used to examine winter and transition-season operation. The analysis considers temperature stability, electrical activation patterns, recovery behavior and the influence of thermostat settings. The experiments demonstrate that the electric system can maintain spatially consistent and thermally smooth indoor air temperatures despite intermittent nominal-power input. The floor and room thermal mass buffer the thermostat's pulse-width-modulated proportional-integral control, while direct electrical switching enables independent zone regulation and verified intervals without cable power input. These characteristics support practical applications requiring simple heat delivery and flexible operating schedules. The hydronic reference contextualizes the results through its continuously enabled heat-pump and water-circulation strategy. Differences in control settings, thermal conditions and measurement coverage are considered when interpreting energy use. The findings establish the feasibility of the tested installation and identify opportunities for coordinated electrical load management and future photovoltaic-aware or predictive control.		
Short CV (EN):		
Dr Tryfon Roumpedakis is Assistant Professor at the School of Mechanical Engineering, National Technical University of Athens, and a member of the Laboratory of Applied Thermodynamics. His research combines experimental investigation, modelling and optimisation of heating, cooling and renewable energy systems, with emphasis on heat pumps, thermal storage and building energy performance.		
Short CV (GR):	(If Greek)	
Ο Δρ. Τρύφων Ρουμπεδάκης είναι Επίκουρος Καθηγητής στη Σχολή Μηχανολόγων Μηχανικών του Εθνικού Μετσόβιου Πολυτεχνείου και μέλος του Εργαστηρίου Εφαρμοσμένης Θερμοδυναμικής. Η έρευνά του συνδυάζει πειραματική διερεύνηση, μοντελοποίηση και βελτιστοποίηση συστημάτων θέρμανσης, ψύξης και ανανεώσιμων πηγών ενέργειας, με έμφαση στις αντλίες θερμότητας, τη θερμική αποθήκευση και την ενεργειακή απόδοση των κτηρίων.		

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Dr Tryfon Roumpedakis is Assistant Professor in the Thermal Engineering Section of the School of Mechanical Engineering at the National Technical University of Athens (NTUA) and a member of the Laboratory of Applied Thermodynamics.

He holds a Diploma in Mechanical Engineering, an MSc in Energy Production and Management from NTUA, an MSc in Mechanical Engineering from Delft University of Technology, specializing in Sustainable Processes and Energy Technologies, and a PhD from NTUA. His doctoral research combined thermodynamic analysis and experimental investigation of small-scale solar systems for cooling, heating and electricity production. His research focuses on experimental characterization, modelling, optimization and techno-economic and environmental assessment of energy systems. His interests include heat pumps, refrigeration, renewable heating and cooling, thermal energy storage, waste heat recovery and advanced thermodynamic cycles.

He has contributed to European research projects addressing sustainable building energy systems, solar and biomass technologies, energy storage and flexible geothermal systems, including SolBio-Rev, SWS-Heating, GREENEST and FlexGeo. He is a scientific co-lead of the NTUA contribution to FlexGeo. His teaching covers applied thermodynamics, thermodynamics software, industrial refrigeration, heat transfer and energy efficiency in buildings. He has also taught postgraduate courses at the Hellenic Open University and the China-EU Institute for Clean and Renewable Energy at Huazhong University of Science and Technology. He has authored and co-authored peer-reviewed journal articles, conference papers, books and book chapters, and serves as a reviewer and guest editor for international energy journals.