Virginia Tech
Invent the Future

Biological Systems Engineering

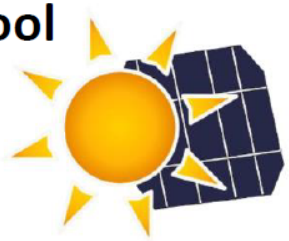
Welcome to the Workshop

Solar Photovoltaic Investment Analysis & DOE NREL's 'System Advisor Model' (SAM) Decision Support Tool

December 13th & 14th 9AM - 5PM

The Institute for Advanced Learning and Research

150 Slayton Avenue Danville, VA 24540



John Ignosh
Biological Systems Engineering
Virginia Cooperative Extension
Virginia Tech
Harrisonburg, VA

Virginia Cooperative Extension

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

Thank you to our workshop sponsors:

DMME

Virginia Department of
Mines Minerals and Energy

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General Workshop Outline

DAY ONE

- Welcome & Introduction
- Estimating System Production
- Assessing System Cost
- Lunch
- Forecasting the Value of Electricity
- Understanding Incentives
- Conducting a Financial Analysis
- System Advisor Model Brief
  - Description
  - Example
- End of Workshop

DAY TWO

- Welcome & Introduction
- Hands-on with the System Advisor Model
- Lunch
- Hands-on with the System Advisor Model
- End of Workshop

Areas I generally work in….

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

Clientele:

- community leaders
- entrepreneurs
- farmers
- K-12 students
- policy makers
- And more!

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

2014-2017
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

Large project with many different collaborators and agencies: DMME, ODEC, USDA-RD, USDA-NRCS, NCIF, and many in Extension throughout region and on campus

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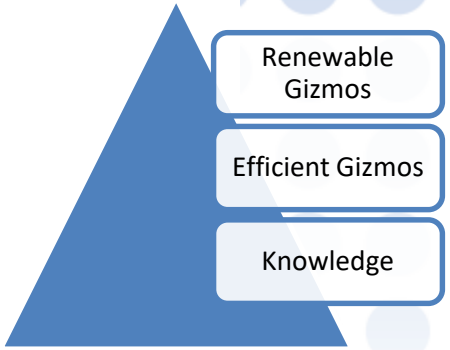
General Strategy



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:
http://www.ces.ncsu.edu/wp-co
Con_PyramidRev1.pdf

2014-2017 Agricultural Energy Efficiency Initiative:
Agricultural Energy Efficiency Project Workshop Series

Workshops

- Poultry Energy BMPs
- Dairy Energy BMPs
- Tobacco Curing Energy BMPs
- Greenhouse Energy BMPs
  - Virtual Grower
- Solar PV
- Solar Hot Water
- GSHP
- Standby Power Systems
- RETScreen

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

RECENT AEEI EVENTS

- Dairy Energy Efficiency Workshops
  - 11/29 McGaheysville (Daubert, VCE, Univ. Wisc., SVEC & Cub Run Dairy)
  - 11/30 Rocky Mount (Martel, VCE, Univ. Wisc., & ODEC)
- Solar Finance & NREL System Advisory Model (SAM) Workshop
  - Webinar November 17th (online)
  - Workshop, December 13 & 14 (Danville, VA)
    - 12/13: basics of solar finance analysis
    - 12/14 solar project analysis with NREL's System Advisor Model (SAM)
- Please let me know if you're interested in more information

AEEI program provided access to, and funding for, energy audits for 66 farms in Southside and Southwest Virginia. Between 2014 and 2017, 66 farms completed an energy audit. The audits identified potential annual energy savings of 873,968 kWh in electricity and 429,847 gallons of propane with efficiency improvements resulting in a projected 3,151 MTCO2e greenhouse gas emissions reductions and an annual energy-cost savings of $850,734. Approximately 46% of the energy conservation measures had a payback period of less than 5 years. Each $1 from the AEEI cost-share program has leveraged ~ $3 in private funding toward identified retrofits. The AEEI has delivered 20+ related educational programs on farm energy management.

USDA Rural Development
Committed to the future of rural communities.

