

## **Thesis Question**

Can the improvement of the energy performance of an existing building inform the social, economic, and environmental sustainability of rehabilitation?

## **Thesis Statement**

Improving a brick masonry envelope and the integration of a photovoltaic system on an existing building will inform the social, economic, and environmental impact of retrofitting and the rehabilitation of existing buildings.

## **Abstract**

This thesis demonstrates the value of improved energy performance of existing brick masonry buildings by establishing a well-developed envelope that keeps the character and history of the important façades of an existing building. Doing this while also providing a photovoltaic system on the roof of the building will decrease the amount of energy needed to operate the building. The building will be a net-zero building, meaning it will produce as much energy as it uses. As a guideline, Passive House Institute US prescriptive pathway, which is the gold standard for building performance, and will be used to ensure building performance criteria are being met.

To test this thesis, the design of an existing brick masonry building in downtown Connorsville, Indiana has been rehabilitated into a mixed-use building type. An addition to the building enlarges the overall footprint of the project while also providing more space for additional photovoltaic panels on the roof. This also presents the opportunity to balance the existing envelope and the new envelope's performance to show how combining the two can decrease the energy usage of the building as a whole.