**The Future of Sustainable Buildings**

Buildings are becoming more energy efficient, i.e., sustainable, but the limits to their energy efficiency are not well known. After an overview of building energy trends in the USA and worldwide, an analysis is presented of an ideal, all-electric residential home in the USA that defines the ultimate minimum energy consumption of an ‘ideal’ house, akin to the Carnot efficiency of an engine or the Carnot coefficient of performance of a refrigerator. Given that heating, ventilation, and air conditioning (HVAC) remains one of the largest energy end uses in buildings, the presentation concludes with a discussion of cooling technologies that are becoming more and more important with ongoing global warming.



Patrick Phelan

Professor of Mechanical & Aerospace Engineering and Assistant Dean of Engineering

Arizona State University

[phelan@asu.edu](mailto:phelan@asu.edu)

<http://faculty.engineering.asu.edu/pphelan/>