The Woodridge Park District's mission is to “enhance quality of life by providing superior parks, facilities, and recreational services in a fiscally responsible and environmentally sustainable manner, in partnership with the community.”

This mission is exemplified in their recently constructed Athletic Recreation Center in Woodridge, IL. The Park District involved the community every step of the way to make sure that the facility would meet the community’s needs. By bringing affordable athletic programming to users, the Athletic Recreation Center benefits the community in numerous ways. Users are healthier, leading to reduced health care costs. The beautiful new facility attracts home buyers and businesses. Programming decreases loneliness and prevents youth crime.

Not only that, the Athletic Recreation Center was constructed--and is operated--in a fiscally responsible and environmentally sustainable way. Indeed, environmental sustainability and fiscal responsibility often go hand in hand: an energy efficient design will reduce operating costs, and funding from energy efficiency programs makes constructing an efficient building more affordable. In this case study, we explore how SEDAC helped the district achieve its goals.

"In all our buildings, we consistently look for energy efficiency. We are always open to any green initiatives that have a good return on investment, especially if those initiatives can be subsidized through grants."
--Mike Adams, Woodridge Park District Executive Director
Many of these recommendations consist of going beyond code in envelope construction, equipment selection, and lighting standards. Illinois mandates that all new buildings and major renovations meet current energy code requirements, but going beyond code can lead to additional energy savings. An added bonus: going beyond code makes buildings eligible for energy program incentives. SEDAC estimated that by following these recommendations, the park district would be eligible for over $200,000 in incentives.

SEDAC modeled the energy and cost savings for the recommendations, and provided an economic analysis for all measures to show the return on investment.

Table 1: Initial Savings and Economic Analysis

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<tbody>
<tr>
<td>Annual electricity savings</td>
<td>262,000 kWh</td>
</tr>
<tr>
<td>Annual natural gas savings</td>
<td>30,000 therms</td>
</tr>
<tr>
<td>Annual energy cost savings</td>
<td>$39,000</td>
</tr>
<tr>
<td>Incentives available for measures</td>
<td>$217,000</td>
</tr>
<tr>
<td>Capital cost (including incentives)</td>
<td>$338,000</td>
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<tr>
<td>Simple payback</td>
<td>&lt; 9 years</td>
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Mr. Adams worked with the architects (Williams Architects) and engineers (WT Mechanical/Electrical Engineering) to prioritize recommended measures. The Park District received new bids for energy efficient equipment and designs. They were most interested in implementing measures that had a payback of 7 years or less. Based on SEDAC’s economic analysis, the Park District decided to implement all but two of the recommendations.

The Athletic Recreation Center was completed in 2017, and users are enjoying the facility’s many amenities: a fitness center, a large indoor field with artificial turf, a multi-court gymnasium, a walking/running track, a ropes course, and program rooms. The improvements recommended by SEDAC have reduced energy costs and made the facility more comfortable for users. Take a virtual tour of the facility at https://www.wpdarc.org/.

“SEDAC is a great resource. They give you a laundry list of energy efficiency measures, calculate the cost savings, and help you compare measures to get the best possible outcome. I recommend working with SEDAC from the beginning of a planning cycle.” --Mike Adams
Continuous Insulation. Continuous insulation (a layer of insulation unbroken by structural framing) is now required for walls and roofs. A designer should be able to draw an unbroken line of insulation around the building envelope, leaving no hidden gaps to leak energy dollars. Energy codes require minimum levels of insulation. SEDAC recommended exceeding code minimums to make the building more efficient and comfortable.

Continuous insulation also helps prevent thermal bridging. Thermal bridging occurs when insulation is interrupted, and highly conductive materials like metal studs or concrete allow heat to move freely from one side of the wall to the other. The result is thermal bridging every 16 inches, which results in heat loss and moisture problems.

SEDAC recommended installing an insulated transparent wall system in place of glass for windows in the turf area (see image above). These panels can be selected at desired thickness and light transmission levels to improve the overall thermal performance of the building envelope and the quality of daylighting in the facility.

