Welcome to the RETScreen Training Workshop

John Ignosh
Biological Systems Engineering
Virginia Cooperative Extension
Virginia Tech
Harrisonburg, VA
Thank you to our host:
Longwood University
Thank you to our workshop sponsors:
Virginia Tobacco Indemnification and Community Revitalization Commission
2014-2015

AGRICULTURAL ENERGY EFFICIENCY INITIATIVE

Program for Southside and Southwest Virginia

Funded by a 2014 grant from the Virginia Tobacco Indemnification and Revitalization Commission and is supported by VCE Community Viability and the Virginia Tech Biological Systems Engineering Department
Thank you to our workshop co-sponsor:

“Farm Manure to Energy Initiative”

Farm Manure to Energy Initiative
Using Excess Manure to Generate Farm Income in the Chesapeake’s Phosphorus Hotspots

Project Partners: National Fish and Wildlife Foundation, Chesapeake Bay Funders Network, Farm Pilot Project Coordination, Inc., University of Maryland Center for Environmental Science, University of Maryland Environmental Finance Center, Virginia Cooperative Extension, Lancaster County Conservation District, and Sustainable Chesapeake.
Regional collaborations to identify technologies and practices to better manage nutrients in response to Bay TMDL & State WIP

Collaborative Role Includes:

- Assess system performance, ease of adoption and farm integration
- Conduct preliminary biomass feedstock analysis and emission testing
- Organize farm tours and educational workshops
- Convey results good/bad to clientele and extension network
- One effort focuses on poultry litter and another on smaller dairies

**Farm Manure to Energy Initiative**

*Using Excess Manure to Generate Farm Income in the Chesapeake’s Phosphorus Hotspots*

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And to DMME for First Bringing RETScreen to Virginia!

6 Daylong Intro Workshops Throughout the State in 2012
Exploring Solar Energy Applications in Rural Virginia
Applying Renewable Energy Project Screening, Analysis Tools and Decision Support Software

- **RETScreen**
  - Webinar
  - Six Workshops
    - Hampton
    - Richmond
    - Alexandria
    - Shen Valley
    - Roanoke
    - Danville
  - Workshop Webpage
    - Videos, resources

- **Collaborators**
  - NASA Langley
  - Shenandoah Valley Energy Partnership (Blue Ridge Community College)
Improving Urban Stormwater Management and Evaluating Energy Benefits—Dr. David Sample

A look at:

• Urban Stormwater
• Low Impact Development
• Green Roofs & Energy

Available as Adobe Presenter File on Workshop Website (Soon as YouTube)
Energy Aspects of Community Planning & Regulations – Dr. Jonah Fogel

- Challenges and Opportunities for Renewables
- Business friendly communities
- Incentives and Regulations
- Working at the “community scale”
- How can RETScreen help?

Virginia Cooperative Extension
A partnership of Virginia Tech and Virginia State University  www.ext.vt.edu

Virginia Tech
Invent the Future

Live at Richmond & Alexandria Sessions – Upcoming YouTube on Workshop Website
Lean Thinking and Energy Savings
Dr. Henry Quesada-Pineda

Overview of:
– Lean manufacturing concepts
– Energy audits
– Energy efficiency measures
– Lean manufacturing toolkit

Henry Quesada-Pineda
Assistant Professor

Live at Roanoke – Available as Adobe Presenter File on Workshop Website (Soon as YouTube)
Energy Considerations at a Virginia Fish Farm – Bob Lane, Seafood Extension Specialist

A look at displacing propane with a solar thermal project at an aquaculture facility on the Eastern Shore - VA

Live at Hampton Session – Upcoming YouTube on Workshop Website
Jonah Fogel, Community Viability Specialist, Virginia Cooperative Extension

Presentation on Energy Aspects of Community Planning & Regulations

Jonah is a Community Viability Specialist with Virginia Cooperative Extension. He holds a Ph.D. from the University of Tennessee in Natural Resources with a minor in Environmental Policy, a Masters of Landscape Architecture from Virginia Tech, and a B.S. in Hydrogeology from Western Michigan University. As the Community Viability specialist for Virginia Cooperative Extension Jonah serves as a leader in land use planning and policy education, and community food systems. He has co-developed three Extension courses for VCE, and has been awarded competitive grants exceeding $250,000. His work has also led to the development of the Community Food System Explorer, the Richmond Area Food System Council, and the Virginia Citizens Planner program. Prior to completing his graduate schooling, Jonah worked as an environmental consultant, conducting soil and groundwater pollution surveys and reporting. His research interests have centered on the interactions between human decision-making and ecological systems.

