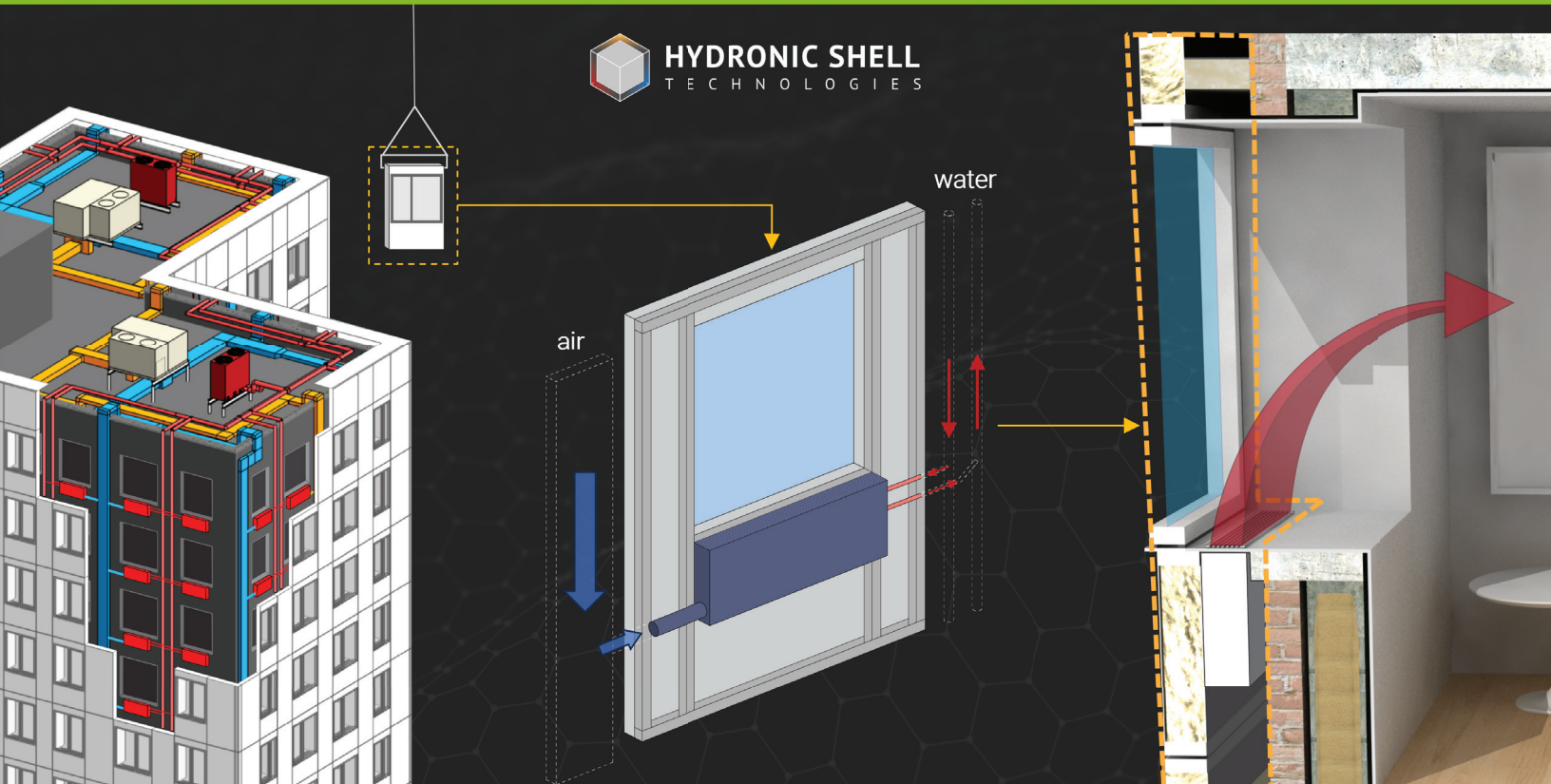


NYSP21 Performs Greenhouse Gas Evaluation of Hydronic Shell Technologies' Façade-Integrated HVAC Retrofit System



Challenge

Hydronic Shell Technologies (HST) sought to estimate the greenhouse gas emission reduction potential (GHG ERP) of their façade-integrated HVAC retrofit system compared to a building without the system.

