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Towne Redux : A Greener Field House

Introduction

Williams College's athletic facilities are comprised of Chandler, Lasell, Towne Field House, Cole Field House, the Lansing-Chapman ice rink, and Weston Field. These facilities were designed and built in times when electricity and oil were relatively cheap, and when the environment and global warming were non-issues. The facilities are indicative of this, as they are all fairly inefficient in many ways. As of last year, however, those times have officially ended at Williams College, due to the recommendations of the Climate Action Committee. Sustainability and the reduction of GHG emissions have now become a goal in all campus activity, including the use, modification, renovation and construction of athletic buildings. The reconciliation of this desire to reduce emissions, and therefore energy usage, with the economic expedient of continued unaltered use of these buildings and the construction of possible new athletic facilities at Williams is integral to the future of a greener campus, and by no means will be easily found.

Total electricity usage at Williams College for the fiscal year '07 was nearly 27 million Kwh, and at least 3 million Kwh, or 1/8th of total electricity, were used by Chandler/Lasell, Lansing-Chapman, and the Field Houses (Sustainability website). When it is taken into consideration that all of the athletic facilities use energy from

the steam plant (except for Cole), while some other parts of campus (most prominently Mission Park) use only electricity, the percentage of total campus energy usage that can be attributed to the athletic facilities may be higher than that of only electricity. Due to the lack of a campus wide metering system for the steam plant, this latter percentage can only be guessed at, but could be as high as 1/6th of total energy usage.

Obviously this number is quite hefty, and provides a relevant reason to look at the athletic complexes when searching for a method of energy reduction on campus.

A "green" athletic facility, which can help both with energy-use reductions and with garnering environmental support through certifications such as L.E.E.D., should be constructed of recycled and non-toxic materials, be well insulated, efficient with both energy and water (if not generating/collecting these resources), and provide a healthy space for building users. These qualities are relatively easy to produce when starting at the design level before construction has begun on a building, but renovating or modifying an old building in order to meet these standards is much harder.

The future of Williams' athletic facilities is uncertain at this point, but will surely include the modification of some existing buildings as well as the demolition and construction of others. The green effort will have to be manifested as the result of extremely efficient design for the new buildings that may be erected as well as the creative planning and weighing of various "greening" options in the existing athletic buildings that will remain in use.

The committee responsible for the future of athletic development options at Williams seems fairly unified when asserting that the demolition of Towne Field House, and the construction of a new Field House, is next on the to-do list after the completion of the Weston Field project. The Field House is not altogether old, but was built before the track was installed (which led to its not being NCAA compliant), and lacks training rooms, locker rooms, and has various other shortcomings. The new field house would rectify these problems, as well as better serve all the sports teams that currently use it (H. Sheehy, B. Lenhart, personal communications, April, 2008).

In order to build a new Field House that maximizes use of the space, as well as helps contribute to the College's goal of decreased emissions, an evaluation of the current Field House and other small college's field houses is essential.

Towne Field House

Towne Field House is located on the southern edge of campus, with the Lansing Chapman rink and the Chandler Athletic Complex just to the north. It was constructed in 1970 and has had one addition and a floor resurfacing since that time (Facilities website). The building is constructed of brick (for the walls), wood (ceiling and roof), and metal trusses and concrete (floor and supporting structures). It features two overlapping domes for the roof, which has a white covering to cut down on solar radiation absorption. On the east and west sides of the building, there are parking spaces, set out from the building about 15 feet, with small trees and grass occupying the space (personal measurements, May 2nd, 2008).

The building is 163 feet wide and 263 feet long, with an average height of around 35 feet (Google Earth). Total square footage is 40,962 (facilities website), and the volume is around 1.5 million cubic feet (personal estimate).

