HEALTH ENHANCEMENT CENTER SOLAR PANEL HISTORY

This is a recap of the history of the solar panels on the UW – Stevens Point Health Enhancement Center (HEC) based on available documents, emails and conversations with university staff.

The panels on the Health Enhancement Center are just collectors and have never been in service or even connected to a solar thermal system. Although we made several attempts to assess them, they are found to be low producing without sufficient payback to make them functional. They haven't been removed because of the cost associated with removal and disposal.

In addition, this report recaps the steps taken by our energy service company, McKinstry, to evaluate potential solar energy system installation on campus during their rough order of magnitude phase.

October 1, 2003

A contract is signed with Solar Mining Co. LLC and the State of Wisconsin Department of Administration (DOA). The agreement was for the purchase of Solar Energy at specified State owned facilities, specifically for swimming pool water heating at UW-Green Bay, UW-Milwaukee, UW-Parkside and Department of Public Instruction School for the Visually Impaired.

April 2004

Solar Mining Company (SMC) submits a project estimate for a solar hot water system for Knutson Hall. Solar Mining would design, build, install and maintain a solar thermal energy system to provide domestic hot water for Knutson Hall. The solar energy system would be owned and maintained by SMC, who would produce solar energy for sale to UW-Stevens Point. The university would be billed monthly for the solar energy consumed by the university.

SMC also designs a system to install panels on the HEC building to provide heat for the swimming pool and the therapeutic pool. (No project estimate available.)

March 9, 2006

An energy conservation project is paid off in a projected number of years based on the energy dollars it saves. "Payback" is the amount of time required for savings from an energy conservation measure to offset all the costs. Once the project is paid off, the university would own the system and would benefit from 100% of the energy savings.

The solar hot water system would not have met the State payback criteria at full cost therefore; we had to "buy down" the project - supply funds up-front to make the project pay off in a stated number of years.

Per SMC calculations, they would need a UW-Stevens Point contribution of $12.00 per square foot of the collector for the project to be economically viable. SMC invoices UW-Stevens Point for a solar energy system buy down at Pray-Sims Hall $8,500.00, a system at the Aquatics Center (HEC therapeutic pool) $15,300.00 and the Aquaculture Center $1,000.00. Funds were paid for by the SGA Sustainability Reserve Account.

December 31, 2006

Solar Mining Company ceases all operations. SMC surrenders all of its assets to Nicolet National Bank.

November 2007

An original investor who guaranteed SMC's indebtedness made payment to the bank and took control of the assets, which included the systems installed at UW-Stevens Point. UW-Stevens Point receives a Bill of Sale for $1.00 conveying all rights, title and interest of the property. Any panels on campus now became property of the university.

2007/2008

Solar Mining Company assets are transferred to the Division of Facilities Development and their value is assessed and a decision must be made on what to do with the systems.
When SMC ceased operations, they were in the process of installing solar systems on Knutzen, Pray Sims and the Health Enhancement Center. They were further along with the residential halls than with the HEC project. Housing decided to pay for completion of the two residential hall systems.
After some negotiations, SMC offers to give their inventory of built panels to UW-Stevens Point. This was perhaps fewer than half of the number of panels in the original HEC design. However, we needed to transport the panels from Green Bay and store them here. Since the mounting brackets for the panels were already installed on the HEC roof, we decided to take the panels and have them mounted on the roof, where they would be protected from damage. The following installation expenses were paid for with Facility Services program revenue funds account 128-155021

> Transportation of panels by Dedicated Systems $758.58
> Crane rental from Peter's Heavy Construction to set panels on the HEC $1,065.38
> Install panels on the HEC building by Seidl's Services $3.660.00

Our intention was to complete the installation as part of some future project since there was no new solar contractor in place at this time. (However, since then, there has not been a project that could justify the cost of completing a portion, or the entire HEC installation.)

March 2008

A solar thermal and photovoltaic site assessment is done by Full Spectrum Solar, a renewable energy contractor out of Madison. The report contains estimates for some potential solar hot water systems that could be installed on campus. The HEC panel assessment is not favorable.
Excerpts from the report:

> *The building has six 4' X 10' solar thermal collectors on the roof that were built and installed by the now defunct Solar Mining Company. The roof was prepared for five more of the collectors which are on the premises. The collectors are not in service and have never been connected to a solar thermal system. It may be possible to use the collectors. I recommend they be used for the smaller systems as the quality of the collectors is suspect. A long term plan should be put into place to eventually replace them with more reputable collectors.*
>
> *11.4 Recommended Solar Thermal System*
> *Two to three systems are recommended, one system for the pool and a second system for the showers and laundry. In theory, the systems could be tied together but this would require complicated controls to ensure that no overheating would occur. The showers and laundry may require individual systems in the event the hot water heaters for each are separate units and in different parts of the building making tying the systems together more costly than installing one.*
>
> *11.4.1 Competition Pool*
> *The system for the pool would require approximately 3,920 square feet of flat plate collectors, or the equivalent linear feet of evacuated tube collectors. Approximately 400 linear feet will be needed for all of the collectors, which can be installed in multiple rows. The rows will need to have enough space between them as to not shade the row to the north. The roof appears large enough to support this number of collectors pointing south to meet this requirement. I recommend the collectors be tilted at 45° from horizontal for the best year round gain. The location of the collectors will be dependent on the location of the pump, filtering equipment and the strength of the roof. Engineering analysis will be needed to see what type of roof mounting could work on the roof as is. If reinforcement is needed, a cost analysis will be needed to determine whether it is more cost effective to install on the ground or on the roof. The system would further consist of a heat exchanger that would transfer heat from the solar thermal fluid to the pool water and controls to keep the pool temperature at the desired 79° F.*
>
> *11.4.2 Therapy Pool*
> *The system for the pool would require approximately 400 square feet of flat plate collectors, or the equivalent linear feet of evacuated tube collectors. Approximately 40 linear feet will be needed for all of the collectors, which can be installed in multiple rows. The rows will need to have enough space between them as to not shade the row to the north. The roof appears large enough to support this number of collectors pointing south to meet this requirement. I recommend the collectors be*

tilted at 45° from horizontal for the best year round gain. The system would further consist of a heat exchanger that would transfer heat from the solar thermal fluid to the pool water and controls to keep the pool temperature at the desired 90° F. At the time of the visit, the option of tying the two pool systems together was discussed. It will be more cost effective and easier to control due to the differences in demand. Additionally, this pool is not used very much. I recommend installing a pool cover on this pool as a more cost effective way of reducing the load. RETScreen estimates that the demand can be reduced by 60-70% by using a cover 20 hours a day. A pool cover company should be consulted to verify this and provide options and expected savings.

11.4.3 Laundry

The laundry would require an estimated 120 square foot system. I recommend a drainback type system if it is possible to install. The use of this type of system will avoid overheating and stagnation issues during the summer when the demand is lower. The analysis assumes the collectors will be pointing true south and at a 50° angle from horizontal.

11.4.4 Showers

An estimated 1,120 square feet of collectors are required for the estimated demand of 2,100 gallons. I recommend a drainback type system if it is possible to install for the same reasons as the laundry system. This system could easily be combined with the laundry system, which should reduce the cost per square foot slightly. The analysis assumes the collectors will be pointing true south and at a 50° angle from horizontal.

Table 6: Athletic Center Financial Summary:

	Competition Pool	Therapy Pool	Laundry	Showers
Estimated Cost of System	$392,000-$490,000	$40,000-$50,000	$12,000-$21,000	$112,000-$140,000
Estimated Focus on Energy Implementation Grant	$50,000 (maximum)	$14,479	$4,013	$24,391
Estimated Cost After Incentive	$342,000-$440,000	$25,521-$35,521	$10,987-$16,987	$87,609-$115,608

November 2008

The State of Wisconsin DOA contracts with a new solar vendor – H&H Solar Energy and municipal cooperative purchasing with Regenisis Power, LLC.

Spring 2011

The current vendor holding the state contract, H&H – Regenisis Power, LLC performs a site visit at the request of the Division of State Facilities (DSF). The scope was to determine if there was potential to use the panels to heat the pool. Although no written summary was received, per Jim Shey of DSF, Regenisis found that the panels were low-producing; they did not produce enough energy to sell back. They also stated that ideally we should be using newer modular technology, where if one panel failed, the entire system would not

shut down. Regenisis suggested that we only keep the mounts and dispose of the rest. Of course, we would have to pay for equipment rental to remove the panels and pay for disposal. Because funds are not available, panels are left on the roof.

Summer 2011

Facility Services participates in the state performance contracting program and invites three energy service companies on campus to perform preliminary audits. These were high-level audits of three buildings – the Health Enhancement Center, Nelson Hall and the Noel Fine Arts Center. The companies were asked to provide an energy conservation measure related to the panels on the HEC building.
Johnson Controls Inc. recommends that a new Heliocol thermal pool heating system be installed. This includes a solar array on the roof plumbed to a heat exchanger in the basement. JCI estimates $236,875 with a 45.5 year payback.
Honeywell had a very high level recommendation to "investigate using the existing rooftop solar thermal panels at the HEC to heat domestic and pool water". They estimate $30,000 with a 15 year payback.
McKinstry looked at a renewable system implementation as a campus-wide initiative.