John Ignosh, Area Specialist, Biological Systems Engineering, Virginia Tech & Extension

Presentation on Workshop Introduction and Virginia Context

Ignosh works to promote the efficient utilization of agricultural byproducts as an Area Specialist with Virginia Cooperative Extension and Virginia Tech’s Department of Biological Systems Engineering. Prior to his current role, John performed air quality research with the University of California – Davis related to aerosols associated with agricultural production in the San Joaquin Valley, as well as nationally regarding the contribution of fine aerosols to regional haze and public health in protected environments. He has also worked in international development and served as a resource extension agent with the U.S. Peace Corps in South Africa.
Robert Lane, Extension Specialist Seafood, Biological Systems Engineering, Virginia Tech & Extension

Energy Considerations at a Fish Farm

As the Engineering Extension Specialist at Virginia Tech’s Seafood Agriculture Research and Extension Center in Hampton, Bob Lane develops practical solutions to address issues such as food safety and processing. Bob works closely with seafood, aquaculture, and agriculture industries to address specific issues they have, from technical difficulties within their facilities to food packaging development. Some of his work includes thermal monitoring in oyster and crab processing. Bob also works with companies to develop efficient energy, water use and waste management systems with the goal of minimizing costs and improving sustainable resource use. He facilitates collaboration on these projects between industry, researchers and regulatory bodies. Bob Lane has been with the Virginia Tech Extension since 1988. Prior to his career with Virginia Tech, Bob worked nine years in the electric utility industry. He holds an M.S. in Agricultural and Life Sciences and a B.S. in Agricultural Engineering, both from Virginia Tech.

Jactone Arogo Ogejo, Extension Specialist, Department of Biological Systems Engineering, Virginia Tech & Extension

Presentation on Anaerobic Digesters: Biomethane Production from Dairy Manure

Anaerobic Digesters: Biomethane Production from Dairy Manure


Henry Quesada
Dr. Henry Quesada works for the Department of Sustainable Biomaterials at Virginia Tech as an expert in business management and operations research. His academic program focuses on process improvement for service and manufacturing firms, and he has over 12 years of experience as a consultant and researcher in medical device components, forest products, microelectronic, financial, and telecommunications industry sectors.

Michael Ross, RER Energy - Multiple Presentations Below:

- Introduction to Course
- Introduction to the Notion of Prefeasibility Assessment for Energy Projects and Financial Analysis with RETScreen
- Introduction to Combined Heat and Power (CHP)
- Introduction to Energy Efficiency with RETScreen
- Overview of "other" RETScreen Modules & Kits

Michael M. D. Ross has worked with renewable energy systems and other clean energy technologies for over 17 years. Michael has held research positions at CanmetENERGY and the Advanced Energy Systems Group of the Department of Technical Physics and Mathematics at Alvar Aalto University, Finland's premier engineering university. Since 2001, in addition to consulting extensively for RETScreen® International, Michael has been contracted to provide assistance in building energy modeling and energy efficiency research on photovoltaic systems, wind energy resource assessment and site selection, energy storage, co-generation and renewable heating systems.
A degree in Systems Design Engineering from the University of Waterloo. RER Energy Inc. is a consultancy focused on energy efficiency and renewable energy. Its main activity is research on system-level topics, including system optimization, component and system characterization, resource assessment, evaluation, modeling, and data analysis. One of its specialties is the utilization of renewable energy technologies in cold climates. In addition, RER develops these materials and provides training related to energy efficiency and renewable energy.

David Sample, Extension Specialist, Dept. Biological Systems Engineering, VT

Presentation on Aspects of Energy Usage and Runoff Reduction Associated with Green Roofs

David is an assistant professor and extension specialist in the department of Biological Systems Engineering at Virginia Tech. He received a BS and MS from the University of Florida (Gainesville, FL) in environmental engineering and a PhD from the University of Colorado (Boulder, CO) in Civil Engineering (Water resources). Dr. Sample has approximately 22 years of experience including both consulting and municipal government before coming to Virginia Tech in 2008. Dr. Sample's research focuses upon improving our management of urban water. He is currently researching the effectiveness of different Low Impact Development (LID) Practices and other Best Management Practices (BMPs) with innovative designs. Dr. Sample has developed numerous natural and urban watershed models, developed monitoring plans, and conducted watershed improvement studies, including economic analysis of alternatives. Dr. Sample is a registered engineer in over 7 states, and is a Diplomate of the American Academy of Water Resources Engineers. In 2008, Dr. Sample was appointed to the U.S. Chesapeake Bay Program Science and Technical Advisory Committee (STAC). He also served on the Virginia BMP Clearinghouse for the Virginia Department of Conservation and Recreation since 2008. He has been a member of the Urban Water Resources Research Council of the American Society of Civil Engineers/Environmental and Water Resources Institute since 2003, and has co-chaired a Committee on implementing Low Impact Development in Combined Sewer Areas since 2009.

