CITIES IN A CHANGING WORLD:
QUESTIONS OF CULTURE, CLIMATE AND DESIGN

• Paper / Proposal Title:
Carbon Capturing High-Performance Buildings

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• Abstract (300 words):
As high performance and zero energy building becomes increasingly common and moves into the mainstream of building, designers look for other ways to improve energy performance. Building materials and construction represent 11% of global CO2 emissions. This aspect of construction and design becomes an increasingly important target for finding energies and emissions reduction savings.

One material which is particularly effective on most matrixes at reducing construction and material CO2 emissions is straw bale. Straw bale is becoming a material of growing interest in the high performance and sustainable performance building community because of its successful track record and the way it has been performing in modeling. Straw bale was added to the International Building Code in 2001, and there has been an increase in its use in building since 2015.

To research straw bale materials’ affectedness and to gain a greater understanding of the materials’ strengths and weaknesses, the team of students under my mentorship began researching and developing a prototype straw bale townhouse residence. The research project was entered as a project for the Department of Energy 2021 Solar Decathlon Design Competition. Part of the research has involved energy and
embedded carbon modeling. Embedded carbon modeling is currently a growing field. The team developed and modeled a series of building and wall assemblies comparing straw bale and double stud light wood framing construction, then organized to design and possibly construct a prototype project in a suburb of London, UK. The initial plan was to construct a hybrid house of two units to monitor and compare the performance of double stud and straw bale assemblies. Based on the results of both energy and embedded carbon modeling, the team is reevaluating choices due to the effectiveness of the prototype designed using only the straw bale assembly.

• Author(s) Biography (200 words each):

Alexander Aptekar is a licensed architect and Assistant Professor at New York City College of Technology. He was the Principal Investigator for the Solar Decathlon Team in 2015. He is also a practicing architect specializing in high performance and passive house architecture and serves as the Co-director of the Department’s Architecture Technology four-year Bachelor of Technology degree program. Aptekar was a member of the team who developed the curriculum for the school’s five-year Professional Degree program. He is a researcher and provides mentorship to students studying high-performance buildings and wall assemblies. Aptekar received his Master of Architecture from Yale University and his undergraduate degree from Oberlin College. He works on the AIA New York Committee on the Environment and New York City College of Technology’s Sustainability Council.