MECHANICAL MEASURES

Ventilation filters outside air into a building to provide building occupants with fresh air, while exhausting contaminated air. Depending on weather conditions, ventilation air must usually be either heated, cooled, or humidified/dehumidified. Because of this, ventilation represents a significant portion of HVAC energy consumption.

Demand Control Ventilation (DCV) systems save energy by reducing the amount of outdoor air brought in that requires conditioning. DCV systems employ automated controls to reduce outdoor air intake below the rates required for maximum design occupancy—when, as is frequently the case, actual occupancy is lower than the maximum.

LED Lighting. The lighting system represents the largest single component of the ARC’s energy cost (27%). The energy code sets requirements for lighting power density, but advances in the development of lighting technologies have stayed well ahead of minimum requirements. SEDAC recommended at minimum a 10% reduction in the maximum lighting power density for the facility. Reducing the lighting wattage has the additional benefit of reducing cooling loads.
TOP 10 RECOMMENDATIONS FOR NEW CONSTRUCTION

1. **Orientation and Form.** Orient building on east-west axis, minimize west glazing and shade south glazing.

2. **Insulation.** Insulate beyond code: min. assembly R-14 for mass wall, min. assembly R-22 for steel-framed wall, min. assembly R-35 for roof above deck. Use low-E gas-filled insulated glazing with max. assembly U-0.35 including frame.

3. **Air Sealing.** Add air sealing standards as a part of the specification. Require performance testing at completion of construction. Consider envelope commissioning.

4. **Lighting.** Target lower lighting power density (LPD: W/sf) than code allowed maximum, while meeting IESNA lighting level recommendations. Choose high efficacy (lumen/W), long lasting lamps with good Color Rendering Index (CRI). Implement effective lighting control strategies based on schedule (timers), occupancy (occupancy sensors), and available daylight (photocells).

5. **Reduce loads.** Use ventilation heat recovery. Modulate ventilation rates based on occupancy with demand control ventilation. Shade glazed surfaces.

6. **Heating.** Use high efficiency boilers and furnaces of 92% efficiency or better. Consider using a geothermal heat pump. Consider a hydronic system with a dedicated outdoor air system.

7. **Cooling.** Use high efficiency (SEER 14+, EER 11.5+) air conditioning equipment with an outdoor air economizer. A geothermal heat pump is also recommended.

8. **Commissioning.** Commission HVAC and mechanical systems to de-bug and ensure systems operate according to design.

9. **Motors and Pump.** Use variable frequency drives on electric motors with variable loads. Use premium efficiency equipment.

10. **Building automation.** Use automatic controls to adjust temperature settings, ventilation, and system operation according to time of day and building loads. Use BAS trend logs to assess system performance.

After implementing all of these, consider renewables such as solar and wind.

SAVE ENERGY AND MONEY WITH SEDAC

**TECHNICAL ASSISTANCE**

SEDAC provides technical assistance to help new and existing buildings become more energy efficient. We offer:

- Quick advice and implementation assistance
- Design assistance for new construction and renovation
- Energy assessments for existing buildings
- Retro-commissioning
- Benchmarking
- Long-term energy planning
- Help navigating energy efficiency programs and incentives

Find out how SEDAC can help your facility save energy and money at [apply.sedac.org](http://apply.sedac.org).

**EDUCATION AND TRAINING**

SEDAC is the Illinois Energy Efficiency Code Training Provider, on behalf of the Illinois EPA. Let SEDAC assist you in navigating code compliance for your new construction or renovation project. Training opportunities include:

- Workshops
- Webinars
- Online courses
- Information center (call us with technical questions)

Find out more at [sedac.org/energy-code](http://sedac.org/energy-code).

**WHO WE ARE**

The Smart Energy Design Assistance Center assists buildings and communities in achieving energy efficiency, saving money, and becoming more sustainable. SEDAC is an applied research program at the University of Illinois at Urbana-Champaign working in collaboration with the 360 Energy Group.