Plainfield Park District

Program Area:
Net Zero Program

County:
Will and Kendall Counties

Grantee:
Plainfield Park District

Grant Date:
2017

Grant Amount:
$1,000,000

Location:
Plainfield, IL 60544

Project: Net Zero Energy Prairie Athletic Recreation Center – New Construction
Gross Square Footage: 37,500 sq ft
Delivery Method: Total Cost: $11,674,380
Funding: Illinois Clean Energy Community Foundation, Plainfield Park District Capital Fund
Incremental Net Zero Energy Cost
– **Building Upgrades:** $758,415
– **Photovoltaics:** $564,276
– **Total:** $1,322,691
Incremental Net Zero Energy Cost (% of total): 11.3%
PV Array: 248.8 kW DC
Predicted Annual Energy Consumption: 244,354 kWh
Predicted Annual Energy Generation: 281,278 kWh
Certifications: PHIUS+ 2015 and PHIUS Source Zero
Contact: Carlo Capalbo, Executive Director, Plainfield Park District, Capalbo@plfdparks.org

The Plainfield Park District (PPD) is located about 38 miles southwest of downtown Chicago, IL and encompasses approximately 27,545 acres of Will and Kendall counties. The District was founded in 1966 and is currently

governed by an elected seven-member board with the primary purpose to provide parks and recreational opportunities to its residents.

In 2023, the District was named a finalist for the 2023 National Gold Medal Award for Excellence in Park and Recreation Management; in 2022, the District joined the ranks of elite park and recreation agencies across the country by earning accreditation through the Commission for Accreditation of Park and Recreation Agencies and the National Recreation and Park Association. The PPD is also an Illinois Distinguished Accredited Agency for excellence in delivering parks and recreation services.

The PPD strives to serve its constituents in alignment with its Mission, Vision, and Values. With sustainability as one of its core values, the District embarked on the design and construction of a net zero recreation facility, the first of its kind in Illinois. The board approved an extra $350,000 to allow for the building upgrades needed to achieve net zero energy building performance, above and beyond the $1,000,000 grant from the Illinois Clean Energy Community Foundation. Construction of the Prairie Athletic Recreation Center (PARC) took place during 2018-2019.

To help attain a low energy use intensity, the new facility is oriented along an east/west axis with very limited glazing on the west façade and additional openings on the north side to enhance daylighting. Daylight modeling was done to confirm that all major spaces would have access to daylight. The strategic placement of the windows resulted in daylighting of all spaces even though the facility has a 11.7% window-to-wall ratio. The building uses LED lighting throughout with daylight sensors for daylight harvesting. In addition, PARC has a very efficient envelope, including highly insulated walls (R-30) and roof (R-55), as well as a very efficient glazing system. The building also has a very low infiltration rate, meeting the Phius certification requirements.

The recreation center uses variable refrigerant flow (VRF) and dedicated outdoor air systems (DOAS) in the administration area and daycare classrooms, and Air Source Heat Pump (ASHP) roof top units for the high-volume spaces. The results prove that current ASHP technology is very efficient in climate zone 5A; with some adjustments to the control sequence, the ASHP can condition the space until outdoor temperatures drop to 0 degrees F.

The recreation center relies on 249 kW-DC of solar photovoltaic (PV) panels to offset its energy consumption. There are 592 panels (Mission Solar 360 W) installed on the roof and an additional 85 panels (Axitec 410 W) are ground-mounted nearby. The PARC facility struggled with the performance of the PV system inverters: 19 of 21 Reliable Power/HiQ solar inverters needed replacement, some multiple times. In addition to long lead times to get replacement inverters installed, this proved very costly for the PPD, and limited the energy generation of the solar array during the prime generation months. During its first 12 months of net zero energy performance, the panels generated 271,979 kWh, just offsetting the 270,780 kWh of energy PARC consumed.

Building performance monitoring was accomplished through a combination of monthly utility analysis, end-use submetering, equipment building automation system (BAS) data, and onsite measuring. End-use meters include electric HVAC, lighting, plug loads, elevator, gas, and PV. The data is analyzed by the team and compared to the past month, similar months in previous years, and the energy model to evaluate if the systems are operating within a reasonable range. The BAS records the performance of system equipment, including but not limited to fan operation status, heating and cooling coil status, outdoor air damper position, etc. All the data is analyzed to evaluate if the systems are operating correctly or if there is room for improvement. During the performance verification period, the results of the analysis were shared with the building operations groups at PARC, the HVAC manufacturer (TRANE) and the design team (Wight & Co.) to make course corrections and maintain the anticipated level of building efficiency.

Suggestion from Carlo Capalbo: “The Plainfield Park District is honored to be an inaugural net zero energy recreation center. By looking at ways to be a trailblazer in energy efficiency and future sustainability strategies, our agency has seen that the time investment and efforts are well worth the rewards. We encourage more agencies to take on the challenge!”