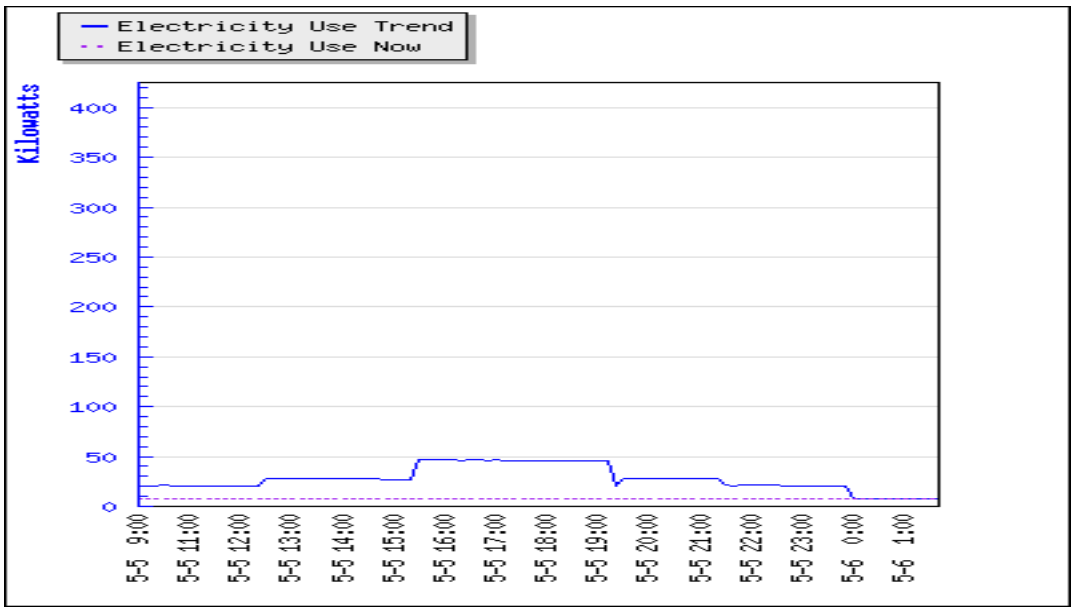
HVAC and Lighting and Elec. Usage

The ventilation system is the Field House is comprised of two large air intakes/exchangers, and two heating units. One air exchanger and a heater are located on the south wall 25 feet above the floor, and this is mirrored on the north wall with another exchanger and heater. The system is powered by electricity, and the heaters are tied to the College's steam system. There are no air conditioning units, and no humidification or dehumidification systems in place (K. Jensen, personal communications, April 27th, 2008). Also, the field house lacks significant insulation, for the walls are just 8 inch brick, and large holes in the walls are covered with just a thin layer of fiberglass sheeting.

The ventilation and heating system is operated through both a timer and a manual control box located on the north wall. The ventilation runs constantly, though at a lower level during the night. The heating is automatically controlled with a thermostat. The building is lit with a multitude of 400-watt metal halide lamps (K. Jensen). Originally developed for industrial use, they produce a "beam" of light, and require reflective luminaires to spread the light (Wikipedia).

Though a base current is always used for minimum ventilation, the energy use level is largely determined by when the lighting is turned on, and when the ventilation is turned up, as evidenced by Figure 1 below.

Figure 1



[1]

Having observed the Field House during the midday, it is easy to ascribe the spikes in usage to the ventilation and lighting. At noon, the ventilation system increased its intensity (audibly so), accounting for the rise on the graph. Shortly after 3 p.m., the lighting was turned entirely on for a plyometrics practice for the hockey team, accounting for that rise on the graph. The base current seen is mainly because of the constant ventilation, and a small number of lights that were turned on early in the morning (for the "town walks") on the day I observed.

Towne is not a huge user of electricity – the major draws seem to be the ventilation and lighting systems. For the month of February, Towne used 30,000 kwh of electricity. Compared to Chandler Athletic Complex's (125,000), or the Paresky Center's (110,000) total usage during the same period, the electricity draw

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[1] **Image obtained through Sustainability website**

seems fairly small. However, those facilities are used by a much larger number of people, and in proportion to user frequency, the Field House could be using more than both Paresky or Chandler. For the square footage of the building, though, Towne comes out on top, using on average .75 Kwh/Sq.ft, while Chandler consumes 1.4 Kwh (Sustainability website). Because Towne is mainly one large area, instead of being multiple rooms, this fits with predictions. Towne also has very little electrical equipment (treadmills, computers, etc.), which surely contributes to this figure.

