





Memorandum

TO: Kevin Jackson, Village Manager 

FROM: Marcella Bondie-Keenan, Sustainability Coordinator
Ahmad Zayyad, Deputy Village Manager 

FOR: Village President and Board of Trustees

DATE: September 6, 2022

SUBJECT: Sustainability Considerations regarding the Fire Station II (North Fire Station) Heating System Upgrade Project

This memo provides additional environmental impact considerations for decision making regarding agenda item RES 22-216 “A Resolution Approving an Independent Contractor Agreement with Comprehensive Construction Solutions, LLC to Replace the Boiler System at the North Fire Station in an Amount Not to Exceed \$40,293.75 and Authorizing its Execution”.

This analysis is supplemental information to the Clark Dietz “HVAC Upgrade Feasibility Study” and evaluates externalized environmental and financial costs, and alignment with Village policy regarding sustainability, equity, and affordability. The four heating system options for the North Fire Station are: 1.) Natural gas boiler; 2) Natural gas furnace; 3). Air source heat pump; and 4.) Geothermal.

Data Analysis

1. **Alignment with Sustainability Policy.** On August 1, 2022, the Village Board passed a resolution adopting *Climate Ready Oak Park*, declaring a climate emergency, and committing to greenhouse gas reductions goals. The goals include reducing 60% of community greenhouse gas emissions by 2030, and becoming a net zero carbon community by 2050. Furthermore, Section 8 of the resolution states, “The Village adopts a goal to meet the energy needs of Village facilities with 100% renewable electricity by 2030 without the use of renewable energy credits.”

Options 3 and 4 produce zero greenhouse gas emissions from the system equipment. While it is true that Oak Park’s current electricity is not completely renewable energy, State legislation mandates that Illinois shift to 100% renewable energy by 2050. The Village can also take local action, by negotiating renewable energy agreements for facility electricity needs. By contrast, natural gas appliances will always generate greenhouse gas emissions. Of the four heating system options,

only Option 3 (air source heat pump) and Option 4 (geothermal system) align with this policy.

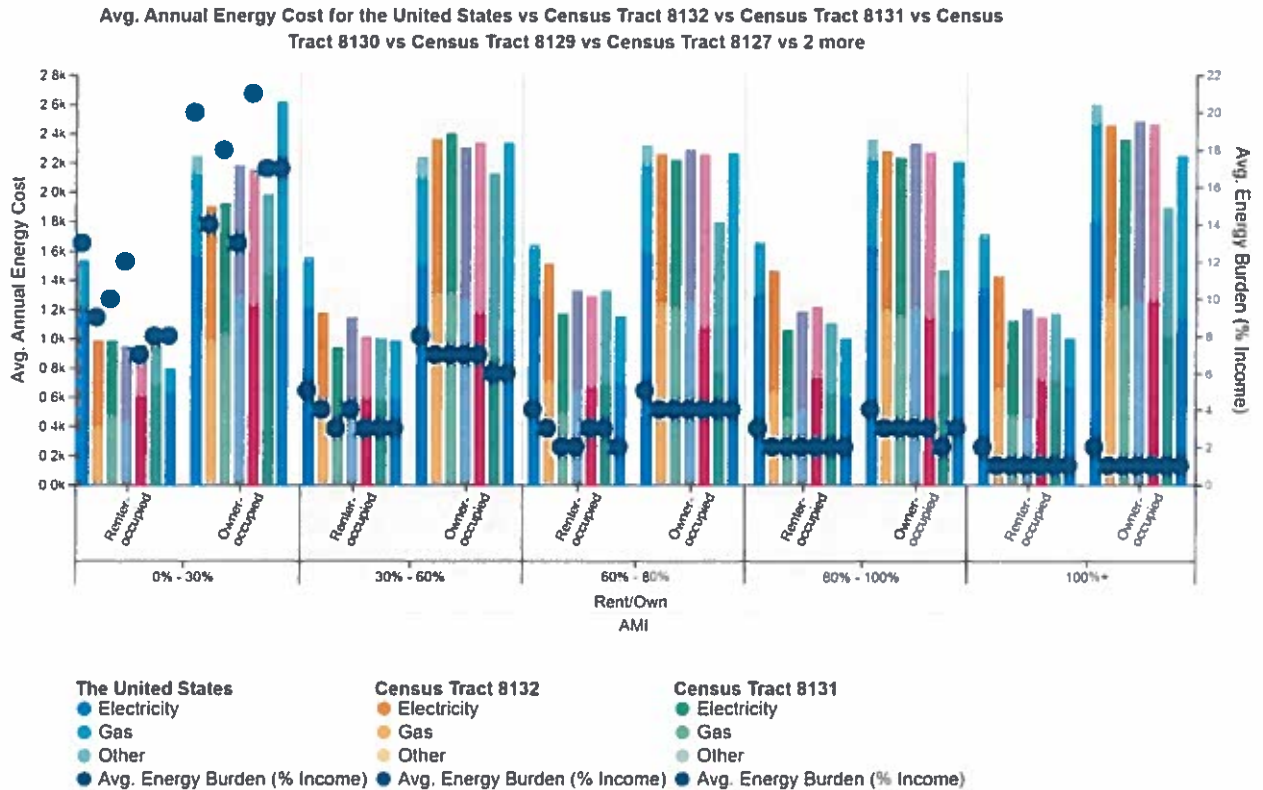
2. **Alignment with Community Affordability Goal.** On June 14, 2021, the Village Board adopted the goal *Value Community Affordability*. Option 1 (natural gas boiler) and Option 2 (natural gas furnace) continue to rely on the Nicor municipal franchise agreement that provides free natural gas to Village facilities. While this policy provides a lower natural gas cost to the Village, this cost is shifted to Nicor ratepayers, meaning Oak Park residents and business owners. This higher energy burden makes Oak Park less affordable. Option 3 (air source heat pump) and Option 4 avoid shifting the energy burden onto Oak Park community members.

