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Presentation title:	**Experimental and Numerical investigation of the Energy Efficiency of a Lightweight Steel Framed building incorporating Vacuum Insulation Panels**	

Current challenges for sustainability in building construction require advanced building envelopes combining high thermal performance with easy and fast implementation. In an effort to meet this need, lightweight steel framed building systems coupled with Vacuum Insulation Panels (VIPs) form an attractive solution. Lightweight buildings have become more and more widespread thanks to their advantages, such as seismic resistance, recyclability and reduction of costs. One of the main challenges is related to the reduction of the effect of thermal bridges caused by metal structure. This issue can be deal with using additional insulation.

An innovative insulation material is the VIP, whose insulation performance is approximately seven times better than that of conventional insulation, for the same thickness. Their use in the building sector has been investigated for more than a decade; however, most of studies have focused on their development and optimization at the component level.

In the present study, a lightweight steel framed building envelope with incorporated VIPs is experimentally and numerically investigated. Temperature and heat flux measurements at several locations of the envelope obtained over a period of a whole year, are analyzed. The investigation concerns the total energy needs for the maintenance stable of the indoor temperature and the thermal performance of the envelope focusing on the impact of the VIPs. The measurements showed that the VIPs reduce the thermal transmittance of the wall by ca 50% and reduce the impact of thermal bridges.

Additionally, a numerical model was developed using the commercial software EnergyPlus. The validation of the model was carried out utilizing the measurements. The model was implemented on a typical residential building at four climatic conditions revealing the impact of the VIPs on the energy efficiency of the envelope. The results showed that the VIPs reduced the energy demands by ca. 20%.

CV:	

Ioannis Atsonios was born in Athens in 1990. He is a Ph.D. candidate in Thermal Engineering at the School of Mechanical Engineering, National Technical University of Athens (NTUA) since 2014. He graduated as Mechanical Engineer from NTUA in 2012 and obtained his Master of Science in Computational Mechanics from NTUA in 2014.

Since 2012, he has been working as a senior researcher at the laboratory of Heterogeneous Mixtures and Combustion Systems at the NTUA. He has joined the research project "ELISSA" (Energy Efficient Lightweight – Sustainable – Safe – Construction).

He specializes in the experimental and computational methods for the energy assessment of the thermal performance of building envelopes. He has also participated in the experimental monitoring of several buildings with the purpose of assessing the thermal and hygrothermal performance of their building envelopes. Moreover, his research includes the experimental and numerical investigation of innovative insulation materials (Vacuum Insulation Panels). He has published several articles in international scientific journals and international conferences.