COMMISSION ON UNIVERSITY SUPPORT
MEETING
April 15, 2021
Videoconference (via Zoom)

Present: Judy Alford, John Benner (Chair), Michael Borowski, William Dougherty for Scott Midkiff, Martha Glass, Bradley Klien, Polly Middleton, Debbie Greer for Ken Miller, Phil Miskovic, Ryan Speer

Absent with Notice: Robert Sumichrist

Absent: Jeff Earley, Chris Kiwus, Charlie Phlegar, Patrick Pithua, Kimani Jackson, Connie Stovall

Guests: Richard Ashley, Denny Cochrane, John Ignosh, Christina King, April Myers

Recorder: Teresa Thompson

1. Welcome and Roll Call

Commission Chair, John Benner, called the meeting to order at 2:00p.m.; initiated introductions and roll call. A quorum was present.

2. Approval of Agenda

Proper motion was made, seconded, and unanimously passed to accept the March 2021 agenda.

3. Approval of the March 2021 meeting minutes

Chair Benner noted that these minutes have been voted on electronically and can be publicly accessed on the Governance Information System on the Web (http://www.governance.vt.edu).

4. Old Business

No old business for discussion.

5. New Business

John Ignosh, Specialist with Biological Systems Engineering and Virginia Cooperative Extension, who presented an overview of Virginia Cooperative Extension’s outreach and program efforts with solar energy projects which presentation is attached and incorporated herein as part of the minutes.

6. Updates from Committee Representatives

Campus Development Committee – Christina King reported committee has nothing new to report. They have been reviewing capital projects in general.
Energy and Sustainability Committee – Denny Cochrane shared that progress continues with 2020 Climate Action Commitment Resolution that was approved at March 2021 Board of Visitors meeting. They completed their 5th STARS submission and the university received their third Gold rating with the highest rating yet. The Green RFP proposals have been submitted and results are pending. Earth Week is April 18-24, 2021 and Earth Day is April 22 with an extensive schedule of events planned. A flyer describing some of those events will be shared to the group by Chair Benner.

IT Services and Systems Committee – William Dougherty updated the group that Virginia Tech’s license with Qualtrics has been extended and is now set to expire May 31, 2022. Question-Pro is a similar program. The voice communications system/transition is being researched and additional information will be shared as it develops.

Transportation and Parking Committee – Nothing new to report.

7. **Acceptance of Committee Minutes**

Campus Development Committee – February 8, 2021 minutes approved by the Commission.

Energy and Sustainability Committee – February 22, 2021 minutes approved by the Commission.

IT Services and Systems Committee – No new minutes submitted to the Commission.

Transportation and Parking Committee – February 3, 2021 and April 7, 2021 minutes approved by the Commission

8. **Next Meeting Date**

Chair Benner shared we will not meet in May. The Commission’s next meeting will be in September 2021. He reminded everyone that submission of ideas for future meetings are very welcome.

Phil Miskovic advised this is his last meeting with us. Beginning July 1, he will serve as the graduate student representative to the Board of Visitors.

9. **Adjournment**

There being no further business, proper motion was made to adjourn the meeting at 3:06pm.

Respectfully submitted,

Teresa Thompson
Commission of University Support Meeting

“Virginia Cooperative Extension Renewable Energy Programs”

Energy Management Related Extension Programming
A Brief Intro Presentation

2PM Thursday April 15, 2021

John Ignosh
Extension Specialist, BSE/VCE-VT
Harrisonburg, VA
540-232-6009
jignosh@vt.edu
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

Areas I generally work in:

Goals:
- Raise awareness among clientele of new approaches to increase the efficiency of production systems and opportunities to minimize environmental impact
- Spur appropriate adoption and application of innovations among clientele to help meet their production objectives
- 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

Teaching  
Research  
“LAND GRANT SYSTEM”  
Teaching  
Extension
General Learning Classifications

- Informal learning is learning that occurs in daily life, in the family, in the workplace, in communities and through interests and activities of individuals.
- Non-formal learning is learning that has been acquired in addition or alternatively to formal learning. In some cases, it is also structured according to educational and training arrangements, but more flexible. It usually takes place in community-based settings, the workplace and through the activities of civil society organisations.
- Formal learning takes place in education and training institutions, is recognised by relevant national authorities and leads to diplomas and qualifications. Formal learning is structured according to educational arrangements such as curricula, qualifications and teaching-learning requirements.

