Renewable Energy and Energy Efficiency at Educational Institutions in Illinois
Farmington Central District #265
SOLAR INSTALLATION PROJECT
September 2013 – Initial meeting with Steve Smith (Farnsworth Group)

November 2013 – Preliminary scope of project meeting with Farnsworth Group and Clean Energy Design Group (James Holtzman and Dan Griffin)

December 2013 - Submittal of grant to Illinois Clean Energy Foundation (ICEF)

Spring 2014 – Periodic updates of grant status and potential project scope to Board of Education

May 1, 2014 – Notification of grant award ($1,157,193) from ICEF
Timeline (continued)

- June 2014 – Board update and final project details
- August 2014 – Board of Education provides notice to community regarding working cash bond sale
- September 2014 – Sale of working cash bonds and formal approval of solar project
- October 2014 – Kickoff celebration and arrival of materials on site
- November 2014 – April 2015 – Project build period
- April 16, 2014 – 756 kW system goes live!
Financial Data

- Overall Cost of the Project: $1,928,656
- Grant Award: $1,157,193
- Cost to the District: $771,463 (Working Cash Bond Sale)

- Estimated 1st Year Utility Savings: $43,935
- Actual 1st Year Utility Savings: $57,892
- Total Savings to date (4/16/15 – 7/14/16): $76,869.46
- *Savings do not include as-yet uncalculated Capacity Charge Savings
Final Thoughts

- Installer Expertise is Critical
- Ameren was extremely helpful
- Angle of Roof/Orientation of Building is very important
- Educate, Educate, Educate
- Value is greater than savings
- Be well-versed in public financing options and their benefits/drawbacks
TORQUING RACKING BOLTS TO SPECS
Inverters & Electrical Equipment
Renewable Energy & Energy Efficiency at Educational Institutions in Illinois

Heartland Community College
Normal, IL

Mr. James Hubbard
July 21, 2016
Heartland Community College
Overview

• Project Premise
• Schedule
• Considerations
• Financials
• Results
Project Premise

- Curriculum Development
- Utility Cost Control

Performance Contract:
A legislative vehicle that encourages public entities to improve their facilities, by using their energy and operational budgets to fund a project with guaranteed results. Maximum 20 years payback.
Project Premise

Comprehensively address infrastructure needs without capital funds.

Figure 1

- Before Performance Contract
- During Performance Contract
- After Performance Contract
Schedule

Dec 2006 – Project identified on campus Master Plan
Feb 2008 – Town receives project site plan
Oct 2009 – One-Year wind data feasibility report completed
Oct 2009 – Submitted for two separate grants
Feb 2010 – Requested proposals for Performance Contract
Mar 2010 – Began Environmental Assessment process
Apr 2010 – Selected Performance Contractor
Feb 2011 – Received Environmental Assessment FONSI
Apr 2011 – Board of Trustees approves project
May 2011 – Quote received for Vestas V82 1.65 MW wind turbine
Sep 2011 – Submitted for Ameren Interconnect Agreement
Feb 2012 - Construction begins
Jun 2012 - Turbine becomes operational
Considerations

• Location – adjacencies and space (i.e. ice throw, fall distance, shadow flicker, FAA, noise, etc…)
• Available winds – finances won’t flow without data
• Financial – funds and grants available, payback
• Partners – study, design, develop, supply, and construct
• Manufacturer – type and size of turbine (& US made)
• Environmental – animal and vegetation
• Utility – Interconnect Agreement
Financials

- Project cost of $5.168 million
  - US DOE ARRA Grant $0.950 M
  - IL Clean Energy Grant $0.512 M
  - College Bond Funded $3.706 M
- Project savings of $7.02 million over the 15 year payback
Results

• Generated 17,904 MWH
  • Consumed 13,455 MWH
  • Sold 4,449 MWH
• Met 41% of College electrical needs over the past 4 years
Geothermal

James Hubbard
Heartland Community College
Geothermal Overview

• Design Premise
• The Facts
• Considerations
• Results
Design Premise

- Follow LEED Principles
- Reduce Carbon Footprint
- Assist in Curriculum Development

Renewable Energy & Environmental Controls

What Will I Learn?