Paul Stackhouse Jr., Senior Research Scientist, NASA Langley Research Center (USA)


Dr. Paul Stackhouse is a Senior Research Scientist at the NASA Langley Research Center in Hampton, Virginia. He received his B.S. in Physics and Atmospheric Science from Drexel University and his M.S. and Ph.D. in Atmospheric Science and Solar-PV Electric Power Systems from the University of Colorado. Before joining NASA, he was a postdoctoral researcher at the University of Colorado. His research focuses on the development of remote sensing and computational models for the retrieval of solar and other meteorological parameters.
Dr. Paul Stackhouse is a Senior Research Scientist at the NASA Langley Research Center in Hampton, Virginia. He received his B.S. in Physics and Atmospheric Science from Drexel University and his M.S. and Ph.D. in Atmospheric Sciences at Colorado State University. Dr. Stackhouse is lead scientist of the NASA/Global Energy and Water Cycle Experiment Surface Radiation Budget Project, and he leads several NASA-funded Applied Science projects that tailor satellite data parameters, along with meteorological input, for the energy-related and agricultural industries. These projects, along with long standing partnerships including RETScreen, have led to internet applications for distributing these data to the clean energy industry.

ADDITIONAL RESOURCES FROM WORKSHOP

NASA's "Prediction of Worldwide Energy Resource" (POWER) Lab Website

NED/Power Profile - Regional Emission Information for Primary Energy Fuel Mixes

Screen NING Online User Forum

Simple Community Energy Plan (Arlington, Virginia)
What is Virginia Cooperative Extension?
About Virginia Cooperative Extension...

Virginia Cooperative Extension brings the resources of Virginia's land-grant universities, Virginia Tech and Virginia State University, to the people of the commonwealth.

3 Goals of U. S. Land Grant Universities:

• Teaching
• Research
• Extension Service
### Objectives

#### Goals:
- Raise awareness and understanding among clientele of new approaches to increase the efficiency of production systems and opportunities to minimize environmental impact
- Relay emerging issues expressed by clientele to research community

#### Focus Areas:
1. On-farm energy efficiency
2. Renewable energy conversion technologies
3. Project assessment tools
4. Nutrient management technologies

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Promote the efficient utilization of agricultural byproducts. This role includes:
- Collaborating on regional efforts to assess opportunities to integrate nutrient management technologies with renewable energy generation
- Providing unbiased technical information on bioenergy conversion technologies including anaerobic digestion, biodiesel and thermal conversion processes
- Assisting farmers and rural small businesses in conducting energy assessments and audits of greenhouses, dairies, poultry farms, and other operation

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#### Clientele:
- community leaders
- entrepreneurs
- farmers
- K-12 students
- policy makers
- And more!
Bioenergy Engineering Education Program

- BEEP provides tailored informational sessions for community leaders, entrepreneurs, farmers, K-12 students, and the general public on renewable energy technologies.
- Started in 2006 by Dr. Arogo, BEEP is delivered via webinars, presentations, meetings, field tours and hands-on workshops.
- Aimed at providing basic information to Virginian’s interested in bioenergy: farmers, students, organizations, anyone interested in learning more.
- Growing to include solar energy conversion technologies new mobile learning lab!
Welcome to the "Virginia Boiler Workshop"
Enhancing Energy Efficiency via Steam System Assessments

Wednesday, June 4, 2014
Virginia Museum of Natural History
Martinsville, VA
Welcome to the “Solar Photovoltaics: Introductory Workshop”

May 17, 2014
Northern Virginia 4H Camp & Conference Center
Front Royal, VA
Exploring Solar Energy Applications in Rural Virginia
Applying Renewable Energy Project Screening, Analysis Tools and Decision Support Software

Development of Working Educational Demos

• Northern Virginia 4H Center
• Solar PV w/ Monitoring
  – 1-2 kW grid interactive
  – Web monitoring

