

Solar University Network: Innovation in Solar Energy Finance & Development

September 22, 2016 2:30 – 3:30 pm ET

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- Michele Madia Director of Education and Partnerships, Second Nature
- Jane Cowan Market Research Coordinator, Midwest Renewable Energy Association

Panelists





Jim Martin-Schramm

Professor of Religion and Director of the Energy and Climate Program Luther College

Jim Martin-Schramm is Professor of Religion and Director of the Energy and Climate Program at Luther College in Decorah, Iowa. His research and teaching focus on ethics, energy, and climate change; ethics and technology; and Christian ethics. Dr. Martin-Schramm holds the Ph.D. from Union Theological Seminary in New York and is an alumnus of Pacific Lutheran University. Among his many works, he is the co-author of Earth Ethics: A Case Method Approach (Orbis, 2015), and has authored Climate Justice: Ethics, Energy, and Public Policy (Fortress, 2010) and The Power to Change: U.S. Energy Policy and Global Warming (PCUSA, 2007). He is an active leader in the North American consortium, Lutherans Restoring Creation.

Panelists





Joshua Brooks

Graduate Student Appalachian State University

Josh is a graduate student at Appalachian State University studying Sustainable Technology. For the last four years, Josh managed the University's Renewable Energy Initiative, a student fee based organization tasked with lowering App State's carbon footprint and developing the University's renewables portfolio. Previously working with Blue Ridge Electric Membership Cooperative, a power cooperative in northwest North Carolina, Josh developed community solar projects, customer efficiency programs, and the associated finance models. Josh is currently focused on finishing his Master's thesis on energy policy and spends his free time worrying about things he may have forgotten to complete.

Panelists





Kevin Bright

Sustainability Coordinator Colby College

As Sustainability Coordinator, Kevin supports all facets of sustainability at the College including: occupant engagement programs, greenhouse gas accounting, third party certifications, new and existing building performance, renewable project development and demand management activities in the existing building stock. Currently, Kevin is managing an energy management program reduction program aimed to reduce energy consumption at the College by 20% over the next six years. Kevin also volunteers as a member of the United States Green Building Council (USGBC) Energy and Atmosphere Technical Advisory Group and has served as Chair since January 2015. Kevin holds a Master of Arts in Energy and Environmental Analysis from Boston University and a Bachelor of Arts from Middlebury College in Environmental Geology.



About Second Nature

Second Nature works to proactively build a sustainable and positive global future through...

initiating **bold commitments**,

scaling successful actions,

and accelerating innovative solutions

... among leadership networks in higher education.







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The Climate Leadership Commitments

Bold commitments by leaders in the higher education sector yield positive changes at their institutions and beyond.



The Climate Commitment: integrates carbon neutrality with climate resilience. Provides systems approach to addressing climate.



The Carbon Commitment: focused on reducing Greenhouse Gas emissions and achieving carbon neutrality as soon as possible.



The Resilience Commitment: focused on climate adaptation and community capacity-building to deal with a changing climate and resulting extremes.



Contact Second Nature



For more information, contact:

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Jane Cowan

Market Research Coordinator, Midwest Renewable Energy Association

September 22, 2016



Midwest Renewable Energy Association



- Founded in 1990
- 3,000 members
- Custer, WI
- Milwaukee, WI
- St. Paul, MN

Our work

- Annual Energy Fair
- Accredited Certificate Training
- Midwest Grow Solar Partnership
- The Solar Endowment









The Solar Endowment: A Solar Deployment Roadmap for US Colleges and Universities

Theory of Change:

- 1. Issue visibility = learning moments for leadership
- 2. Working investment models exist
- 3. Internal stakeholder process as a guide
- 4. Donor and alumni support





Strategy:

Powered by

U.S. Department of Energy

SunShot







The Solar Endowment – Resources

Case Studies

• Addendum to Luther

Roadmap Resources

- Pilot university executive summaries
- Full roadmaps

Applied Campus PV Course

Upcoming events:

- AASHE Baltimore, Oct. 9-12 "Using Campus Solar Deployment Roadmaps to Guide University Investment
- IEN Intentionally Designed Endowment Forum – Chicago, Nov. 1-2
- 2017 Presidential Climate Leadership Summit – Tempe, Feb. 13-15