November 2012

University contracts McKinstry. McKinstry would be doing an investment grade audit of our buildings in the near future to propose various energy conservation and renewable energy options once the audit is complete. The HEC solar panels were on the list of items for McKinstry to review.
Around the same time, a Student Government Association Senator starts working with a local company, North Wind Renewable Energy LLC, with the hope of "fixing" the HEC panels. North Wind's intention was to partner with students from Mid-State Technical College using SGA sustainability funds to fund the project. North Wind is interested in providing us with a quote to make the panels functional.

May 2013

The original design and intent of the HEC panels was to provide heat for the swimming pool and the therapeutic pool. From the time we began working with Solar Mining, we were never convinced that the swimming pools were a good application. We were discussing our concerns with Solar Mining at the time they went out of business because UW-Green Bay had problems with temperature control, and some other issues with their newly installed (Solar Mining) system. Since installation, the UW-Green Bay heat exchanger failed, contaminated their pool, and they have not put the solar system back into service.
On May 6, 2013 our campus engineer contacted UW-Green Bay to inquire about their experience heating their pool with solar panels. Here is their response:

Yes, we had Solar Mining install collectors on our sports complex for preheating pool water. They incorrectly sized the load or they were going to use the pool as the heat storage, but it didn't run for a few years. Two years ago, I requested money to get this running. August Winter was the low bid. They did a good job. We actually decommissioned 5 out of 11 panels, even after linking the panels to domestic showers and laundry. We included storage tanks, controls, and piping for $100k. It ran a few months, but then we had a complete glycol leak into the pool and filters. It hasn't been running since that incident. Solar Mining ran the galvanized piping through the surge tank, which corroded and eventually leaked. Until we can redesign the system's piping and loads, it will remain inactive.
Paul Pinkston
Director of Facilities Planning and Management
University of Wisconsin - Green Bay
920.465.2373

Summer 2013

McKinstry looks into three renewable energy projects on campus, including the HEC solar panels. McKinstry uses North Wind Renewable Energy as a subcontractor for the solar energy work.
McKinstry quotes a rough budget estimate based on a quote from North Wind Renewable Energy. (Note: date on quote states April 2012, but it should be 2013.) The McKinstry budget includes their state agreed upon fees – there is a premium paid for work done through performance contracting. McKinstry also notes that North Wind's "years to cost recovery" is not accurate because an incorrect MMBtu rate was used and the simple payback calculation did not agree with state requirements. The increased cost makes it challenging to meet the 16.07 simple year payback which DOA requires for most projects. (Renewable projects can sometimes go to a 25 year payback.)

Budget estimate: $315,000 – $402,000
Annual savings estimate: $5270 - $6820
Savings over 16.5 years: $87,000 – $113,000
Min. & Max. buydown dollars: - $202,000 – $375,000

Savings over 25 years: $132,000 - $170,000
Min. and Max. buydown dollars: $144,000 - $271,000

Because the project did not meet the state energy program requirements, the project was dropped during the Rough Order of Magnitude (ROM) phase.
North Wind also submits a quote to McKinstry for a photovoltaic (PV) system at Schmeeckle Reserve. It was also dropped because it did not meet state simple payback criteria. (Note: date on quote states April 2012, but it should be 2013.)
McKinstry also looked at PV systems across campus during the ROM phase. North Wind quoted solar arrays on the roofs of the Dreyfus University Center, library, Noel Fine Arts

Center, HEC, and maintenance buildings during the ROM phase, however all were dropped because projects did not meet state energy program simple payback requirements.

Fall 2013

North Wind Renewable Energy provides the university with a copy of the quote they submitted to McKinstry as a subcontractor, with a revision in cost.