• Built in ongoing outreach programming via future ongoing field days and remote system performance monitoring
  – ~5,000 4H campers with edu programming
  – Appalachian Trail runs by facility, procure local food at cafeteria, (<energy costs, >local food)
  – Public Pool
  – Conference Center (hosting our PV workshop)

Beyond Project

• Exploring additional opportunities for larger project outside of current project using PV Project Finance vehicle unique to non-profits
• Exploring opportunities with energy efficiency competitions, energy audits, sub-metering, etc. with utility (ODEC)
• 6 facilities in VA
Exploring Solar Energy Applications in Rural Virginia
Applying Renewable Energy Project Screening, Analysis Tools and Decision Support Software

- Development of Working Educational Demos
  - Randolph Farm – VSU
  - Aquaculture
- Solar Thermal w/ Monitoring
  - Off-shelf vs. DIY
  - Web monitoring
- Built in ongoing outreach programming via future ongoing field days and remote system performance monitoring
  - ~5,000 people on facility tours each year
Virginia Engineering Design Note 614 (DN-614) Watering Facility

September 2010

Virginia Livestock Watering Systems - Pressure System Worksheet

1) Assistance Information
   - Department:
   - Office:
   - Division:
   - Section:
   - Project:

2) Water Budget
   a) Total Daily Water Demand
      - Type of Operation:
      - Number of Animals:
      - Water Demand:
      - Total Demand:
   
3) Design Parameters
   a) Trough Information
      - Trough Height:
      - Trough Width:
      - Trough Length:
   
   b) Pipe Information
      - Pipe Material:
      - Pipe Size:
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In addition to dedicated energy crops, what biomass feedstocks do we have to work with? Where and when are they generated? Is there competition for this material? What’s its highest/best use?

Are there other mgmt constraints or opportunities due to location? (SOM, federal land, TMDL, tipping fees, etc.)

Sought after as initial project screening tool by bioenergy project developers

Component to Virginia Energy Plan

5 Categories, 23 Feedstocks
With more work underway
Geocoding & Analysis of Active Boilers

Where might it be worthwhile to explore options with biomass?

25,612 Active Boilers in VA
Active Boilers in Farmville, VA
Regional collaborations to identify technologies and practices to better manage nutrients in response to Bay TMDL & State WIP

Collaborative Role Includes:

- Assess system performance, ease of adoption and farm integration
- Conduct preliminary biomass feedstock analysis and emission testing
- Organize farm tours and educational workshops
- Convey results good/bad to clientele and extension network
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Project Partners: National Fish and Wildlife Foundation, Chesapeake Bay Funders Network, Farm Pilot Project Coordination, Inc., University of Maryland Center for Environmental Science, University of Maryland Environmental Finance Center, Virginia Cooperative Extension, Lancaster County Conservation District, and Sustainable Chesapeake.
Welcome to The Center for Natural Capital 2014

The Center is a 501 c-3 applied research, education, and job training and development organization focused on community economic development through health in four program areas - energy, rivers, landscape, and people. Learn More
### Pellet Mills in the Region

**NOTES:**
- Some: bagged retail only, no bulk deliveries, make product intermittently, are export only, etc.
- **Dynamic & details change** – worth a phone call for latest information in exploring your project scenarios

<table>
<thead>
<tr>
<th>Company</th>
<th>Locations</th>
</tr>
</thead>
</table>
| Hamer Pellet Fuel Company        | 1. Elkins, WV  
                                 | 2. Mt. Hope, WV                          |
| Enviva Biomass, LP (formerly: Intrinergy, LLC) | 1. Ahoskie, NC  
                                 | 2. Northampton County, NC  
                                 | 3. Chesapeake, VA               |
| Lignetics, Inc.                  | 1. Linn, WV  
                                 | 2. Kenbridge, VA                        |
| O'Malley Timber Products, LLC    | 1. Tappahannock, VA                         |
| Potomac Supply Corporation       | 1. Kinsale, VA                               |
| Turman Hardwood Pellets          | 1. Galax, VA                                 |
| Biomass Energy, LLC (formerly: WoodFuels Virginia) | 1. Bumpass, VA                             |
| Wood Fuel Developers, LLC        | 1. Jarratt, VA                               |
| American Wood Fibers             | 1. Marion, VA  
                                 | 2. Jessup, MD                             |
| Nash Timber Corporation          | 1. Gladys, VA                                |

*From project survey December, 2011*
2014-2015
AGRICULTURAL ENERGY EFFICIENCY INITIATIVE

Program for Southside and Southwest Virginia
Funded by a 2014 grant from the Virginia Tobacco Indemnification and Revitalization Commission
and is supported by VCE Community Viability and the Virginia Tech Biological Systems Engineering Department