3. **Alignment with Racial Equity Goal.** On June 14, 2021, the Village Board adopted the goal *Be a Leader in Racial Equity*. Research shows that energy burden (the percent of income spent on energy bills) is disproportionately born by people of color, low-income people, renters, and other vulnerable populations.¹ Low-income Oak Parkers pay a substantially higher proportion of their income towards energy costs, including natural gas. As discussed in item 2, the continued receipt of free natural gas exacerbates the energy burden on vulnerable Oak Park community members. Option 3 (air source heat pump) and Option 4 (geothermal) avoids this inequity.

The chart below illustrates that in Oak Park, natural gas costs approach or exceed electricity costs, and low-income Oak Parkers pay a higher proportion of their income towards energy costs.³

¹ <https://www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf>

³ <https://www.energy.gov/eere/slsc/low-income-energy-affordability-data-lead-tool>



4. Geothermal Systems Now Eligible for 30% Federal Rebate. Significant Federal, State, and utility funding is available for building electrification, weatherization, and energy efficiency. The recently authorized federal Inflation Reduction Act (IRA) provides a 30% rebate to local governments installing renewable energy systems, such as geothermal, beginning in 2022. This is an extension of the Investment Tax Credit.⁴

Using the July 2022 cost estimate, which provides the best apples-to-apples comparison across the four options, the cost of Option 4 (geothermal) after the IRA incentive is expected to be approximately \$185,000.

5. Geothermal System's Payback Period Estimated At Less Than 10 Years. As noted by the ClarkDietz report, the geothermal system will pay for itself in time. A geothermal system produces renewable energy and operates at 400% efficiency. By contrast, Option 1 (gas boiler) requires fossil fuels and is only 95% efficient. With incentives, the payback period for Option 4 (geothermal) is expected to be less than 10 years. In addition, the geothermal well field life span will be at least 50 years. In the event that the North Fire Station is rebuilt in the future, Option 4 (geothermal well field) will remain as a permanent energy asset that can be reconnected to any new facility located at the site.

⁴ <https://www.natlawreview.com/article/general-overview-inflation-reduction-act-2022>

- 6. Future-proofing Village Energy Costs.** Natural gas can no longer be assumed to be the cheapest energy option for long-term decisions such as facility upgrades. Natural gas costs are currently 2.5 times higher than they were a year ago. In fact, in Oak Park, residential natural gas costs approach or exceed electricity costs. Option 4 (geothermal) enables the Village to achieve greater “energy independence” by investing in onsite renewable energy that isn’t vulnerable to price shocks caused by global market conditions. Furthermore, redesigning the scope of this project will enable the inclusion of cost-saving weatherization measures and a nuanced geothermal design that will enable the North Fire Station heating system to be right-sized, potentially inclusive of the apparatus bay, and less expensive to install and operate.