Overview on Developing Extension Programs

- What is an “extension program”?
- Conducting a needs assessment
- Identifying Program Goals/Outcomes
- Setting Program Priorities
- Identifying Target Audiences and Capabilities
- Writing Program Objectives
- Factors Influencing Program Development
- Program Design and Implementation
- Program Evaluation
- Involving People in Program Development
- Communicating Program Plans
- Interdisciplinary Program Planning
- Ethical Issues in Program Planning
- Programming Pitfalls

Source: Seevers et al. 2007 “Education through Cooperative Extension” 2nd Edition,
Conducting Needs Assessments

- A needs assessment is a way to find "gaps" between what learners already know and what they should know (and be able to do) to achieve a certain goal.

- Needs assessments often can help to: Improve program accessibility, learn more about actual conditions, identify specific needs, learn of opportunities for new programs, gauge opinion about goals, spur interest in related programs and projects.

Example Types of Questions

- What must be improved?
- What is the real cause of the problem?
- Who is involved?
- What role can education play in impacting the issue?
- Who supports the program?
- What expertise and resources exist to address the issue?
- Is this issue already adequately addressed by others?
- What other individuals and entities can assist in the effort?

General Approaches:

- Need-based (what’s missing)
- Asset/capacity-based (build upon what there is to work with)

Identifying Program Goals – Focus?

- The extensionist helps identify and articulate the desired end goals (what the desired changes are) are for the program, this focuses program efforts.

- Goals are determined based on the context of the situation (and stakeholders), with potential input from individuals, groups, organizations, etc.

- Generally, there are 3 program categories:
  - Institutional programs
  - Informational programs
  - Developmental programs

Source: Seevers et al. 2007 “Education through Cooperative Extension” 2nd Edition, Chapter 5
**Setting Priorities – Constraints?**

- **Needs are often identified without a clear picture of their relative importance or ranking**
- Extensionists balance pressures (internal organization, stakeholders, local clientele, political leaders, society, their individual professional goals, etc.) to constantly establish priorities throughout the programming process:
  - Defining target audiences
  - Identifying needs
  - Determining methods and strategies
  - Execution of daily activities toward program goals
- **Key reasons for priority setting (Forest and Mulcahy, 1976)**
  - **Focuses limited resources (time, money, personnel) toward changes stakeholder needs for maximum impact**
  - Enables working proactively to prevent/mitigate future problems
  - Develops credibility/accountability with stakeholders
  - Enhances well being of extensionist (less overwhelmed by too many "opportunities")

**SAMPLE STEPS**

1. Assess present situation and current scope of program activities
2. Identify priorities from needs assessments and other sources
3. Weigh importance of priorities from above
4. Reflect on consequences of acting on different opportunities (go/no-go impact, etc.)
5. Take action on priorities (e.g., refer to others, raise priority level, establish timeline, etc.)

*Source: Seevers et al. 2007 "Education through Cooperative Extension" 2nd Edition, Chapter 5*
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**Example stakeholder engagement regarding “energy”**

**What are your goals?**

- **Examples:**
  - Reduce system energy requirements
  - Reduce energy costs
  - Reduce reliance on grid-tied energy
  - Increase use of renewable energy
  - Offset grid-tied energy where possible
  - Become completely independent of grid
  - Invest a specific amount of money toward a renewable system

- System design choices and considerations for each of these could look very different
- Understanding your goals is very important
Issue: Increasing LPG prices impacting poultry producers, greenhouse growers & tobacco farmers

Weekly Virginia Propane Residential Price

Source: U.S. Energy Information Administration
On-Farm Energy Efficiency Program
A Pilot Program for Southside & Southwest Virginia

Virginia Tobacco Indemnification and Revitalization Commission

- According to the 2012 National Agriculture Statistical Service (NASS) report, farm energy prices increased approximately 19% from 2007 to 2011. It is estimated that across the 34 counties of Southside and Southwest Virginia, farmers spent more than $66 million in farm energy related expenses during 2011. A 10% increase in energy efficiency would have produced nearly $6.6 million additional income to Virginia farms in 2011. But, how can we find those opportunities?

- Farm energy efficiency program provides research-based information related to best management practices concerning energy via Virginia Cooperative Extension workshops, factsheets, webinars, etc.
- Farm energy audits to provide tailored operable information to decision maker to identify cost-effective retrofits.

The seven-year Agricultural Energy Efficiency Initiative (AEEI) sponsored program was completed in December 2017. The recently completed second phase has resulted in:
- 64 completed farm energy audits identified potential annual savings of:
  - 873,968 kWh in electricity,
  - 429,847 gallons of propane,
  - 3,151 MTCO2e greenhouse gas emissions reductions,
- Annual energy-cost savings of $850,734.
- 46% of retrofits had a payback period of less than 5 years.

