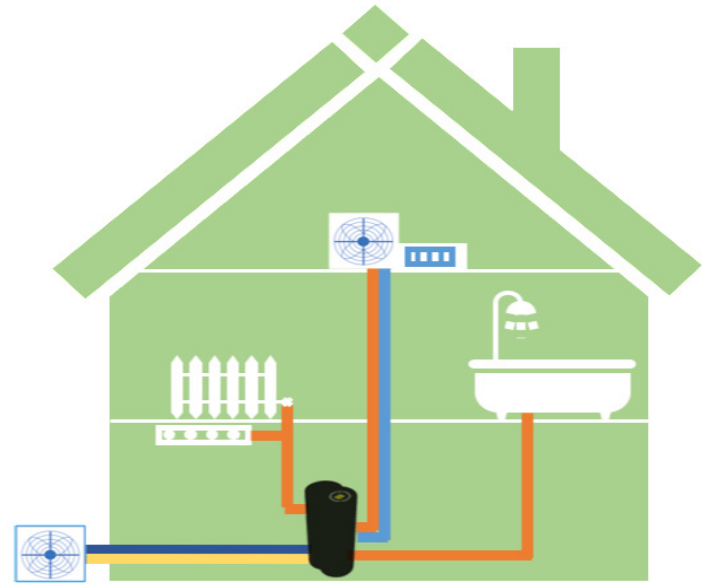


# NYSP2I Evaluates the Greenhouse Gas Impact of ThermoLift's Novel Hofbauer Cycle TCHP™ Technology



## ThermoLift, Inc.

Based out of Stony Brook University's Clean Energy Business Incubator Program, ThermoLift, Inc. (ThermoLift) is developing its Hofbauer Cycle Thermal Compression Heat Pump™ (TCHP™) technology to provide building heating, cooling, and hot water with a single appliance. To date, ThermoLift has advanced the TCHP™ to a Technology Readiness Level of 6/7 (TRL-6/7) and is in the process of securing field demonstration sites. A recent performance evaluation by Oak Ridge National Laboratory (ORNL)<sup>1</sup> demonstrated uninterrupted operation of a TCHP™ unit with a coefficient of performance (COP) that exceeded the Department of Energy's target COP for cold-climate heat pumps.

## Challenge

ThermoLift claims that their TCHP™ technology has the potential to significantly reduce energy use and greenhouse gas (GHG) emissions associated with building space heating. ThermoLift wanted to determine the energy and GHG impacts of their TCHP™ technology compared to existing natural gas fired, space heating water boilers in the residential and small commercial building markets.

## Solutions

ThermoLift requested assistance from the New York State Pollution Prevention Institute (NYSP2I) to estimate the potential energy and GHG impacts of ThermoLift's TCHP™ technology vs. existing natural gas fired, space heating water boilers. Using results obtained during the ORNL performance evaluation<sup>1</sup> NYSP2I conducted a high-level comparative analysis of the energy and GHG impacts of ThermoLift's TCHP™ vs. natural gas fired, space heating water boilers in the residential and small commercial building markets of the Middle Atlantic Census Division (NY, NJ, PA).

## Challenge

- ThermoLift requested NYSP2I to estimate the potential energy and GHG impacts of their TCHP™ technology.

## Solution

- NYSP2I conducted a high-level comparative analysis of the potential energy and GHG impacts for ThermoLift's TCHP™ technology vs. natural gas fired, space heating water boilers.

## Results

- NYSP2I's high-level comparative analysis suggests that ThermoLift's TCHP™ technology has the potential to reduce annual energy use and GHG emissions by approximately 36% in the examined markets

<sup>1</sup> Hofbauer, Peter, Schwartz, Paul, and Sharma, Vishaldeep. Performance Evaluation of the ThermoLift Natural Gas Fired Air Conditioner and Cold-Climate Heat Pump. United States: N. p., 2019. Web. doi:10.2172/1564173.

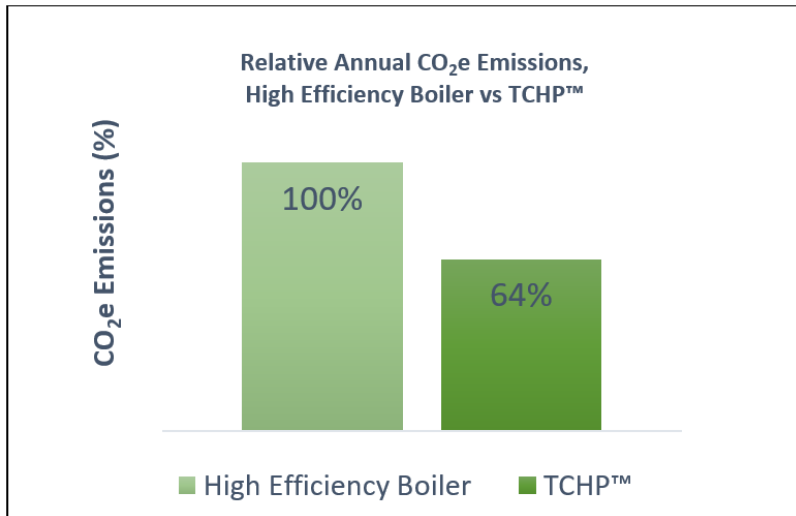
*“NYSP2I provided the expertise needed to successfully benchmark the unit’s potential to save green house gas emissions and the analysis will serve as an important reference for future conversations regarding the environmental benefits of TCHP™.”*

**- ThermoLift**

**Results**

NYSP2I’s high-level comparative analysis suggests that when compared to a new, high efficiency boiler:

- The TCHP™ has the potential to reduce annual natural gas consumption by approximately 36% per unit
- The TCHP™ has the potential to reduce annual GHG emissions by approximately 36% per unit



**Conclusion**

Utilizing ORNL data, NYSP2I was able to model the TCHP™ in the Middle Atlantic Census Division using data from the Energy Information Administration’s Residential Energy Consumption Survey. The results identified that the TCHP™ has the potential to significantly reduce GHG emissions for heating small commercial and residential buildings. This investigation concludes there is a strong basis for the TCHP™ unit to assist NY in offering heating equipment that will help to meet the State’s emission reduction targets.

**Note:** The estimated GHG emission impacts calculated by NYSP2I at RIT are based on information and claims provided to NYSP2I by ThermoLift relative to their TCHP™ technology. It should be noted that this high-level analysis resulted in estimates and only considered the use phase of the product life cycle. The production and end-of-life phases were not considered as part of this analysis.

**ThermoLift, Inc.**

Advanced Energy Research & Technology Center  
 1000 Innovation Road  
 Stonybrook, NY 11794-6044  
 (631) 779-1370

**Partners**



**For more information please contact us:**

P: 585-475-2512  
 W: nysp2i.rit.edu  
 E: nysp2i@rit.edu

111 Lomb Memorial Drive, Bldg 78  
 Rochester, NY 14623

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