


Event:  
Date:  
Place:

**ENERGY in BUILDINGS 2016**  
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#	<p><b>Constantinos A. Balaras</b> Dr Mechanical Engineer, FASHRAE</p>	
Title:	<p>Research Director, Group Energy Conservation, Institute for Environmental Research &amp; Sustainable Development, National Observatory of Athens, P. Penteli, Greece</p>	
Presentation title:	<p><b>Operational Energy Savings &amp; Embodied Energy in Hellenic Residential Buildings</b></p>	
<p>As buildings' operational energy use is decreased, more attention will be given to the embodied energy in its materials and systems over the building's life cycle. This paper investigates the embodied energy in construction materials for representative Hellenic residential buildings in order to derive simple metrics. The first part of the work identifies the types and quantifies the material quantities that are then associated with the corresponding embodied energy coefficients from international databases. The estimated embodied energy indicators for different building constructions and vintages ranging from 2.18 GJ/m<sup>2</sup> to 10.2 GJ/m<sup>2</sup>, depending on the data resources, with a mean of 6.23 GJ/m<sup>2</sup>. On average, the embodied energy represents 11% to 22% of the building's primary operational energy use over a 50-year life cycle, depending on the building type. As a contribution to the knowledge base, field studies of two Hellenic manufacturing facilities for ready-mix concrete and clay bricks were performed to estimate the embodied energy of these two commonly used building materials. The second part of the work considers common energy conservation measures, quantifies their embodied energy and their impact on outweighing some of the resulting operational energy savings. Representative results indicate a recovery time of about 4 to 9 years, depending on the investigated measures.</p>		
CV:		
<p>Dr. Balaras is a Research Director with the Group Energy Conservation at the Institute for Environmental Research &amp; Sustainable Development -NOA, Athens, Greece. He has over 30 years of experience in R&amp;DD in the areas of energy conservation, high performing buildings, thermal and solar building applications, building energy audits-diagnosis and refurbishment, national regulations - technical guidelines – software tools for EPBD transposition, environmental impact of buildings, indoor environmental quality, thermal energy systems and building thermal simulations, solar air-conditioning. He holds a PhD and MSc in Mechanical Engineering from Georgia Institute of Technology. He is a registered EUR ING and Chartered Mechanical Engineer, member of the Technical Chamber of Greece, Fellow ASME, Fellow ASHRAE. Dr. Balaras has over 260 scientific publications in Journals and Conferences and over 20 contributions in books.</p> <p>For more information visit: <a href="http://www.linkedin.com/in/costasbalaras">www.linkedin.com/in/costasbalaras</a>  <a href="https://www.researchgate.net/profile/Constantinos_Balaras/">https://www.researchgate.net/profile/Constantinos_Balaras/</a>  <a href="http://www.facebook.com/GGroupEnergyConservation">www.facebook.com/GGroupEnergyConservation</a></p>		