Assessing Greenhouse Electrical Energy Needs for Aquaponic System

Examples of Small (E8X12) and Large (10 X 96) Greenhouses

Bob Lane
Extension Specialist
Biological Systems Engineering
Virginia Seafood AREC
• Opportunities for efficiency?
• How might these choices affect your solar system?

Assessing Thermal Energy Needs of Horticultural Structures (Low/Hi Tunnels)
ICTAS, VSU (Dr. Rafie & C. Mullins), SPES (Dr. Welbaum, C. Galanopoulos & BSE (Dr. Arogo; J. Ignosh)

### Additional Resources

- **Greenhouse Heating Video**, An overview of greenhouse heating design considerations by Dr. A.J. Both, Associate Extension Specialist, Department of Environmental Sciences, Rutgers University.
  - [https://youtu.be/8iZsrpNTVp4](https://youtu.be/8iZsrpNTVp4)

### Energy Audits

**USDA - NRCS**

**EQIP On-farm Energy Initiative**

The Environmental Quality Incentives Program (EQIP), a Farm Energy Initiative, helps farmers and ranchers make informed decisions to improve energy use and adopt energy efficiency practices, which can lead to increased profitability and cost savings. NRCS will provide financial assistance to implement energy conservation improvements and administer EQIP energy conservation payments. All energy conservation projects must be based on a baseline determination of current energy usage and prosperity and a proposed improvement.

**Table 1: Summary of Energy Improvements (Examples of recommended measures shown)**

<table>
<thead>
<tr>
<th>Recommended Measure</th>
<th>Estimated Annual Reduction in Energy Use</th>
<th>Estimated Cost</th>
<th>Savings</th>
<th>Payback</th>
<th>Year</th>
<th>Bas. Life (Yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation</td>
<td>28,973</td>
<td>3,450</td>
<td>$7,822</td>
<td>5,372</td>
<td>6.75</td>
<td></td>
</tr>
<tr>
<td>Diesel Engine</td>
<td>1,380</td>
<td>175</td>
<td>$2,310</td>
<td>1,670</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Farm Equipment</td>
<td>422</td>
<td>55</td>
<td>$1,188</td>
<td>712</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Compost</td>
<td>20,253</td>
<td>2,400</td>
<td>5,875</td>
<td>4,475</td>
<td>5.7</td>
<td></td>
</tr>
</tbody>
</table>

Sources:
Additional Resources

https://farm-energy.extension.org/energy-answers-for-the-beginning-farmer-and-rancher/
Additional Resources

• Photovoltaic (PV) Modules “Panels”
  • Generate Electricity
    https://youtu.be/73wZPcz9c70

• Solar Thermal/Hot Water (SHW)
  Collectors
  • Generate hot water
    https://youtu.be/JUJvbM1YPSA

Can you lower energy costs for field crop production?
How to choose a feedstock for pellet making?
Energy efficient LEDs and long day lighting for dairy
How to control energy use and cost?
How to grow greenhouse crops sustainably?
Can I use biodiesel in farm diesel engines?
Where can I find money to implement energy efficiency measures?
How do I make pellets on the farm?
How to determine pellet durability?
How can you compare heating costs of different fuels?
How can I save on the cost of grain drying?
How to select LED lights for agriculture?
Why do an energy audit on your farm?
Is wood heat right for you?
How can proper livestock ventilation save energy & feed?
What is it like to apply for farm energy incentive programs like REAP?
How to choose a heating fuel?
How to save money by understanding your electric bill?
How to choose proper livestock ventilation fans?
How do I size a cooler for on-farm produce storage?
How to design an energy efficient hydroponic system?

https://farm-energy.extension.org/energy-answers-for-the-beginning-farmer-and-rancher/
Additional Resources

https://www.dsireusa.org/

A Value Chain Analysis of the U.S. Beef and Dairy (Lowe & Gereffi, 2009)

Industries: https://www.researchgate.net/figure/US-Beef-Industry-Summary-Value-Chain_fig9_294579508
To meet the goals of the Chesapeake Bay TMDL, Virginia’s Watershed Implementation Plan II sets forth a series of sector-specific best management practices (BMPs) to improve water quality. The BMP for pasture fencing is targeted to increase by 162M feet of pasture fencing by the year 2025. Fencing may require alternative livestock watering systems. Access to grid-tied electrical power may present itself as a cost-effective option to meet farm water pumping needs. However, for other locations the cost to extend the electrical grid to power a small water pump may prove prohibitive. Furthermore, the installation of capital intensive and/or cost-shared livestock watering improvements can be problematic on rented acreage. Portable solar-powered water pumping systems may be a viable option among farmers.
Solar Resource

Considerations for tilt angle:

- Variations in annual load profile? Optimize tilt for max load?
- Solar Window & Latitudes
  - Alaska? Virginia? At Equator?