Uses of the Field House

Towne Field House is utilized for a large variety of sports at Williams, including Baseball, Track, Tennis, Lacrosse, Softball, Soccer, Frisbee, Basketball, and Climbing, and is also used for "town walks". Its peak usage comes in the winter and early spring. Most sports use Towne as just a training venue until the weather becomes more conducive to being outside. The only sport to use the building for competition is Indoor Track. Also, the field house has been used in the past for all-campus events, such as barbeques and concerts (most recently, Third Eye Blind used the building as a venue).

Complaints with the Facility

The largest shortcoming of the facility is the length of it track. It has a nine-lap track instead of the standard indoor track size of eight laps, which in of itself is not horrible, but those nine laps still do not add up to a regulation length for indoor track. This fact makes it so that our Indoor Track athletes cannot qualify for Nationals on their home track (H. Sheehy, personal communications, April 2008).

Other complaints (made by users of sports teams besides Track) are that the surface within the track is too fast for good tennis training, and that it cause shin-splints in athletes due to its lack of cushion (the floor is a concrete slab with a ¾ inch layer of high-density rubber. The lights are also spaced widely and are very bright, and are said to be more distracting than a lighting scheme that would feature a greater number of lights and less intensity per light. The air inside the track is apparently very dry in the winter (due to a lack of a humidifier), and at times is overly hot.

Other Examples of Field Houses

The Farley Field House at Bowdoin College

[2]

[2] Image obtained through Google Earth

Bowdoin's field house is 200 ft. wide and 300 ft. long. It has a 200 m, 8-lap track, with 4 indoor tennis courts, a free-weight room and aerobic exercise room, locker rooms, a trainer's room, and seats 1000 spectators (Bowdoin website). Given a guess that the height of the building is around thirty feet, the Farley Field House is around 60,000 square feet and has a volume of 2 million cubic feet.

Bates College's Merrill Gym

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The Merrill Gym is also 200 ft. wide and 300 ft. long, and thus also has an estimated volume of 2 million cubic feet, and 60,000 square feet. It features a 200m, 8-lap track, an 8-lane swimming pool, 4 tennis courts, and a squash center.

Both of these Field Houses seem to pack a lot more into their facilities in comparison with how much larger they are than Towne. They also have conventional roofs, which are darkly colored. While not L.E.E.D. certified, these

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[3] **Image obtained through Google Earth**

buildings are probably more efficient in regards to use and energy usage than Towne. Perhaps since both are quite similar in design, and have been constructed recently, they would serve as good models for a new field house here at Williams. I can also speculate that they were built with their exact uses in mind (top-down design strategy?), and use their space more efficiently because of this.

Why Not Build a Huge Field House?

When the possibility of the construction of a new field house comes around, the inclination to build a large one, which can have everything inside of it and be spacious, seemed to be natural to most people I interviewed. However, for a college that is looking to lower emissions, this would not be a good choice to make without further examination and planning. Total square footage and volume of a building relate to its electricity usage, because the ventilation system has to work to circulate the air. With higher volume of air inside a building, the ventilation would have to work harder, and more lighting would be needed. In a building where the main electricity draws are ventilation and lighting, increasing floor space, and therefore volume (assuming a standard height) by half would cause a large jump in electricity use.

However, if the building were designed with green technologies and efficiency measures, as well as a sound view of future uses, increased size would not necessarily mean a dramatically larger carbon footprint than Towne's and would certainly lead to a more useful space.

The New Field House?

The new Field House will be designed to provide for the various sporting uses, as well as to be "sustainable" and efficient, fitting in with the College's long term goals.

