

Quantifying the Road Map to Net Zero Energy

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The Rubenstein School has been working for over 10 years to make our energy use more sustainable. We have strived towards Net Zero Energy in the School's buildings (Upper left then clockwise: Aiken Center, Rubenstein Ecosystem Science Laboratory (not pictured) at ECHO Leahy Center for Lake Champlain, Johnson House, Aiken Forestry Sciences Laboratory) using a three-step process:

- 1. Quantify the energy used (electricity, natural gas, and water) in RSENr buildings and research vehicles, including boats.*
- 2. Conduct energy audits of RSENr buildings and implement suggested efficiency upgrades when possible.*
- 3. Facilitate the installation of renewable energy that will be used to mitigate the required energy use in the School. This will lead to Net Zero Energy whenever possible.*

In 2010, the University of Vermont (UVM) adopted a climate action plan to be carbon neutral by 2025. However, just last year, the UVM administration decided to revisit its previous commitment and replace it with a Comprehensive Sustainability Plan (CSP). The CSP is set to be released soon and while reaching carbon neutrality by 2025 seems unlikely, UVM and the Rubenstein School of Environment and Natural Resources (RSENr) continue to invest in responsible energy policies and practices. Working specifically with RSENr buildings, the Greening of Rubenstein Interns class seeks to make RSENr net-zero energy, which means that all the energy used by the School would either be completely renewable or covered by purchasing RECs (renewable energy credits). We seek to accomplish this goal by quantifying energy use, running energy audits and efficiency upgrades, and adding renewable energy production.

The goal of the Quantification group is to track energy usage for the buildings of the Rubenstein School and identify areas where we can improve energy efficiency infrastructure and reduce energy use. The buildings we cover include the Aiken Center, Rubenstein Ecosystem Science Laboratory adjacent to ECHO Leahy Center for Lake Champlain, Aiken Forestry Sciences Laboratory on Spear Street, and the newest addition, the Johnson House located across Main Street from Aiken.

Using the program SchoolDude, we can track thermal, electric, and water use across all RSENr buildings for the past 10 years. Our goal is to continue to develop an understanding of historic RSENr building energy consumption, determine building operating costs, and facilitate an energy audit of the Johnson House. Through our exploration of this data, we hope to identify areas where we can reduce water consumption, electricity usage, and natural gas (heating) usage, with the goal of bringing the Rubenstein School to the status of carbon neutrality.

So far, we have successfully assembled each utility for the Johnson House since 2013 as well as rectified past data for the other RSENr buildings—remediating discrepancies between fiscal and calendar years. Several interesting trends emerged from our analysis of the data. Most notably, energy use for most buildings has not returned to pre-pandemic levels. In a few cases, such as the Aiken Center, where water use dropped precipitously in 2019, we are working to confirm the accuracy of the SchoolDude data with the utility company directly (See Figure 1).

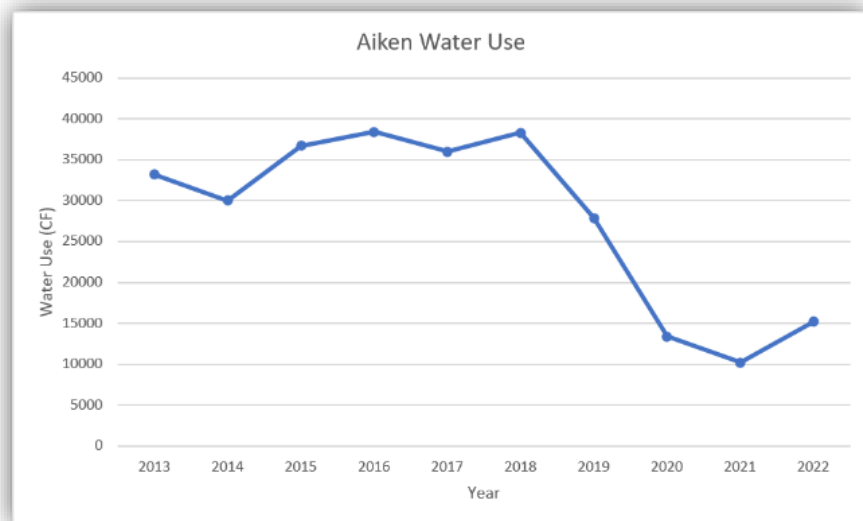


Figure 1: Aiken water use measured in CF (cubic feet) from 2013 to 2022

The picture of RSENr's energy consumption is more complicated than it first appears. Four buildings with myriad uses combined with the past three years of constantly evolving school and work arrangements make it hard to draw concrete conclusions about our energy consumption. Through our quantification of the RSENr buildings, we hope to determine why energy use has not returned to pre-pandemic levels and if that trend will continue. We hope to contextualize our data to effectively move towards a net-zero Rubenstein School. Knowing whether the reduction in energy use is related to post-pandemic hybrid work schedules, change in building uses and class arrangements, or simply an anomaly, will be crucial in informing UVM energy policy moving forward to achieve the ultimate goal of net-zero energy across all RSENr buildings.