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ADAPTIVE BUILDING ENVELOPE STRUCTURES

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Abstract – Buildings in the European Union account for 40 % of energy consumption and 36 % of greenhouse gas emissions. These numbers highlight the urge to address building energy efficiency improvement and the reduction of related emissions. There are promising trends to reduce building energy consumption and provide innovations in the sector of building thermal envelope – active and adaptive building envelopes. These approaches perceive thermal envelope as a media that transforms and transmits the energy available outside to the user inside of the building or changes its properties in response to the changes in surrounding conditions (temperature fluctuations, solar radiation level, etc). This study investigates the application of biomimicry principles in the development of an innovative adaptive facade with energy storage capabilities. Important step in applying the biomimicry approach is to explore suitable nature strategies, that can help to solve the technological challenge. Thus, inspired by the natural mechanisms employed by animals that utilize fat tissue for energy storage, research focuses on cataloguing such animals to gather significant data on the characteristics of both the animals and fat tissue. Through systematic observation and analysis, study offers a catalogue highlighting the unique strategies employed by various species to store and utilize fat reserves, offering valuable insights for biomimetic design that can be used for further transfer to the technical design.

Keywords – *Adaptive building envelope; biomimicry; building energy efficiency, energy storage*