On average, how sunny is it for a region in a particular month?
(long-term averages, think “climate” not “weather”)


http://rredc.nrel.gov/solar/pubs/redbook/PDFs/VA.PDF
Solar Pathfinder

Source: https://www.solarpathfinder.com
PV WATTS

DEMO

<table>
<thead>
<tr>
<th>Month</th>
<th>Solar Radiation (kWh/m² day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>2.04</td>
</tr>
<tr>
<td>February</td>
<td>2.96</td>
</tr>
<tr>
<td>March</td>
<td>4.03</td>
</tr>
<tr>
<td>April</td>
<td>4.76</td>
</tr>
<tr>
<td>May</td>
<td>5.08</td>
</tr>
<tr>
<td>June</td>
<td>5.18</td>
</tr>
<tr>
<td>July</td>
<td>5.14</td>
</tr>
<tr>
<td>August</td>
<td>5.11</td>
</tr>
<tr>
<td>September</td>
<td>4.66</td>
</tr>
<tr>
<td>October</td>
<td>4.29</td>
</tr>
<tr>
<td>November</td>
<td>2.84</td>
</tr>
<tr>
<td>December</td>
<td>2.35</td>
</tr>
<tr>
<td>Annual</td>
<td>4.14</td>
</tr>
</tbody>
</table>

http://pvwatts.nrel.gov/pvwatts.php
Sources: https://www.energysage.com

Sources: https://extensionpubs.unl.edu/publication/9000018244809/solar-electric-investment-analysis-ec3008/

Sources: https://extensionpubs.unl.edu/publication/9000018244809/solar-electric-investment-analysis-ec3008/
The Ag Energy Efficiency Initiative (AEEI) program focuses on identifying appropriate energy-cost saving opportunities for producers in Southside and Southwest Virginia. The program uses energy efficiency as a basis for minimizing production costs, and prior to adopting renewable energy conversion technologies. Farm energy audits are conducted to meet NRCS and USDA‐RD “REAP” criteria, and based on the ASABE S612 Standard “Performing On‐farm Energy Audits” posted at: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_007593.pdf

According to a USDA 2013 Irrigation Survey, the AEEI eligible counties of Southside (blue counties highlighted in map below) have relatively higher rates of irrigated land

AEEI Eligible Counties: http://www.aeei.bse.vt.edu/?page_id=14

The AEEI program, with Phase II in its final year (2017), has provided educational workshops dealing with many of the major activities described in Table 1 of ASABE S612, by farm type (e.g., lighting efficiency in poultry houses, etc.) and also on how to perform an on‐farm assessment. However, so far, no workshop content has focused on irrigation systems nor on their proper assessment, a potential need as indicated by the USDA 2013 irrigation survey data (above map).

OBJECTIVES:
• Participants to gain hands‐on experience (field and classroom) regarding best practices for assessing performance of more common irrigation systems in Southside VA, with emphasis on identifying energy efficiency‐related improvement opportunities (fairly broad scope as it can include management (when to irrigate? How much to irrigate?), measurement (how much did I irrigate? How much did I actually irrigate?), components (could I improve efficiency by system modifications?), etc.)
• Introduce participants to appropriate research‐based resources (factsheets, decision support tools) and contacts for future irrigation‐related work
• Network collaboration and capacity building to provide best available resources to clientele

TARGET AUDIENCE:
• Southside and Southwest Virginia
• “Train‐the‐Trainer”, in this case agency (USDA, Extension, etc.) personnel and service providers (Technical Service Providers, equipment vendors, etc.)
• End‐users (farmers with systems, farmers considering systems)
National Chicken Council: https://www.nationalchickencouncil.org/industry-issues/vertical-integration/

The Farm Manure to Energy Initiative
Increasing Manure Management Options – Generating On-farm Thermal Energy – Improving Water Quality

Description
The Farm Manure to Energy Initiative is designed to improve the performance of on-farm renewable energy systems and to increase energy production. This is achieved through the integration of solar photovoltaics and on-farm manure management technologies. The initiative involves the installation of solar photovoltaic systems and on-farm manure management technologies, followed by the integration of these technologies to optimize energy production and improve manure management.

Key Projects
- LEI Bio-Burner
- Blue Flame Boiler
- Extreometry Gasifier
- Global Refuel

Project Partnerships
Project Partners: Virginia Tech, National Grid, AECOM, and the Virginia Department of Agriculture and Consumer Services.