> ***Option 1:*** *plumb up and connect the existing 6 collectors (8'x32' each) only to the large pool filtration system.*
> *Cost: $53,400*
> *Retscreen BTU base case consumption: 3,258 MMbtu*
> *Solar offset: 367 MMbtu annually*
> *Solar Fraction of pool heating: 11%*
>
> ***Option 2:*** *Install 48 additional AET 32 SF collectors on existing supports (pending structural engineer approval) and tie the entire system together to the large pool, therapy pool, and domestic water heating system in the upstairs mechanical suite.*
> *Cost: $166,000 plus $45,000 for option one (due to overlapping parts and tasks between option1 and 2)*
>
> *Retscreen BTU base case consumption: 3,858 MMbtu*
> *Solar Offset: 737 MMbtu annually*
> *Solar Fraction: 19%*
> *Years to cost recovery: 18 years*
>
> ***Option 3:*** *Replace existing collectors with (48) 4x8 collectors and add an additional (48) 4x8 collectors on existing supports (pending structural engineer approval) and tie entire system together to the large pool, therapy pool, and domestic water heating system in the upstairs mechanical suite.*
> *Cost: $250,000*
> *Retscreen BTU base case consumption: 3,858 MMbtu*
> *Solar Offset: 737 MMbtu annually*
> *Solar Fraction: 19%*
> *Years to cost recovery: 20 years*

December 2013

After the McKinstry Rough Order of Magnitude phase, the campus team decides to explore the option of utilizing the existing panels in an effort to reduce overall cost and try to meet state criteria. Perhaps we could submit the project as a small project request and pay using campus dollars rather than go through performance contracting. However, there will be no warranty on the panels. North Wind submits a new proposal.

February 2014

McKinstry works with the Division of Facilities Development (DFD) and is able to put together a business case for the HEC Solar Thermal Retrofit based on North Wind's updated proposal. Cost would be approximately $110,000. Based on energy cost offset, simple year payback is 50 years. Current new solar thermal system individual payback is 20 years. However, given the fact that the panels have not been in use for so long and past issues with Solar Mining panels, DFD would only approve a 10-15 year payback because they didn't believe the panels would last any longer than that. In order for the project to pass through the state process, campus would need to buy down $85,000-$90,000 of the project cost. As a result, the measure was not included in the overall state project.

McKinstry believes the project is not feasible. They are in agreement with DFD that there is a concern about using the existing panels. Perhaps it would be a better use of dollars if we invested in a new system outside the state process since a state project would also require contingency and DFD fees on top of the overall price.

May 2014

Per our request, McKinstry provides a summary of all the solar options they explored on campus.

Solar Options Explored: *note, simple payback is calculated by taking implementation price divided by energy savings dollars only as dictated by the state energy program.*

- *Replacement of existing solar thermal system at HEC*
  - *Replacing existing solar collectors and installing additional collectors, while tying system together for pool/domestic hot water heating.*
  - *Approximately $360,000 with a simple payback of 60 years.*
  - *Simple payback did not meet the requirement as dictated by the state energy program, so the measure could not be included in the overall energy project.*
- *Upgrade of existing solar thermal system at HEC*
  - *Re-use existing solar collectors and tie into system for pool water heating.*
  - *Approximately $110,000 with a simple payback of 50 years.*
  - *Simple payback did not meet the requirement as dictated by the state energy program.*
  - *In addition, re-use of the existing panels is not recommended, given their age, as they would probably leak in the near future if put back into operation.*
  - *As a result, this measure was not included in the overall energy project.*
- *Installation of solar pv at Schmeekle Visitor Center*
  - *Installation of solar pv collectors and tie into existing building electrical grid.*
  - *Approximately $115,000 with a simple payback of 75 years.*

    - *Simple payback did not meet the requirement as dictated by the state energy program, so the measure could not be included in the overall energy project.*
- *Installation of solar pv across various campus buildings*
    - *Installation of solar pv collectors and tie into existing building electrical grid.*
    - *Buildings proposed: University Center, Library, Fine Arts, HEC, Maintenance Building and Maintenance Shed.*
    - *Approximately $3,900,000 with a simple payback of 45 years.*

Simple payback did not meet the requirement as dictated by the state energy program, so the measure could not be included in the overall energy project.

Early 2015

Facility Services requests an estimate from Altmann Construction for panel removal and disposal (recycling) during the week of May 18, 2015. Meanwhile, the Office of Sustainability contacts Mid-State Technical College (MSTC) to see if they could use the panels in their renewable energy program. MSTC is interested. Facility Services gets an updated quote from Altmann, splitting costs between UW-Stevens Point and MSTC.

5/12/15 Email from Paul Hasler to Tom Altmann:
When we met with Ben Nusz from MSTC earlier this year we had asked that the original quote be adjusted and the scope of work split into two quotes. One quote going to Ben Nusz at MSTC and one to myself at UWSP.

