# Hudson Green Community Designation Grant Project Narrative

The Town of Hudson plans to follow its approved Energy Reduction Plan (ERP) in using its Green Community Designation Grant Funds. Since we began our Five Year Plan in FY2019, we are currently in Year 2 of the ERP. The first two projects planned for Year 2, replacing the boilers in the High School and Mulready School, are already in the Capital Plan, so we will not require the use of Green Communities Funds for these. The remaining Year 2 projects include:

- Variable Frequency Drive pumps for Mulready School
- Insulation for the Main Fire Station
- Efficient heaters and a heat timer in Fire Station 1

These projects were chosen because they have significant energy savings and relatively short payback periods. We plan to use our Green Communities Funds for these projects and additionally for two projects originally planned for Year 3:

- Variable Frequency Drive pumps for Forest Ave School and Farley School
- Insulation for the Library

As all of our projects are under $100,000, we will be using National Grid-approved contractor Horizon Solutions. This company performed an audit for the town and provided the documentation that was used to formulate our Energy Reduction Plan.

School projects will be managed by School Buildings and Grounds Director Len Belli and Assistant Director Wayne Miller. Projects for the remainder of the Town Hall buildings will be managed by Maintenance Coordinator Ray Girard and Environmental Planner Pam Helinek. All paper-work, contracts, and reporting will be handled by Pam Helinek.

## PROJECT 1 – VFD Pumps Mulready School

The total energy use for the Mulready School in native units is 160,476 kWh and 16,167 therms.

The mechanical equipment room in the JL Mulready School contains two 7 1/2 HP drive motors, and neither motor is VFD compatible. The motors drive Taco end-suction pumps. These pumps run constantly, circulating hot water at full flow, regardless of demand.

The project is to install Variable Frequency Drives (VFDs) to control hot water circulating pump output. New Premium Efficiency, VFD compatible drive motors will be installed as well. Pump speed will be responsive to demand and will be controlled by pressure differential. Significant energy savings and associated cost savings should result.

Work will be done in the summer to avoid disruption when school is in session. Electric, gas, and plumbing permits will be required.

The following is the control sequence of operations for the VFDs. For each VFD pump installation, there will be pressure sensors in place. Differential pressure signals are sent to the

VFDs to regulate pump motor speed for each. For example, when an individual heating unit's water valve is closed i.e. when heat is not required, hot water pressure is elevated. The resulting elevated water pressure differential signal is sent to the VFD, and pump motor speed is reduced. When additional heating valves are opened, the opposite occurs, with a reduction in water pressure, and the VFD speeds up the pump motor.

The estimated cost from our audit was quoted at $16,535. We don't expect any rebates or incentives. Our projected annual cost savings are $1641.

### Projects 2 – Fire Station 1 HWR Heat Timer

The total energy use for Fire Station 1 in native units is 39,332 kWh and 4167 therms.

An Elite Series Boiler controller is in place on Fire Department No. 1's boiler. It is operating, but current condition is questionable. This type of boiler control can only control of water temperature in response to outside air temperature.

We will start by having customer service inspect the existing Heat Timer. If it can be repaired, the rest of this project will not be necessary.

If it cannot be repaired, the project is to install a Heat Timer HWR Controller on this boiler. The controller is designed to control water temperature in response to outside air temperature, to accommodate multiple day and night schedules, and to bring a building quickly back to comfortable temperatures after the cooler night period.

The project is planned for the spring. An electric permit will be required.

The estimated cost of the project is $4247 and a $701 utility rebate is expected, resulting in a budget of $3546. Projected annual cost savings are $374.

### PROJECT 3 – FIRE STATION 1 EFFICIENT HEATERS

The total energy use for Fire Station 1 in native units is 39,332 kWh and 4167 therms.

Three suspended gas–fired unit heaters furnish heat to the garage at Fire Station #1. These are older units operating at thermal efficiency significantly less than nameplate rating.

The project is to remove the existing unit heaters and install three high efficiency condensing natural gas–fired unit heaters. New heaters will be located at same locations as existing units. A substantial energy savings is expected to result.