If the new building were to be a bit larger than the current one, it could have big impacts on the efficacy of its space. An advantageous length and width would be only slightly smaller than the field houses of Bates and Bowdoin, perhaps being 200 ft. by 290 ft. Also, the ceilings in the current field house are higher than needed, as was discovered when talking with athletes that use the facility like baseball and tennis players. Instead of having domed roofs, which are very high (45 ft., personal estimate) in the middle of the building, a flatter, triangular roof would suffice and perhaps keep the overall volume of the building close to that of the original. The addition in width would not necessarily mean the demise of the parking spaces on the sides of the current field house, for there is at least 15 ft. currently in between the walls and the parking lot. The pleasant trees that are there now would have to be removed for this addition in width, but that would occur even if a similar sized Field House as the one now was built, for construction purposes.

These changes would allow for the installation of a NCAA compliant, 8-lap track, as well as give room for a trainer's room, an area for spectators, and perhaps even a room for the Ski Team that would be closer to the parking lot and more convenient. Since the building is to be designed with the multiple uses in mind, it

would not be very difficult to make the floor surface more conducive to tennis and training, and to resolve previous complaints.

Features of the new Green Field House

Structural

A large question would be the color of the new roof. At the moment, the roof is white, which cuts down on absorption and therefore heat in the building. However, if the roof were darker, more radiation would be absorbed and the building would have to be heated less. In the winter, fall, and spring, this would be a boon to energy savings, but would perhaps lead to the necessity of air conditioning in the summer. However, almost all of the building's use would be occurring during the other three seasons, so I would recommend a darker roof, and advise the users of the building in the summer (who would they be?) to go outside if it was too hot. The inclusion of skylights in the roof would have a similar effect. They would reduce heating and lighting costs during three seasons, and would therefore probably outweigh the negatives that would be seen during the summer due to increased heat inside the building. Also, the walls in the current field house are not insulated, and retain heat poorly. With good insulation, the heating costs would drop dramatically during the winter, but perhaps could lead to a hotter field house in the summer.

The roofing material and that of the main structure and main flooring should be of recycled material as aggressively as possible. The Weston Field House will be using upwards of 85% recycled steel. A similar program should be followed on the new field house.

HVAC

Obviously, a more efficient, newer ventilation and heating system would be installed. But would the heating still rely solely on the steam plant? The new heating system would probably still be steam powered, but should be selected with a mind to a possible switch to electricity in the future. Also, if a standard convection heating system was used, and made compatible with electricity, energy generated from the building (PV panels) possibly could be used on site.

A great possibility in the stead of convection heating would be the usage of a radiant heating system. In a large space with high ceilings, radiant heat is much more efficient in theory. Radiant heat, as opposed to large convection heaters, heats objects rather than air. Instead of heating all the air inside to 65 degrees, radiant heat would warm the people and not the air. Radiant heating systems have the effect of generating the same level of comfort for people with a lower air temperature than standard heating (Wikipedia). The only problem with radiant heating in the new field house could be its interactions with the surface of the track. If problems arose, then perhaps the radiant heating could still be used on the inside of the track.

Solar Technologies

The new field house could perhaps feature evacuated tubes for hot water, and PV panels on the roof. If a locker room were a part of the new building, then evacuated tubes would be a great possibility due to the on-site usage of the water. Also, the large, flat roof would be prime for solar panels. The energy generated from them could be tied directly to the building's ventilation system and perhaps radiant heating system, as well as the lighting. If solar panels were not decided to be

installed at the time of development, then the roof should still be made solar-compatible to allow for that decision in the future, much as will be done at the Weston Field project.

Efficient Appliances

Low-flow water appliances should be used, as well as more efficient lighting. According to Facilities, they have even been tempted to install high-bay fluorescents in the current field house, and most certainly would use them in the new one. LED lighting is also a possibility.

Moving Forward

If the new field house is built in accordance with these recommendations, it will become a great facility that will be used by a much larger number of students, faculty and community members than are seen in the current field house. Also, with the right choices regarding green features and budget, it could qualify for L.E.E.D. certification and contribute to the College's goal of lowering emissions (or at least not raising those numbers noticeably). Any construction in the future must be done in the most environmentally friendly manner possible, for as the square footage of the College increases, it will become harder and harder to satisfy the goals laid out by the CAC and embraced by the institution.

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