Martha Walker, Ph.D.
Community Viability Specialist
Virginia Cooperative Extension

John Ignosh
Biological Systems Engineering
Virginia Cooperative Extension
On-Farm Energy Efficiency Program
A Pilot Program for Southside and Southwest Virginia

Virginia Tobacco Indemnification and Revitalization Commission

- In 2007, farmers spent:
  - $156M in fuel, $52M in electricity and other utilities, $208M in total
- A 10% increase in energy efficiency would have produced nearly $21 million additional income to Virginia farms in 2007

**How can we find those opportunities?**

- Provides research-based information related to best management practices concerning energy via Virginia Cooperative Extension workshops, factsheets, webinars, etc.
- Train energy assessors, energy use BMPs, thermography tools, fuel purchasing, etc.
- Secure grant funding from the Virginia Tobacco Indemnification and Community Revitalization Commission (2010-2012)

2010 - 2012 Impacts
- 58 energy audits completed
- 19 counties throughout Southside and Southwest Virginia
- Completed energy audit reports have identified farm specific energy conservation measures to save:
  - 1,258,776 (kWh) in electrical usage;
  - 603,315 (gallons) propane fuel;
  - 19,336 (gallons) fuel oil;
  - 63,298 Million BTUs;
  - 4,315 (MTCO2e) greenhouse gas emission reductions;
  - $1,178,917 energy savings
- Approximately 76% of the recommended energy conservation measures have a payback period shorter than five years.

- > 60 agricultural operations including aquaculture, tobacco, dairy, poultry, swine, greenhouse, lumber/sawmill, and on-farm food value-added agribusinesses will improve farm energy efficiency and/or have an opportunity to explore renewable energy.

- > 300 agricultural entrepreneurs will increase their understanding of energy efficient operations.
Initial Collaborators

we’re always looking for more

- Virginia Cooperative Extension: Martha Walker, John Ignosh, David Reed; Joyce Latimer, Henry Quesada; Stephen Barts (Pittsylvania), Taylor Clarke (Mecklenburg), Mike Parrish (Dinwiddie), and Cynthia Martel (Franklin); Amy Fanon-Osborne (Lee), Scott Jerrell (Scot), Scott Jessee (Russell)
  - ANY OTHERS IN VCE & WORKING IN REGION THAT ARE INTERESTED CAN PARTICIPATE TOO
- Old Dominion Electric Cooperatives, Erin Puryear
- Virginia Department Mines, Minerals & Energy, Robin Jones
- Virginia FAIRS, Chris Cook
- USDA NRCS, David Faulkner
- USDA Rural Development, Laurette Tucker
- Natural Capital Investment Fund, Hannah Vargason
General Strategy

Renewable Gizmos
Efficient Gizmos
Knowledge

Energy Action Pyramid

Complexity and Cost

Alternative Energy
Choices such as installing solar, wind, geothermal, micro hydro or biofuels systems

Efficiency: Investment in Longer Term Energy Savings
Choices such as:
- Installing energy efficient lighting, fixtures, windows, doors, appliances, and equipment
- Installing water-efficient appliances and fixtures
- Investing in items with Energy Star, EnergyGuide or WaterSense labels
- Insulating homes

Conservation: Simple Everyday Actions
Behaviors such as:
- Turning off lights, equipment, fans, and appliances when not in use
- Adjusting thermostats in heated or cooled spaces
- Using powerstrips to control for phantom electrical loads
- Caulking and weatherstripping around windows and doors
- Landscaping with native and xeric plants, and utilizing rain water

Assessment: Assess your personal objectives and your energy and water use to determine cost-effective strategies for implementing conservation and efficiency measures and integrating renewable energy systems in your home.

Source:

Agricultural Energy Efficiency Project Website
- Energy Benchmarking
- Farm Energy 101 Modules

Agricultural Energy Efficiency Project Workshop Series
- Agricultural Production Systems (Greenhouses, Tobacco, Dairy, etc.)
- Emergency Backup Power Generation Systems
- Renewable Energy Technologies & Applications (solar, RETScreen, small wind, biomass, etc.)
- Forest Product Industries (Lean Manufacturing, etc.)

Validation of Energy Savings
- Monitor performance of some of the recommended retrofits
$5,000 per program participant funds will be used toward:

- the energy audit process
- development of a renewable energy feasibility study
- and/or implementation

- **Energy Audits** - ASABE S612 Farm Energy Audit Criteria (Completed by an NRCS Technical Service Provider), or ASHRAE Level II Energy Audit (completed by a Professional Engineer or Certified Energy Manager), as appropriate for entity type.