"My experience with the Solar University Network has led to immense personal development, a full time career after graduation, and overall a leg forward in the field of renewable energy." - Tim Pollnow, UMN EE Graduate



Jane Cowan janec@midwestrenew.org www.solarendowment.org : UniversitySolar



Financing Methods for Solar Projects at Luther College

Midwest Renewable Energy Association (MREA) Webinar September 22, 2016

Jim Martin-Schramm marschja@luther.edu

Motivations

- Reduce operating costs
- Environmental stewardship



kWh Costs Including Demand



Motivation: Environmental Stewardship





- Luther College became a charter signatory in January 2007.
- Two long-term goals:
 - Make sustainability a part of every student's learning experience
 - Achieve carbon neutrality by a date we determine
- Interim goal: Reduce Luther's greenhouse gas emissions 50%

Luther College Carbon Footprint



Luther's Solar Projects









Sustainability House (4 kW)

- \$22,000
- Installed in August 2011
- 4 kW ground-mounted array
- Sized to provide all electricity for the house
- 100% Donor-funded
- Net-metered





Shirley Baker Commons (20 kW)

- \$76,000
- Installed in May 2013
- Public demonstration site for marriage of geothermal energy and solar PV
- 40% Donor-funded
- 40% DOE grant funding
- 20% Utility rebate



President's House I (5.3 kW)

- \$18,000
- Installed August 2013
- To honor former President, Rick Torgerson and his wife, Judy, for their commitment to sustainability
- 80% Donor-funded by faculty, staff, and friends of the college
- 20% Utility rebate



President's House II (13.66 kW)

- \$37,537
- Installed August 2016
- To honor former President, Rick Torgerson and his wife, Judy, for their commitment to sustainability
- 100% Donor-funded



Baker Village Array (280 kW)

- \$1.2 million
- Installed Summer 2012
- Leased from Decorah Solar Field, LLC, which utilized the Section 1603 Cash Grant and accelerated depreciation
- 280 kW array
- 355,000 kWh/yr offsets
 Baker Village consumption
- Net metered



Main Campus Arrays (822 kW)

- \$1.6 million
- Installed: August October 2015
- 96 kW on roof of the library
- 726 kW in two ground-mounted arrays
- Third Party Power Purchase Agreement with Oneota Solar, LLC, which used a USDA REAP grant, the Federal ITC, State PTC, and MACRS
- Projected generation: ~1,118,000 kWh/yr
- Annual carbon footprint reduction: 5-6%
- 11-year payback for Luther





PREUS LIBRARY 96 KW

96 kW on Preus Library Roof



1 Preus Library - layout









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Appalachian State's Renewable Energy Initiative

Student Leadership in Sustainability

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Mission

"Reduce the environmental impact of Appalachian State University by implementing renewable energy technologies, investing in energy efficiency projects, and promoting campus engagement"

Existing REI Projects

Since its inception, the Renewable Energy Initiative has funded and completed 15 projects ranging from photovoltaic arrays, solar thermal systems, an EV charging station, a wind turbine, along with biofuels & pv + storage research facilities



Finances

- Student "green" Fee
- \$10 per Student per Academic Year
- ~\$170,000 each academic year





Benefits

- Liberated from ROI
- Guaranteed cash flow
- Spread project benefits

Project Development

Concept Development

Initial Proposal Reaction

Project Development

REI Approval

University Approval

<u>RFP/RFQ</u>

Project Management

Final Presentation

Project Completion

Hurdles

- University's Status
- Approvals
- Timeline(s)
- Stakeholders
- Costs
- Ex. 300kW System



Current Efforts

- College of Health Sciences 64 kW
- College of Business 20 kW
- Live Campus Initiative





Large Scale Solar Photovoltaic Installation Process 9/22/2016

ABOUT COLBY COLLEGE

- Founded in 1813 in Waterville, Maine
- 1850 Undergraduates
- 1.55M square feet on main campus
- 714 acres on main campus
- Sustainability a core value
- Oversight for sustainability issues by EAG

Colby's Timeline to Carbon Neutrality



2002-2013 Regular Projects to Improve Energy Efficiency/Reduce Emissions

Green Electricity

- First contract signed in 2003
 - Maine mix: 50% hydro/50% wood biomass
- Subsequent contract
 - Hydro/biomass/wind
 - Hydro/wind
 - 100% wind
- Sustainable power most often through RECs
- Changes/varying opinions on what is "green" power
- Premium for sustainable power has ranged around \$0.002 per kwh