© Virginia Tech, All Rights Reserved
4/15/2021
Sharing Experiences & Considerations on Utility-scale Solar Projects from Virginia Localities

Off-grid Applications

Residential

Commercial

Utility-Scale ("Solar Farm")

~ < 1kW

~ 1 - 10 kW

~ 10 kW – ~ 2 MW

~ > 2MW
SEIA Major Projects List (updated July 2020):
https://www.seia.org/research-resources/major-solar-projects-list

YEAR: 2016

SEIA Major Projects List:
http://www.seia.org/map/majorprojectsmap.php
SEIA Major Projects List (updated July 2020):
https://www.seia.org/research-resources/major-solar-projects-list

Utility-Scale Solar PV in Virginia
Sources: https://sites.google.com/vt.edu/vceinservice121919solarfarms/home
Context:
A pilot project to drive a collaborative process for industry-engaged, and stakeholder-relevant, prioritized research/extension work focused on responding to utility-scale solar (USS) issues in Virginia

Method:
• Transdisciplinary VT-led “panel”, with input via collaboration of internal and external stakeholders with experiences, insights, questions & concerns regarding USS in VA. Over 15 VT and other faculty involved.
• Iterative process to identify, refine & prioritize research/extension needs via modified DELPHI process, to better target limited resources and best respond with timely information
• Framework for parsing issues best addressed by adapting information from the existing literature from those issues that may warrant further investigation via original research to address knowledge gaps

Initial Pilot Period:
March 2021 – June 2022 (with potential for additional phases)
Program Evaluation

- It is important to consider program evaluation during the program-planning process (and timeline)
- Needs assessment (an evaluation itself of stakeholder needs) results determine program goals
- Continual stakeholder feedback from program activities indicates how the program can be improved
- Evaluation provides documentation of program results for reporting impacts

Source: Seevers et al. 2007 "Education through Cooperative Extension" 2nd Edition, Chapter 5

Solar Energy Workshop Evaluation Instrument Excerpt
Solar Energy Decision Support Tool Short-course Workshop Results

Twelve people registered or presented at this two-day workshop, 50% of which returned a workshop evaluation form. Figure 1 describes selected aggregate workshop evaluation results on a 5-point scale (1 star = poor/few, 5 stars = excellent/high). 100% of respondents indicated that they would attend this type of workshop again. In the future, NREL recommends this workshop to a friend. Participants indicated that some of the most beneficial parts of the workshop related to: learning how to use SAM, learning directly from subject matter experts, obtaining resources to later share with farmers, gaining more hands-on experience with the SAM decision support tool, learning about the current state of the solar industry, learning about SM applications in the agriculture sector, among other areas. 100% of respondents anticipate sharing, or applying, the information learned through this workshop with others. 100% of respondents identified specific action they plan to take as a direct result of this workshop, including: contacting farmers to share information, meeting with farmers to review solar projects using SAM, using data and SAM to evaluate projects, better use of SAM to teach about solar analysis, working to build partnerships between the agricultural extension community and NREL, among others.

Irrigation Workshop Evaluation Instrument Excerpt
Irrigation Workshop Results

Twenty-nine people participated in the workshop, 65% workshop evaluation forms were returned. Figure 1 describes selected aggregate workshop evaluation results on a 5-point scale (1 star = poor/low, 5 stars = excellent/a lot). 100% of respondents indicated that they would attend this type of workshop again in the future or recommend this workshop to a friend. Many participants indicated that some of the most beneficial content related to: irrigation system evaluation procedures, variety of technical and financial assistance programs related to farm energy and water management, awareness of variability in water distributions, drip irrigation system components and technology, determining system flow rate, and specific steps to improve water management. 76% of respondents anticipated sharing, or applying, the information learned through this workshop with others. 43% of respondents had identified specific actions they plan to take as a direct result of this workshop, including: assessing drip irrigation system, utilizing irrigation scheduling, using uniform irrigation components, increasing amount of overlap, flushing irrigation lines, more robust system monitoring, changing timing of irrigation applications, developing a water management plan, among others.

<table>
<thead>
<tr>
<th>ASPECT OF WORKSHOP</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, how much did attendees learn from this session?</td>
<td>4.62</td>
</tr>
<tr>
<td>Participants’ knowledge of irrigation system assessments</td>
<td>4.43</td>
</tr>
<tr>
<td>Participants’ knowledge of USDA Programs related to energy and irrigation</td>
<td>3.60</td>
</tr>
<tr>
<td>Participants’ awareness of Research/Institute Resources &amp; Information: Energy &amp; Irrigation Eng.</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Figure 1. Selected Aggregate Workshop Evaluation Results

Thank You!

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Virginia Cooperative Extension
Virginia Tech • Virginia State University