- **Renewable Energy Feasibility Studies** - Producers who completed the energy audit process and, based on the owner’s management goals, have implemented all relevant energy efficiency retrofit opportunities having a simple payback period of less than 5 years, may then use the cost-share program to partially fund a renewable feasibility study. The feasibility study must satisfy the criteria for the USDA Rural Development REAP program, be completed by a Professional Engineer that is not affiliated with any particular technology provider, and include a screening model output from RETScreen Clean Energy Project Analysis Software.

- **Implementation Cost-Share Program** - Energy-cost saving opportunities identified in the audit report are eligible for a cost-share from funds remaining in the participant’s $5,000 allocation.

- **NOTE:** Cost-share percentage increases (from 25% to 50%) with participation in educational programming (either workshops, mailed fact sheets, and later “Farm Energy 101 Modules” online content)
Cost-share percentage increases (from 25% to 50%) with participation in educational programming (flexible format: either via workshops, mailed fact sheets, and later “Farm Energy 101 Modules” online content, etc.)

**Why?**

- **Significant energy cost savings can be achieved via no-cost and low-cost energy efficiency measures.** Many of the management practices that generate the greatest energy savings often continue to use existing equipment, however, incorporate energy best management practices to do so more efficiently.

- **VCE delivers the educational programming related to energy management practices that are tailored to specific agricultural production systems.**

- **Better yet, any of the more expensive retrofits that are installed will tend to perform better with these same energy BMPs.**
General Strategy

Renewable Gizmos
Efficient Gizmos
Knowledge

ENERGY ACTION PYRAMID

ALTERNATIVE ENERGY
Choices such as installing solar, wind, geothermal, micro hydro or biofuels systems

EFFICIENCY: Investment in Longer Term Energy Savings
Choices such as:
- Installing energy efficient lighting, fixtures, windows, doors, appliances, and equipment
- Installing water-efficient appliances and fixtures
- Investing in items with Energy Star, EnergyGuide or WaterSense labels
- Insulating homes

CONSERVATION: Simple Everyday Actions
Behaviors such as:
- Turning off lights, equipment, fans, and appliances when not in use
- Adjusting thermostats in heated or cooled spaces
- Using powerstrips to control for phantom electrical loads
- Caulking and weatherstripping around windows and doors
- Landscaping with native and xeric plants, and utilizing rain water

ASSESSMENT: Assess your personal objectives and your energy and water use to determine cost-effective strategies for implementing conservation and efficiency measures and integrating renewable energy systems in your home.

Source:
Agricultural Energy Efficiency Initiative: Program Activities

Agricultural Energy Efficiency Project Website
- Energy Benchmarking
- Farm Energy 101 Modules

Agricultural Energy Efficiency Project Workshop Series
- Agricultural Production Systems (Greenhouses, Tobacco, Dairy, etc.)
- Emergency Backup Power Generation Systems
- Renewable Energy Technologies & Applications (solar, RETScreen, small wind, biomass, etc.)
- Forest Product Industries (Lean Manufacturing, etc.)

Validation of Energy Savings
- Monitor performance of some of the recommended retrofits
Cost-share percentage increases with participation in educational programming (either workshops, mailed fact sheets, and later “Farm Energy 101 Modules” online content)

- Post workshop presentations on website
- Create additional ag energy related content and post as online educational videos (e.g., lighting, ventilation, etc.)
  - Selected Lectures from BSE Service Course – Dr. Christian Mariger (more on these later)
  - ***If you have a suggestion for a specific topic please let me know***

Later in the project we will attempt to integrate brief “quizzes” within online video content, viewers can use this as one more way to satisfy edu requirement for increased cost-share rate
Energy Benchmarking - The process of accounting for and comparing energy performance with its energy baseline, or comparing energy performance with the energy performance of similar types of facilities. Benchmarking can be used to compare performance over time, within and between peer groups, or to document top performers.

Benchmarking drives action – “You know what’s motivating? Finding out you’re behind the curve and you didn’t even know it…Once you benchmark your energy performance, you’ll have a better idea what to do next…Got a low score? Time to do an energy audit and see where you may be wasting energy. The good news is you have the potential to save money…” - energystar.gov

Will work for some production systems better than others..