The project is planned for the spring. Electric and gas permits will be required.

The estimated cost of the project is $38919 and a $4337 utility rebate is expected, resulting in a budget of $34,582. Projected annual cost savings are $2313.

## PROJECT 4 – MAIN FIRE STATION INSULATION

The total energy use for the Main Fire Station in native units is 205,280 kWh and 9952 therms.

Currently there is no insulation under the plywood roof. The project is to add Johns Manville FSK Fire Retardant Batts to all drop ceilings in the upper living space, resulting in R-38 insulation levels.

The project is planned for the spring. A building permit will be required.

The estimated cost of the project is $50,549 and a $8953 gas utility rebate is expected, resulting in a budget of $41,596. Projected annual cost savings are $6958.

## PROJECT 5 – VFD Pumps Forest Ave School

The total energy use for the Forest Ave School is 279,512 kWh and 16,123 therms.

The mechanical equipment room in the Forest Avenue School contains two 10 HP drive motors. The first is premium efficiency, VFD compatible, while the second drive motor is less efficient, and not VFD compatible. Motors drive Taco end-suction pumps. Pumps run constantly, circulating hot water at full flow, regardless of demand.

The project is to install Variable Frequency Drives (VFDs) to control hot water circulating pump output. One new Premium Efficiency, VFD compatible drive motor will be installed as well, to replace the second drive motor which is not VFD compatible. Pump speed will be responsive to demand and will be controlled by pressure differential. Significant energy savings and associated cost savings should result.

Work will be done in the summer to avoid disruption when school is in session. Electric, gas, and plumbing permits will be required.

The following is the control sequence of operations for the VFDs. For each VFD pump installation, there will be pressure sensors in place. Differential pressure signals are sent to the VFDs to regulate pump motor speed for each. For example, when an individual heating unit's water valve is closed i.e. when heat is not required, hot water pressure is elevated. The resulting elevated water pressure differential signal is sent to the VFD, and pump motor speed is reduced. When additional heating valves are opened, the opposite occurs, with a reduction in water pressure, and the VFD speeds up the pump motor.

The estimated cost from our audit was quoted at $13,964. We don't expect any rebates or incentives. Our projected annual cost savings are $2124.

## PROJECT 6 – LIBRARY INSULATION

The total energy usage for the library is 109,140 kWh and 3077 gallons of oil.

Currently, there is approximately 3 in. thick mineral fiber insulation on attic floor. The proposal is to add 5.5'' Closed Cell Spray Foam and International Fire Technology DC-315 Thermal Barrier along the roof line, resulting in R-38 insulation levels.

The project is planned for the spring. A building permit will be required.

The estimated cost of the project is $40,027 and a $1100 gas utility rebate is expected, resulting in a budget of $38,927. Projected annual cost savings are $1624.

### PROJECT 7 – VFD Pumps Farley School

The total energy use for the Farley School is 331,134 kWh and 21,831 therms.

The mechanical equipment room in the Farley School contains two 15 HP drive motors. Both are VFD compatible. Motors drive Taco end-suction pumps. Pumps run constantly, circulating hot water at full flow, regardless of demand.

The project is to install Variable Frequency Drives (VFDs) to control hot water circulating pump output. Existing drive motors will be retained. Pump speed will be responsive to demand and will be controlled by pressure differential. Significant energy savings and associated cost savings should result.

Work will be done in the summer to avoid disruption when school is in session. Electric, gas, and plumbing permits will be required.

The following is the control sequence of operations for the VFDs. For each VFD pump installation, there will be pressure sensors in place. Differential pressure signals are sent to the VFDs to regulate pump motor speed for each. For example, when an individual heating unit's water valve is closed i.e. when heat is not required, hot water pressure is elevated. The resulting elevated water pressure differential signal is sent to the VFD, and pump motor speed is reduced. When additional heating valves are opened, the opposite occurs, with a reduction in water pressure, and the VFD speeds up the pump motor.

The estimated cost from our audit was quoted at $11,913. We don't expect any rebates or incentives. Our projected annual cost savings are $2124.