Lessons Learned: As the first recreation center in Illinois to be designed and operated as a net zero energy facility, there were challenges. As more agencies follow this trend, additional learnings will provide better insight, but lacking that knowledge, we had to learn through experience. If you want to successfully operate a net zero energy facility, have the BAS integrated with the HVAC and PV system generation and allow for real-time monitoring. We would suggest dedicating an individual on your staff to monitor the BAS and solar panel production on a daily basis. (Having had a lot of turnover during

the building performance verification period created challenges.) While we have made improvements, there were times of a “wait and see” mentality on adjustments and modifications, that adversely impacted building performance.

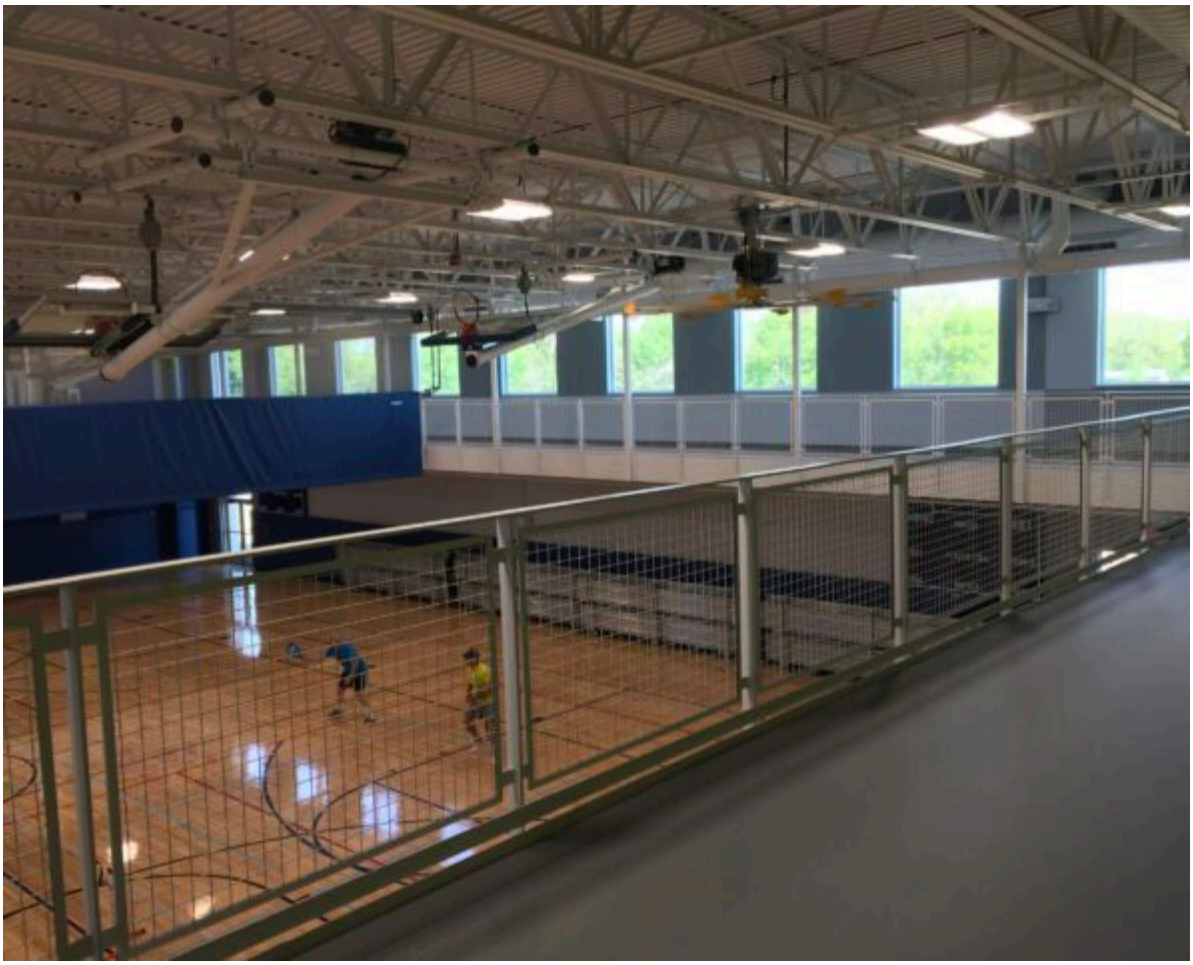
Project Team
Architect: Wight & Co.
MEP Engineer: Wight & Co.
Civil Engineer: Wight & Co.
Structural Engineer: Wight & Co.
Construction Company: Wight Construction Services
PV System Design: Huen Electric
Lead Phius CPHC: Lisa White
Phius Certified Verifier: Emmily Rhea
On-site Verification: EcoAchievers

Link to building data
https://www.plfdparks.org/parks-facilities/prairie-activity-recreation-center/net-zero/


NET ZERO
what
we're doing.
R-60
R-40
wall insulation
R-20
ENERGY
why
we're doing it.
our
CO2
97%
smaller carbon
footprint
their
CO2
LOSE ENERGY
65%
electricity and you.
BUILDING
performance

Kmiecik Imagery

Kmiecik Imagery

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