DMME
Virginia Department of Mines Minerals and Energy

NRCS
U.S. Department of Agriculture
Natural Resources Conservation Service

Old Dominion Electric Cooperative
ODEC

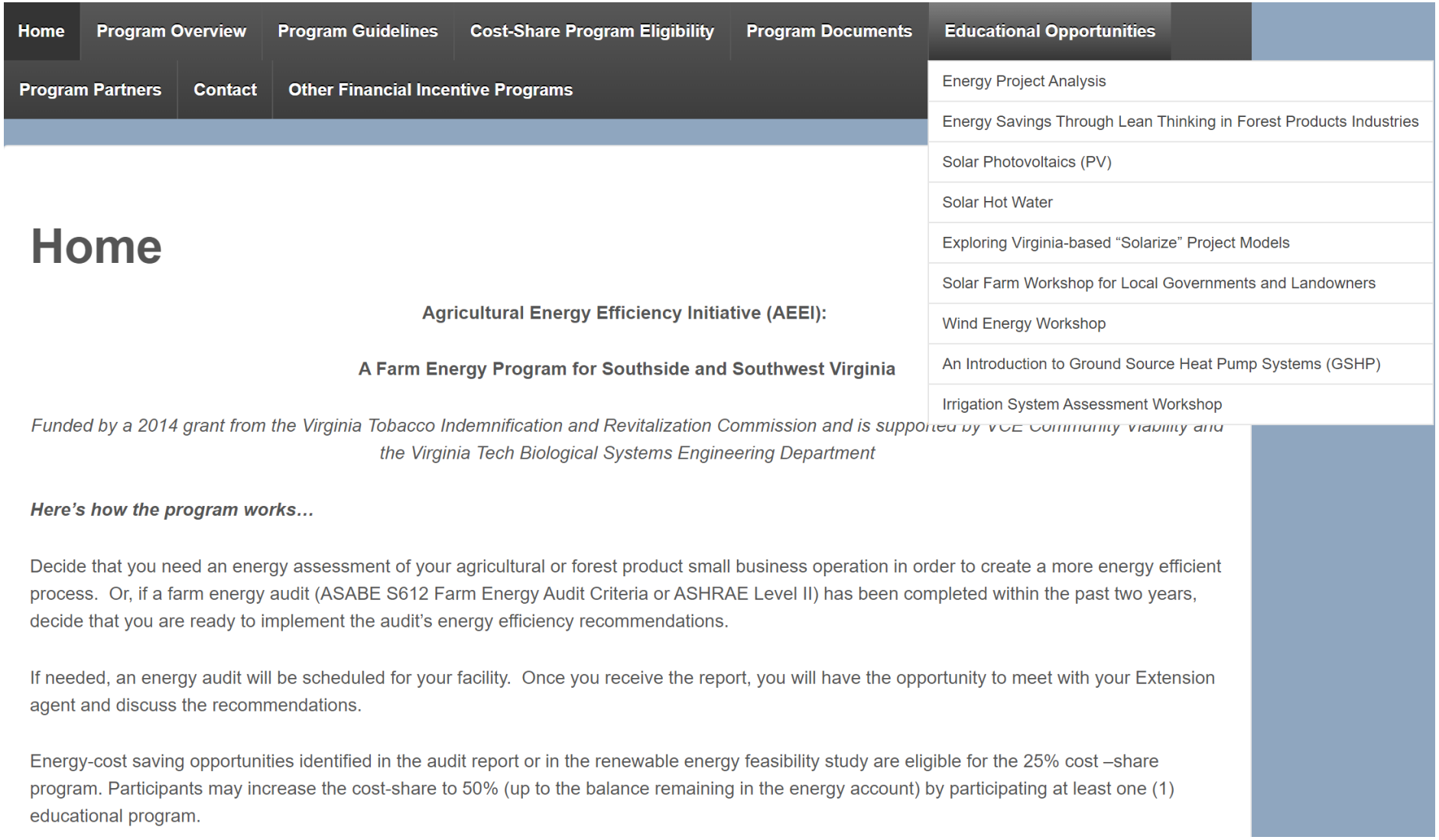
TYPES:
Poultry
Dairy
Swine
Greenhouse
Tobacco
Grain Dryer
Cattle
Winery
Aquaculture

TSPs

Biological Systems Engineering

Workshop Website:

www.aeei.bse.vt.edu



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&

featured technical speakers:

Speaker Bios

John Hay, University of Nebraska

John Hay is an Extension Educator Dept. Biosystems Engineering, University of Nebraska. John works in areas of the biofuels industry, ethanol co-product utilization, bioenergy crops, changes in farming practices due to the biofuels industry, small wind turbines, and small solar systems for home, farm, or business. John has a B.S., Agronomy, University of Nebraska-Lincoln and an M.S., Agronomy, Texas A&M University

Paul Gilman, NREL SAM Development Team

Paul Gilman is a technical writer and trainer and has worked on projects for the National Renewable Energy Laboratory (NREL) and other clients since 2002. He has written documentation for NREL's System Advisor Model (SAM) and PVWatts, and for HOMER. Paul designed and facilitated dozens of training workshops for energy professionals around the world, and has provided technical assistance to project developers in the preparation of feasibility studies for renewable energy projects. He has a B.S. in electrical engineering from the University of Washington and a B.A. in music performance from Oberlin College.

Eric Romich, The Ohio State University

Eric Romich is an Ohio State University Extension Field Specialist for Energy Education. As a statewide Extension Field Specialist he works closely with faculty and staff from various program areas and departments to conduct research, develop extension programs, and teach in communities throughout the state. His educational programs are designed to guide informed decision making on energy issues to enhance the overall environmental and economic conditions in Ohio communities.

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Thank you !

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