Energy Star Portfolio for the North Fire Station provides historical data on natural gas usage at the facility. The annual natural gas usage for baseline year 2019 is 4,057 therms. If Option 1 (95% efficient gas boiler) were implemented, the natural gas usage could be about 2,800 therms annually. This is equivalent to 14.8 Metric Tons of Carbon Dioxide equivalents (MTCO_{2e}) each year. To sequester this amount of carbon would require growing 245 tree seedlings for 10 years.⁵ By 2030, the cost for purchasing carbon offsets for this amount could be as much as \$3,611 each year.⁶

The September 2022 cost per therm is \$1.24. This is nearly 2.5x the cost of natural gas as of one year ago. The conventional wisdom that natural gas will always be cheap can no longer be relied upon for long-term decisions. The annual natural gas cost for the current heating system at North Fire Station is \$5,030. This cost is passed on to Oak Park community members, as discussed above. Over the life of a 20-year heat pump system, this is a savings of over \$100,000 in natural gas costs.

The current scope of work for the North Fire Station does not include building weatherization measures that would allow any heating system to be right-sized, i.e. less expensive to install and operate. Weatherization is an extremely cost-effective measure that should be conducted as a precondition of any building energy system upgrade. Redesigning the project scope with weatherization considerations will allow the cost of a heat pump system to be further reduced. See the July 29, 2022 report provided by Architectural Consulting Engineers for further details.

⁵ <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results>

⁶ <https://www.bloomberg.com/professional/blog/carbon-offsets-price-may-rise-3000-by-2029-under-tighter-rules/>

Energy Use by Calendar Month (Not Weather Normalized) for Augusta Fire Station

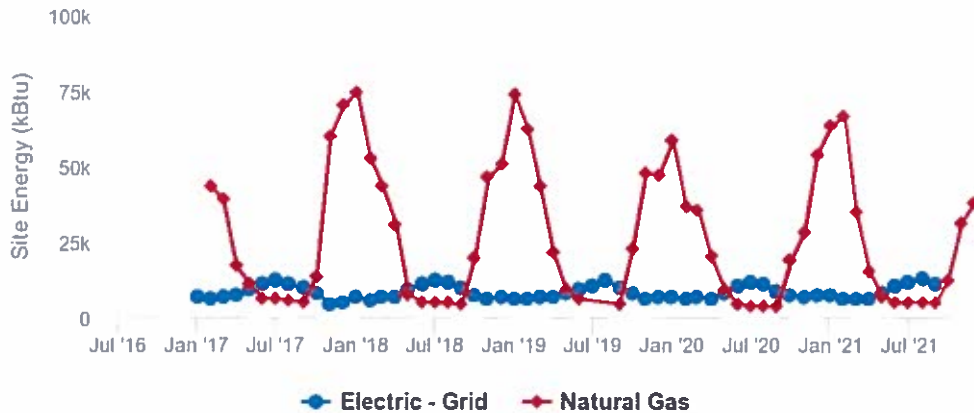


Figure 1. Energy Star data, North Fire Station

- Acknowledging Environmental Costs.** Greenhouse gas emissions from natural gas and other fossil fuels are driving the climate change that we have observed over the past 60 years. In Oak Park, commercial buildings like the North Fire Station are responsible for a third of community greenhouse gas emissions. If greenhouse gas emissions are not reduced by 50% globally by 2030, the impacts of climate change will become increasingly destabilizing, leading to natural and economic disasters. While the human cost of climate change can never truly be reflected in dollars, we can measure the projected price of purchasing carbon offsets to pay others to sequester the greenhouse gas emissions that Oak Park produces. By 2030, the price of purchasing carbon offsets for Option 1 (gas boiler) could add over \$3,600 to operating costs each year.

For any questions, please contact Marcella Bondie Keenan, Sustainability Coordinator, at (708) 358-5700 or Sustainability@oak-park.us.

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All Department Heads
Christina M. Waters, Village Clerk