Solution

NYSP21 compared the GHG impact of HST's retrofit system to the GHG impact of pre-1980 multifamily masonry buildings from New York City to estimate the GHG ERP during the use life cycle phase.

Results

It is estimated that HST's retrofit system has the potential to reduce GHG emissions by 2.17 kg CO₂e per square foot per year for the multifamily buildings studied. At 0.1% capture of the total addressable market (TAM) of 2.54 billion square feet, the annual reduction in GHG emissions is estimated to be 5.56 MMT CO₂e.

Hydronic Shell Technologies LLC

Hydronic Shell Technologies LLC (HST) is a startup company based in Queens, NY. HST has designed a façade-integrated HVAC retrofit system (retrofit system), which is a centralized HVAC system where the distribution and terminal equipment are fully integrated into modular façade panels. The façade panels improve the buildings' insulating properties, and the system employs energy efficient electric heat pumps as the central equipment to generate

"The experts at NYSP21 helped us by conducting a detailed analysis of the GHG reduction potential of our technology. Their unbiased evaluation is essential for our customers, partners, and investors to understand the potential impact of our technology." David Goldstein, Hydronic Shell Technologies Founder and CEO

heating and cooling. The entire system can be installed from a building's exterior without modifying the building's original HVAC infrastructure and disturbing tenants, making HVAC retrofits and building envelope upgrades accessible to many buildings.

Challenge

HST believes that their retrofit system results in fewer greenhouse gas (GHG) emissions compared to a building without the retrofit system and sought to estimate the potential reduction in GHG emissions resulting from the use of their technology at scale.

Solutions

HST requested assistance from the New York State Pollution Prevention Institute (NYSP2I) to determine the GHG emission reduction potential (ERP) associated with their retrofit system as compared to a building without the retrofit system. A GHG ERP is an order of magnitude estimate of the potential reductions in GHG emissions associated with a new technology or system as compared to a baseline technology or system. To this end, NYSP2I worked with HST to develop criteria for a baseline building for comparison as pre-1980 masonry multifamily buildings in New York City (NYC). NYSP2I conducted a high level comparative analysis of the GHG impacts of both the baseline building and a building with HST's retrofit system during the use of the product.

The heating and cooling GHG impact of the baseline building was estimated on a per square foot basis using publicly available Local Law 87 Energy Audit Data from the NYC Mayor's Office of Climate and Environmental Justice. HST provided NYSP2I with energy savings claims, which were then used to estimate the retrofit system's GHG impact. The estimated impacts of the baseline building and the retrofit system were then compared to determine the potential reduction in GHG emissions on an annual per square foot basis.

HST believes their total addressable market (TAM) includes multifamily buildings located in ASHRAE climate zones 4-7, and they expect to capture 10-20% of the market within 10 years. Considering climate zones 4-7, similar baseline building criteria used in the analysis, and data from the ABC Market Guidance for Zero-carbon Aligned Residential Buildings study from the National Renewable Energy Laboratory, HST's TAM was estimated as 2.54 billion square feet.

Results

The analysis resulted in an estimated annual GHG ERP of 2.17 kg CO₂e/ft² for the retrofit system. Additionally, at 0.1% of the TAM capture, HST's retrofit system was estimated to have a GHG ERP of 5.56 MMT CO₂e/yr.

The estimated GHG ERP calculated by NYSP2I was based on information and claims provided to NYSP2I by HST regarding their HVAC technology. It should be noted that this analysis solely considered aspects of the use life cycle phase. The raw material extraction, manufacturing, and end-of-life life cycle phases were not considered. Additionally, NYSP2I did not validate the performance of HST's system nor savings claims. Moving forward, HST may consider a more comprehensive life cycle assessment to validate energy, GHG, and other environmental impacts.

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