Biomass



- Total project cost \$11.25M
 \$750,000 Efficiency Maine Grant
- Estimated 5- to 8-year payback
- Experiencing higher efficiency resulting in less wood use. More down time for cleaning requiring more oil use.
- During FY13, reduced oil use by approximately 850,000 gallons by using biomass
 - □ Reduced carbon emissions by 81%
 - Total savings over \$1.5 million annually

USGBC LEED Gold Certification

Colby College Solar Energy Pilot

- In May 2015, Colby completed its first solar installation as part of a larger energy management reduction project
- 26 kW 92 panels were installed at SSWAC, Colby's 1st LEED Bldg
- Expected to produce ~30,000 kWh, approximately 20% of building's annual consumption
- Used this installation to build technology comfort and continue a larger discussion around a campus PPA in earnest
- <u>Real-time results are here.</u>

- Analysis Iterations
 - 1. Business As Usual Continue to purchase electricity from CMP, project rates increase at 2% each year
 - 2. Purchase PV Outright Purchase 1.5 MW in Year 0, reduce purchased electricity by 13% each year
 - Lease to Buy PV After Year 6 Enter a PPA with a third party and purchase the array after year 6 for 30% of first cost
 - 4. Lease to Gift After Year 6 Enter a PPA with a donor and the donor gifts us the array
 - Lease PV Only 20-30 Years Enter a PPA with a third party and buy the electricity from the third party at a reduced rate compared to market over 20-30 years

- The College evaluated several financial structures; a Power Purchasing Agreement (PPA) was overall the most attractive. The arrangement would involves the following key elements:
 - Land lease to the Developer for a period of 20 to 30 years as the site for PV panel installation.
 - The Developer responsible for panels, installation, operating costs, and maintenance of the panels.
 - Colby would purchase the electricity from the Developer at a predetermined rate for the duration of the agreement.
 - The Developer, as a for-profit entity, will access federal tax incentives.
- From a financial statement perspective, this is treated the same as a multiterm utility contract, albeit a long-term contract.

- College conducted RFP to solicit proposals for a large-scale solar project in summer 2015.
- 8 firms were solicited and four firms formally interviewed
 - National and local solar outfits were included in the RFP Process
 - Through conversations with other Colleges, Colby developed its RFP list
 - Colby wrote its RFP using EPA resources, other examples from colleagues who have worked on solar projects
 - Colby selected NRG to partner with on the project

Solar Project Details

- Large Scale Solar Installation Evaluation
 - Over the past year, the College finalized a Power Purchasing Agreement (PPA) with NRG for a large scale solar installation
 - 1.865 MW, 2,450,000 kWh annually, 16% of campus annual electric load
 - College signed a deal that provides this electricity to the College at a competitive rate for the life of the project
 - Colby has access to the SRECs
 - Colby is leasing the land to NRG for 27-30 years
 - NRG constructing a solar field and sell us the energy at a predetermined price and collect tax benefits

Solar Preliminary Site Plan

Solar project enhances Colby's sustainability leadership profile:

- Diversifies the College's energy sources.
- Adds to expanding renewable energy sources in Maine—Colby would be responsible for the creation of 2+ million kWhs of renewable electricity.
- Installation contributes to the academic mission of the College by creating another living laboratory site for student research. The panel's real-time monitoring systems have provided data for theses and independent projects. This robust monitoring system was included in the RFP.
- Renewables are highly visible. The installation would be partially visible from I-95 and Washington Street. Real-time display of electricity production data would be available on web-site and monitoring devices for campus visitors, parents, and potential and current students.

- Outside consultants are necessary / invaluable as they have more broad project experience
 - Used Competitive Energy Services for assistance throughout the RFP and PPA process to help evaluate / solicit bids and negotiate the final PPA and site lease
- EPA has a wonderful PPA resource site: <u>Green Power Partnership Tools</u> and <u>Resources</u> that was invaluable during the consensus building and RFP drafting process
- Be mindful of project permitting both their process and schedule. The big two are site/stormwater and utility interconnection permits
- These are long term projects and partnerships with developers and they need to be treated as such

Questions?

For more information:

Contact:

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- solarendowment.org/resources
- <u>secondnature.org/solar-university-</u> <u>network/</u>