Green living and sustainable practices are important additions to our way of life. Be a part of that positive change through HCC’s program in Renewable Energy & Environmental Controls (REEC). The Renewable Energy courses provide you opportunities to learn technical aspects and skills related to renewable energy, solar and wind generation technologies, sustainability, smart grid technologies, building controls and geothermal systems. Through the Green Building Technology courses you’ll explore energy efficiency, construction principles and the Leadership in Energy & Environmental Design (LEED) process.
The Facts

• College has two buildings with geothermal closed loop fields
  • Workforce Development and Child Development buildings
  • 130 individual heat pumps
  • 240, 300-foot deep wells
  • 480 tons of capacity
Heartland Community College

Workforce Development Center

Child Development Lab

IL National Guard Normal Readiness Center

SITE PLAN - ABOVE - MAIN
HEARTLAND COMMUNITY COLLEGE - COLLEGE DEVELOPMENT PLAN
The Facts

- Many Colleges and K-12 districts use geothermal systems
- Cost effective for new and retrofits
- Public institutions are a major part of the geothermal market
- Peers: Joliet, Kaskaskia, John Wood, Lincoln Land, SIU and Lakeland College
Lakeland Community College

Geothermal System

- West Building Addition 2009
- Well Field #1 Completed 2008 140 Wells
- Fitness Center Well Field Completed 2008 36 Wells
- Diversification Loop 2008
- Vo Tech Bldg 2008
- Admin Bldg Future
- Webb Hall Scheduled 2010
- NW Bldg 2009
- Neal Hall Future
- Field House 2008
- Future Well Field
- Well Field #2 Completed 2011 132 Wells
Considerations

- Field Location – space is needed
- Soils – optimum heat transfer
- Financial – payback ~ 7-10 years
- Manufacturer – selection matters
- Heat Pump Location – elbow space for maintenance
Results

• College offers 2 associates and 3 certificate programs

• LEED Effort / Carbon Savings
  • WDC savings of $15,420
    • (-$11,480) in kWh
    • $26,900 in Therms
  • CDL savings of $1805
    • (-$3525) in kWh
    • $5330 in Therms
Energy Efficiency

Naomi Dietzel Hershiser
Prairie Crossing Charter School
Energy Efficiency

Naomi D. Hershiser
Climate Control

Fans

Windows

Insulation
Lighting

Passive solar

½ on-off options

Motion sensors
Efficiency Coupled with Conservation

Green Challenges put ownership of energy use and expenditures in the hands of the students and teachers!

In FEBRUARY and beyond, we Use Less Electricity

In JANUARY and beyond, we Save Energy
Naomi D. Hershiser
Dean of Environmental Learning
nhershiser@pccharterschool.org
Biomass

Morgan Johnston
University of Illinois
BIOMASS BOILER AT ENERGY FARM, UNIVERSITY OF ILLINOIS

Morgan Johnston, Director of Sustainability, F&S Institute for Sustainability, Energy, and Environment University of Illinois at Urbana-Champaign
SUSTAINABILITY WORKING/ADVISORY TEAMS

- Energy Conservation & Building Standards
- Energy Generation, Purchasing, & Distribution
- Transportation
- Purchasing, Waste, & Recycling
- Water and Stormwater
- Agriculture, Land Use, Food, and Sequestration

SUSTAINABILITY.ILLINOIS.EDU
Biomass boiler

- Heizomat Chain Drag Boiler
- Multi-fuel Boiler
- 2000 gallon thermal storage
- Variable output
To heat two story greenhouse
Feedstock storage system
Demonstration Heating System

1: Boiler plant
2: Greenhouse
3: Hoop house
4: Main offices
5: Drying oven
### Funding sources

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Illinois Clean Energy Community Foundation</td>
<td>$228,260</td>
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<tr>
<td>UIUC Student Sustainability Committee</td>
<td>$100,000</td>
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<tr>
<td>Dudley Smith Initiative, UIUC Extension</td>
<td>$17,848</td>
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<tr>
<td>UIUC Internal Funds (Carbon Credit sales)</td>
<td>$200,892</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$547,000</strong></td>
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Lessons learned

• Address Field to Flame first
• Engage with manufacturers and current users to keep from re-engineering the wheel.
• Lack of US manufacturers building in this size class with a demonstrated ability to burn perennial grasses led to boiler imports
• Cost effective installations need to rely on upgrading existing hot water heating systems, not installing new heat systems from scratch.
• More to come next year!
CONNECT WITH ISEE.

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www.sustainability.illinois.edu/calendar

iSEE Office: sustainability@illinois.edu
The Illinois Renewable Energy Conference

Event Partners