

## **PUSH Buffalo's Net Zero House at 10 Winter St.**

Kyle Taylor



### **How would you describe the property and the neighborhood?**

The Net Zero house is located at 10 Winter Street on the West Side of Buffalo. This neighborhood is home to many vacant lots and properties. Prior to renovation, 10 Winter Street was abandoned, deteriorating fast, and filled with garbage.<sup>1</sup>

### **What is the purpose of the Net Zero house?**

PUSH Buffalo rehabilitated the Net Zero house using the latest green technologies to produce as much energy as it consumes on an annual basis. They designed the Net Zero house to serve as a model of energy efficiency and renewable energy technology.

PUSH Buffalo also used the renovation of the Net Zero house as an opportunity to combat the higher than average unemployment and poverty rates in the area. They partnered with local organizations and unions to provide education and practical, on-the-job training to disadvantaged workers.

Finally, PUSH Buffalo designed the Net Zero house to change the current market trend regarding vacant properties, demonstrating that there is value in vacant properties and that even a very challenging rehab can be more cost-efficient than new construction.

### **How did PUSH Buffalo acquire the property at 10 Winter Street and what state was it in?**

PUSH Buffalo acquired the property at 10 Winter Street for \$2200 at the City tax foreclosure auction, free and clear of all liens. The house is a single family home that is approximately 1198 sq. ft., with three bedrooms, two bathrooms, a partial basement and a crawl space. The house was originally built in 1920. The farm house style is unusual in this neighborhood. Previous owners never altered the original floor plan and had not made any significant investment in the house since the 1960's, when an owner added asbestos siding. The house was severely rundown, and the previous owner was a "pack rat", which made the initial phase of the Net Zero project difficult.

### **What was the process of gutting and rehabbing the Net Zero house?**

The gutting and rehabbing of the Net Zero house occurred in multiple phases. The first phase of the project involved, through the help of volunteers, removing everything that the prior owner had accumulated, and then completely gutting the interior. The next phase was the design phase. Working with architect Kevin Connors, PUSH Buffalo designed the house using the ideals of the Green and Healthy Homes movement. The design plans included adding a small addition to the house, and incorporating green technologies such as photovoltaic solar panels and geothermal heating. The team at PUSH Buffalo shored up the foundation of the house to ensure maximum structural integrity. After these initial phases, PUSH Buffalo began outfitting the house with the latest green building technologies.



### **What are some of the features of the Net Zero house?**

PUSH Buffalo renovated the house to be energy efficient and lead and asbestos free. Two of the key features of the Net Zero house are the house's solar panels and geothermal heating system. The house also utilizes three forms of insulation and a metal roof to reduce energy consumption.

### **How does PUSH Buffalo harness solar energy to meet the house's electric and hot water needs?**

The Net Zero house has an array of 4.5 kw photovoltaic solar panels that a local company mounted on the roof, with plans to add additional panels to the other side. These photovoltaic panels supply the house with all of its electrical power.



In addition to the solar panels, PUSH Buffalo had evacuated glass solar tubes mounted to the roof. These tubes harness the solar energy to pre-heat a

water/antifreeze solution, which the system then pumps to a large tank in the basement.<sup>2</sup> The heat from this tank heats the house's drinkable water tank through a water-to-water transfer process.<sup>3</sup> If the solar pre-heated solution does not reach 120 degrees, the house is equipped with a gas-fired on-demand tankless unit to supplement the house's needs.<sup>4</sup>

### **How does the house conserve water and handle stormwater?**

The Net Zero house conserves water through a variety of efforts. The house utilizes low flow shower heads and toilets and faucet aerators,<sup>5</sup> which can reduce consumption by as much as 50%.<sup>6</sup>

To handle the storm water, the Net Zero house uses a drywell.<sup>7</sup> The drywell is 10'x8', buried 3'-4' below the grade in the front yard.<sup>8</sup> The house's storm water and sump pump water is diverted to this drywell.<sup>9</sup> About half of the house's gutters drain into this dry well, allowing the storm water to percolate slowly into the soil.<sup>10</sup> The rest of the gutters drain into the house's landscaped gardens.<sup>11</sup> Thus, none of the stormwater flows into the City's combined sewer system. By conserving water and diverting stormwater, the Net Zero house avoids contributing to the City's combined sewer overflow problem and helps keep pollution out of the area's waterways.

### **How does the Net Zero house utilize geothermal heat?**

The Net Zero house is the first use of a vacant lot in Buffalo for geothermal heating. The house produces its heat through a closed loop geothermal and radiant floor heating system. PUSH Buffalo placed plastic tubing throughout the floors of the home and connected the pipes to a heat pump in the basement. They also utilized the vacant lot next to the Net Zero house by digging trenches, placing plastic tubing into the trenches, and then filling the trenches back in. The geothermal heating system circulates a mixture of water and antifreeze, from the pump in the basement, through the plastic tubing in the ground, where the natural temperature of the ground heats the water to fifty five degrees. This water then returns to the basement where a heat exchanger processes the water, heating it to a more suitable temperature. Finally, the system circulates the water through the plastic tubing in the floors, heating the entire house.