Sources:

Scott Sanford, Univ. Wisconsin


Agricultural Energy Efficiency Project Website
- Energy Benchmarking
- Farm Energy 101 Modules

Agricultural Energy Efficiency Project Workshop Series
- Agricultural Production Systems (Greenhouses, Tobacco, Dairy, etc.)
- Emergency Backup Power Generation Systems
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- Forest Product Industries (Lean Manufacturing, etc.)

Validation of Energy Savings
- Monitor performance of some of the recommended retrofits
2014-2015 Agricultural Energy Efficiency Initiative:
Agricultural Energy Efficiency Project Workshop Series

- Agricultural Production Systems: (at least 13 workshops/webinars)
  - Planned tracks:
    - Dr. Reed: Tobacco Curing Energy Management (*more on these later*)
    - Dr. Latimer: Greenhouse Energy Management (*more on these later*)
  - Anticipated workshop/webinar opportunities for other production systems (based on interest/opportunities): Dairy, Poultry, Swine, Grain Drying, etc.
    **please contact me if you have an idea/suggestion***

- Forest Product Industries (at least 4 workshops/webinars)
  - Dr. Quesada: Lean Manufacturing Principles and Energy Mgmt Practices for Forest Product Industries (*more on these later*)
Emergency Backup Power Generation Systems (at least 1 workshop)

- During previous project, some participants expressed interest in emergency power systems.
- Interest also grew with outages from El Derecho event in June 2012.
- Fair amount of confusion between role of: energy efficiency, renewables in backup power (e.g., most net-metered solar PV systems won’t energize grid during outage (exceptions)), and emergency power systems.

- Plan to host workshop on Emergency Backup Power Generation Systems.

Renewable Energy Technologies & Application Workshops (at least 3 workshops)

- During the previous pilot program many producers expressed an interest in solar energy conversion technologies; therefore, at least one workshop will focus on solar energy (e.g., photovoltaic, thermal, and hot air) (workshop 1).

- Two additional workshops will be held focused on appropriate renewable energy technologies for the region and interest and may include: small wind, thermal conversion of biomass, among others (workshops 2 & 3). **please contact me if you have an idea/suggestion***

Sources:
USDA
https://www.puc.nh.gov/Sustainable%20Energy/GHGERF%202009%20Grantees.htm

Renewable Energy Technologies & Application Workshops (1 workshop)

- A two-day workshop will be held on the RETScreen Clean Energy Project Analysis Software

- RETScreen is a unique decision support tool, provided free-of-charge, to evaluate the energy production and savings, costs, financial viability and risk for various types of Renewable-energy and Energy-efficient Technologies (RETs). RETScreen enables participants to explore a variety of “what-if” scenarios to see how a solar PV system might work on their poultry house, or how a solar water pumping unit would perform, or the potential energy-cost savings in swapping a propane-fired heater with biomass pellets, among many other scenarios. The RETScreen program is a free Excel-based program, which utilizes research-based information, and incorporates an energy and financial analysis model to enable sensitivity analysis to anticipate the effect from variations from predicted to the actual performance, costs, and revenue.

- Technical assistance providers will be encouraged to attend the training workshop as the RETScreen Model Output is a required component to any renewable energy feasibility studies cost-shared through this program. They can use other programs too, but must also provide a RETScreen run.

- Workshop materials will also be made available on the project webpage.

- Tool helps folks know what they’re getting into

Sources: RETScreen
RETScreen Software Model Flow Chart

Five Step Standard Analysis

1. Energy Model
   - Sub-Worksheet(s)

2. Cost Analysis

3. GHG Analysis
   - Optional
   - Click on blue hyperlinks or floating icon to access data

4. Financial Summary
   - Project Cash Flows

5. Sensitivity & Risk Analysis
   - Optional

Ready to make a decision

Integrated Features

- Weather Data
- Product Data
- Online Manual

- Training Course
- Engineering Textbook
- Case Studies
- Online Marketplace
- Internet Forums
RETScreen Software: Cumulative Growth of User Base

402,821 users in 222 countries and territories

Top Twenty Countries

1. Canada 77,169
2. USA 51,600
3. France 35,674
4. Italy 20,813
5. United Kingdom 16,086
6. Spain 13,502
7. China 9,918
8. Greece 9,006
9. Portugal 8,868
10. India 8,596
11. Poland 8,390
12. Brazil 7,096
13. Germany 6,756
14. Chile 6,417
15. Australia 6,132
16. Romania 5,599
17. Mexico 4,785
18. Belgium 4,324
19. Ireland 4,296
20. South Korea 3,679

As of March 31, 2014

Participants are from a variety of backgrounds – some concepts, terms, technologies will be new. Hopefully, at least something will be new for everyone!