The UWSP quote was going to include:

1. *Rough panel removal. No concern for repurposing (panels would be scrapped). We would arrange to have our recycler on site during panel removal so Altmann could load the panels into the recyclers dumpster. We would have Altmann screw plywood to the front of the panel to prevent broken glass from falling to the pedestrian area below the roof.*
2. *As part of "rough removal", Altmann would supply crane, traffic control and labor as needed.*
3. *Altmann would remove the panels from the existing mounting brackets leaving the brackets for UWSP to remove.*
4. *Since the panels would not be repurposed, no cribbing of any sort would be needed (load panels into dumpster).*
5. *The original quote was priced for a "careful removal" (one whereby the panels would be cribbed and re-purposed). As such, the price is greater than one would expect to pay for a "rough removal". Based on the previous quote, I am thinking rough removal is less than $10K.*

   NOTE: Basically, we determined that UWSP has no use for the panels other than scrap. Ben determined that MSTC would accept the panels if we donated them to MSTC. UWSP does not want to pay for "careful removal" but because MSTC can repurpose the panels they are willing to absorb the added costs for a "careful removal". UWSP is paying for "rough removal" and MSTC is paying the premium for "careful removal".

The MSTC quote was going to include the following costs:

1. *The costs to increase from a "rough removal" to a "careful removal". I believe a careful removal included shrink wrapping the panels and loading them onto a MSTC flatbed trailer. I don't believe any cribbing was requested as Ben felt that 4x4 lumber spaced between the panels would be sufficient.*
2. *I believe MSTC was going to arrange all transportation.*
3. *Altmann would supply crane, traffic control and removal labor*
4. *The cost to remove the support brackets from the UWSP roof and the cost to install rubber boots over the removed mounting structure. I believe MSTC was going to provide the boots.*

5/13/15 Email from Ben Nusz to Paul and Tom Altmann:

Two additional points.

1. *We may need transportation after all. Please include that in the MSTC portion.*
2. *By MSTC would provide the boots, we mean, MSTC would pay for the boots.*

June 2015

Gary Oudenhoven from WI Public Service contacts UW-Stevens Point to inform us of a potential solar project opportunity: "*WPS as part of an EPA settlement with the Weston Power plant is in initial stages to do several PV solar projects with either governmental or nonprofits in Marathon or adjoining counties. Thus Portage and hence UWSP would be a potential site. We would like to do 100-200kw size projects to get economy of scale. As reference, a 100KW PV system needs about 1 acre or 43,560 sq. ft. I know campus has several large roofs or combo that could work. We would also like all the PV electric energy to be used onsite and not spin the meter backwards. That would not be a problem off the main campus electric meter. As part of the project, WPS would also provide 20 yr. maintenance funding. This is in preliminary stages.* "

We thought the WPS project had potential and if granted to UW-Stevens Point, we would have asked that the existing panels be removed at little to no cost (seeing that WPS would have had the crane already hired to install new PV panels).

UW-Stevens Point contacts MSTC about the potential project, stating the removal timing has become unclear and we're unable to commit until we learn more about the project. We asked for their patience and stated we expected the panels would remain available to MSTC.

Unfortunately, the WPS project died late fall 2015; Wisconsin Energy Corporation purchased Intregrys Energy Group, parent company of WPS, and pursued other projects as part of the EPA settlement.

April 2016

Facility Services contacts MSTC to see if they're still interested in the solar panels. MSTC responds they have withdrawn their interest and thanks us for our efforts. We feel as though we have exhausted all possibilities to re-use the panels and the plan, again, is to remove and salvage the panels.

July 29, 2016

UW-Stevens Point Facility Services collaborated with North Wind Renewable Energy LLC., a Stevens Point based company, on removal and disposal of the solar panels and support structures. North Wind was responsible for all planning and removal activities, including cutting steel support structures as close to the roof deck as reasonable and capping them off. All panels, mounting hardware and support structures were removed from the roof using a crane and lift. The panels were donated to North Wind, and in return for the donation, North Wind paid the removal costs – a $10,000 expense.

North Wind Renewable Energy. LLC. re-used the panels at four separate sites, so they were finally put to good use.

APPENDIX


State Contract with Solar Mining.pdf


Solar Mining Knutson project.pdf


HEC Pool and Roof Model.pdf


Solar Mining Buydown Invoice.pdf


SGA Sustainability Reserve.pdf


Solar System Bill of Sale.pdf


12.3.2007 email Solar Mining Asset Tra


Panel Install Expenses.pdf


UWSPSiteAssess2008.pdf


H&HRegenesisContract.pdf


12.12.2006 email.pdf


North Wind quote to McKinstry.pdf


Schmeeckle PV quote.pdf


Campus PV quote.pdf


KP_UWSP STrepair.pdf


North Wind 2nd HEC proposal using existin


Email documentation McKinstry_DFD Feb 2

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