PUSH Buffalo is currently planning a Net Zero house project next door at 16 Winter Street that will share the geothermal heating system with the 10 Winter Street house.<sup>12</sup>

Utilizing the vacant lot next to 10 Winter Street to produce geothermal heat accomplishes two of PUSH Buffalo's goals. First, and most obvious, it generates all of the Net Zero house's needed heat. Secondly, the project puts a vacant lot to use, changing the view of vacant lots from that of useless eye sore, to a productive, efficient property.

### **What type of roof does the Net Zero house have installed?**

The roof of the Net Zero house was fitted with a 100% recyclable, galvanized, metal roof. This style roof helps to keep the house cool on the hottest days by reflecting the heat, thereby reducing the need to cool the house with other energy consuming devices.



### **How does the Net Zero house use the energy it produces efficiently?**

PUSH Buffalo designed the Net

Zero house not only to use clean energy, but to use energy more efficiently. With this concept in mind, PUSH Buffalo created a “thermal envelope”, insulating the house with three different types of insulation. They first installed rigid foam board over the studs of the house; then they had dense pack cellulose blown into the spaces between the foam board and the studs. Finally, they used spray foam insulation was to insulate any small cracks that might allow energy to escape.

### **How much did these green technologies cost and what are the anticipated savings?**

The photovoltaic solar panels cost approximately \$18,000, after deduction of the \$5,500 NYSERDA rebate.<sup>13</sup> The solar thermal water heating system cost \$7,500, and the insulation cost \$12,000.<sup>14</sup> Finally, the geothermal heating cost \$12,000 for the materials<sup>15</sup> (the labor was donated).<sup>16</sup>

It is difficult at this time to calculate projected savings because the project simulated new construction conditions.<sup>17</sup> In other words, it is as if the house is completely new; PUSH Buffalo does not have a baseline energy consumption to compare the performance of the Net Zero House to.<sup>18</sup>

### **How did PUSH Buffalo use the Net Zero House as an opportunity to employ disadvantaged workers?**

PUSH Buffalo worked in cooperation with various organizations, such as the Outsource Center, and different unions from the area to educate and train disadvantaged workers in practical, on-the-job skills. The Net Zero house took on five new trainees every ten weeks. The trainees took part in a five week training course where they learned skills such as basic carpentry and other various green construction skills.

These workers are better equipped to find permanent work with these practical construction skills. Over time, PUSH workers have gone on to start their own businesses or have found work at construction sites around the area – including other PUSH Buffalo projects. Recently, roughly twenty trainees found work with the Lafayette Hotel project and in January 2011, two trainees found work on PUSH’s Massachusetts Avenue Development project.<sup>19</sup>



## How has PUSH Buffalo used the Net Zero house project as a tool to help local businesses?

In working on the Net Zero house, PUSH Buffalo chose to work with local businesses on different facets of the house. For example, the company PUSH Buffalo hired to install the photovoltaic solar panels on the roof was a local company that was just breaking into the solar panel business.



## Is the house completed? Are there tenants living in the house or lined up?

PUSH Buffalo is putting the finishing touches on the house, including finishing the control wiring for the geothermal system.<sup>20</sup> Currently, they are in the process of advertising the house to prospective tenants.<sup>21</sup>

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<sup>1</sup> All information is from personal communication with Aaron Bartley, October 4, 2011 (unless otherwise denoted).

<sup>2</sup> Personal Communication with Clarke Gocker, October 13, 2011.

<sup>3</sup> Id.

<sup>4</sup> Id.

<sup>5</sup> Id.

<sup>6</sup> eartheasy Solutions for Sustainable Living, Low-Flow Aerators/Showerheads, [http://eartheasy.com/live\\_lowflow\\_aerators.htm](http://eartheasy.com/live_lowflow_aerators.htm).

<sup>7</sup> Personal Communication with Clarke Gocker, October 13, 2011.

<sup>8</sup> Id.

<sup>9</sup> Id.

<sup>10</sup> Personal Communication with Clarke Gocker, October 18, 2011.

<sup>11</sup> Id.

<sup>12</sup> Geothermal heating in the house!, People United for Sustainable Housing, November 21, 2010, <http://www.pushbuffalo.org/index.html?id=20101123182005>.

<sup>13</sup> Personal Communication with Clarke Gocker, October 13, 2011.

<sup>14</sup> Id.

<sup>15</sup> Id.

<sup>16</sup> Id.

<sup>17</sup> Id.

<sup>18</sup> Id.

<sup>19</sup> PUSH Members Rodney and Tefilio Hired Full-Time on the MAD Plan!, January 31, 2011, <http://www.pushbuffalo.org/index.html?id=20110131201957>.

<sup>20</sup> Personal Communication with Clarke Gocker, October 18, 2011.

<sup>21</sup> Id.