

2017 APT CONFERENCE PRESENTATION OUTLINE

Presentation Title: Evaluating inherent energy efficient features in historic buildings

Presenter: Amanda Webb

1) Inherent energy efficient features in context

- a. What are IEEFs and why are they important?
- b. How/where are IEEFs discussed in preservation theory/practice?
- c. Why do we need a better method for evaluating them?

2) Proposed evaluation method

- a. Regionalized sensitivity analysis
- b. Classification trees
- c. Application to building energy simulation

3) Case study application

- a. Description of Penn State's Old Botany building
- b. Retrofit measures evaluated
- c. Analysis results

4) Discussion and Conclusions

- a. Limitations to IEEF concept
- b. Proposed revisions to IEEF concept
- c. Broader implications for the narrative about preservation and sustainability / energy efficiency

Presentation Title: *Historic Buildings as Energy Hogs- Debunking the Myth*

Presentation Format: 20 minute presentation

Presenter Name: Matthew S. Chalifoux, FAIA
Principal, Senior Historic Preservation Architect
EYP Architecture and Engineering
Washington, DC

Presentation Outline

- Introduction (1 minute)
- Different Clients- Different Project Drivers (2 minutes)
 - Public and institutional clients- interest in heritage conservation, legacy conservation
 - Long-term investments
 - Commitments to sustainability and energy conservation
 - Private clients- greater focus on economic drivers
 - Shorter term investments
 - First cost, operational cost- asset portfolio
- Cultural Changes that have Influenced the Market (2 minutes)
 - Improved marketability of existing/historic buildings
 - Marketability of sustainability and energy efficiency
 - Living in the past- the risk of relying on “embodied energy”
- Creating a Level Playing Field: Existing Buildings vs. New Construction (3 minutes)
 - Changing Energy Codes
 - Prescriptive versus Performance Based
 - Design and Analysis Tools
 - The Internet of Everything- Big Data
 - Proprietary and open platform
 - The risk of paralysis through analysis
- Case Studies (5 minutes)
 - Birch Bayh Federal Building and US Courthouse
 - Indianapolis, IN, USA
 - Constructed 1905/1934
 - Limited scope modernization
 - Projected and actual performance
 - Actual EUI 30% below projected
 - One of highest performing buildings in GSA Region 5
 - Lessons learned
 - Maximizing existing attributes of construction
 - Technology is invisible- don’t be afraid to use it
 - Technology is only as good as the people that manage it

Presentation Outline: Hygrothermal and Energy Effects of Insulation and Climate Management on Historic Multi-Wythe Masonry Wall Buildings

Presenter: David Artigas, PE. Simpson Gumpertz & Heger Inc.

- Reasons for adding insulation/climate management systems to historic mass masonry buildings
 - Energy Code requirements (insulation, buildings on historic register may be exempt)
 - Improved energy performance/lower energy costs (insulation)
 - Improved occupant comfort (insulation and climate management)
 - Preservation of historic materials/fabric, building contents, or museum/archive collections (climate management, which may include humidification)
- Energy effects of adding insulation
- Common concerns regarding adding insulation and climate management to mass masonry buildings
 - Increased potential for condensation
 - Increased potential for moisture damage
 - Increased potential for freeze-thaw damage to masonry
- Assessing risk in non-humidified and humidified buildings.
- Modeling tools for assessing risk
 - Hygrothermal modeling (1-D transient heat and moisture transfer)
- Sensitivity of models
 - Standard/generic material databases do not always provide realistic results
 - Variable properties of brick
 - Methods/standards for testing brick hygric properties
 - Must understand durability of masonry materials to assess potential for damage
- Physics of water absorption and freezing in masonry
- Previous research of freeze-thaw mechanisms and damage to masonry
- Need to repair masonry, flashings, seals, etc.
- Questions to consider
 - Are the improvement in energy performance/lower energy costs from adding insulation significant?
 - How to assess risk of insulation?
 - What is the current state of knowledge of freeze-thaw mechanisms and damage?
 - What additional research is needed?

Name: Christopher J. Whitman

Presentation: "Replacement Infill Panels for Historic Timber-Frame Buildings in the UK: Interstitial Hygrothermal Monitoring using a Dual Climate Chamber."

Overview

This presentation is an update on the work that has been enabled by the APT Martin Weaver Scholarship. It focuses on the design, construction and monitoring of three physical test panels placed between two artificial climate chambers. The work aims to investigate the potential impact, both positive and negative, of improving the thermal performance of infill panels of historic timber-framed buildings in the UK. The presentation will introduce UK timber-framed buildings, outline the potential risks and advantages of replacement infill panels, before moving on describe the experiment in detail including results and comparison with those obtained from simulation.

Outline

1. Introduction
 - 1.1. Timber-Frame Buildings in the UK, History and Survival
 - 1.2. Low Carbon Retrofitting of Historic Timber Framed Buildings in the UK
 - 1.2.1. Political context
 - 1.2.2. Climatic context
 - 1.2.3. Risks and opportunities
 - 1.3. Limitations of Digital Simulation and the need for physical monitoring
2. Methodology
 - 2.1. Definition of Test Panel Dimensions
 - 2.2. Definition of panel infill
 - 2.3. Monitoring Sensors- Location and Specification
 - 2.4. Description of dual climate chamber
 - 2.5. Construction of test panels
 - 2.6. Installation of test panels
 - 2.7. Simulation with WUFI Pro 5 software
3. Results
 - 3.1. Measured data
 - 3.2. Simulated data
 - 3.3. Comparison between measured and simulated
4. Analysis and Discussion
5. Conclusions

- Richards Medical Research Building (5 minutes)
 - University of Pennsylvania, Philadelphia, PA, USA
 - Constructed 1961
 - Systems upgrade and envelop improvements
 - Balancing heritage conservation with functional needs
 - Projected and actual performance
 - 40% reduction in energy use
 - Lessons learned
 - Mock-ups and testing are critical tools in fine tuning design ideas
 - Clients value properly balanced designs- performance vs. preservation
 - Users can be important partners in performance success

- Conclusion (1 minute)