RESOURCES:
- Integrated educational tools within RETScreen software and website:
  - Help
  - E-textbook
  - Case studies
  - And more!
- Our workshop website:
  - Presentations
  - Links to RETScreen User Groups (Ning Network, etc.)

PLEASE ASK QUESTIONS THROUGHOUT THE PROGRAM
Some final details...

- Coffee
- Restrooms
- Please sign-in on the sheet
- Lunch is on your own (will break around Noon)
- Want to accommodate as much ‘hands-on’ time as possible for those interested
- We’ll wrap up by 5:30 – understand if people need to leave earlier
- Evaluations – please take a minute to complete the evaluation (even if you leave early). Your feedback helps us improve which is the goal.

PLEASE LET US KNOW IF WE CAN BE OF ANY HELP THROUGHOUT THE PROGRAM
Course Outline

This beginner-level course will provide an intensive introduction to the RETScreen Clean Energy Project Analysis Software, including:

- Overview of the RETScreen software
- Energy efficiency, heating, cooling and power project analysis
- Greenhouse gas emissions analysis
- Financial & risk analysis
- Databases & engineering tools
- Overview of legal and policy toolkits
- On-going energy performance analysis
- Hands-on completion of project templates and case studies

Target Audience

Course participants typically include engineers, architects, scientists, technicians and financial planners who are relatively new to RETScreen, as well as other key stakeholders in clean energy.

Prerequisites

A university or college degree in a technical or analytical field, or equivalent experience.

Duration: 3 days

Cost: $1,499 + sales tax
Thank you to our workshop sponsors:
Virginia Tobacco Indemnification and Community Revitalization Commission
2014-2015
AGRICULTURAL ENERGY EFFICIENCY INITIATIVE

Program for Southside and Southwest Virginia
Funded by a 2014 grant from the Virginia Tobacco Indemnification and Revitalization Commission
and is supported by VCE Community Viability and the Virginia Tech Biological Systems Engineering Department
Thank you to our workshop co-sponsor:

“Farm Manure to Energy Initiative”

Farm Manure to Energy Initiative
Using Excess Manure to Generate Farm Income in the Chesapeake’s Phosphorus Hotspots

**Project Partners:** National Fish and Wildlife Foundation, Chesapeake Bay Funders Network, Farm Pilot Project Coordination, Inc., University of Maryland Center for Environmental Science, University of Maryland Environmental Finance Center, Virginia Cooperative Extension, Lancaster County Conservation District, and Sustainable Chesapeake.
Regional collaborations to identify technologies and practices to better manage nutrients in response to Bay TMDL & State WIP

Farm Manure to Energy Initiative

*Using Excess Manure to Generate Farm Income in the Chesapeake’s Phosphorus Hotspots*

**Project Partners:** National Fish and Wildlife Foundation, Chesapeake Bay Funders Network, Farm Pilot Project Coordination, Inc., University of Maryland Center for Environmental Science, University of Maryland Environmental Finance Center, Virginia Cooperative Extension, Lancaster County Conservation District, and Sustainable Chesapeake.

**Collaborative Role Includes:**

- Assess system performance, ease of adoption and farm integration
- Conduct preliminary biomass feedstock analysis and emission testing
- Organize farm tours and educational workshops
- Convey results good/bad to clientele and extension network
- One effort focuses on poultry litter and another on smaller dairies
Participant Introductions
John Ignosh
Biological Systems Engineering
Virginia Cooperative Extension
Virginia Tech
Harrisonburg, VA
MICHAEL ROSS, RER Energy – Montreal Canada

Michael M. D. Ross has worked with renewable energy systems and other clean energy technologies for over 17 years. Michael has held research positions with CanmetENERGY and the Advanced Energy Systems Group of the Department of Technical Physics and Mathematics at Alvar Aalto University, Finland’s premier engineering university. Since 2001, in addition to consulting extensively for RETScreen® International, Michael has been contracted to provide expertise in building energy modeling and energy efficiency, research on photovoltaic systems, wind energy resource assessment and site selection, assessment of icing losses and mitigation methods for wind turbines, quantification of greenhouse gas emissions associated with various energy technologies, and inspection of residential solar thermal systems. Since 2003, Michael has been the head of RER Energy Inc, which provides services for federal, provincial, and municipal governments as well as utilities, wind developers, engineering consulting firms and private homeowners.

Michael has a Bachelor of Applied Science degree in Systems Design Engineering from the University of Waterloo.