

About the Nexus



The Nexus is an Appalachian State University research project dedicated to improving the profitability of farming in the High Country and enriching the local community through the application of biomass management, renewable energy, value-added byproducts, and season extension. This mission is supported by three major activities, which are:

- Faculty & Student-led research
- Community outreach
- Technology transfer

Through these activities we hope to make a sustainable difference in the lives of those who live in the High Country, and the students who study there.

• *Sustainable Technologies:*

Sustainable technology seeks to tailor technology selection and application to the needs of the users, community, and environment. The Nexus Project investigates technological solutions for Southern Appalachian agriculture, focusing on the role of sustainable energy and synergetic productivity gains. We aim to design low-cost, user-friendly technologies that help farmers keep their farms sustainable and balance economic viability.

On-going researches at the Nexus:

- Anaerobic digestion (AD) with biochar
- Biochar as soil amendment
- Solar energy for heating hydroponic system
- Heated raised bed (Root Zone Heating)
- Aerated static compost bin
- Dynamic lighting control
- AD effluent for hydroponics nutrients
- Temperature controlled roll-up system
- Greenhouse energy efficiency

Technologies at Nexus :

- Solar PV
- Solar thermal collector
- Thermal energy storage
- Hydroponic system
- Biochar maker (open pit & TLUD)
- Biochar kiln with heat recovery (closed system)
- Lighting system for indoor growing
- Root zone heating system
- Anaerobic digester
- Aerated static compost bins
- Biomass dryer
- Automatic side roll-up
- Remote monitoring system

Collaborative projects

Nexus greenhouse heating system

The Nexus research team developed an efficient heating system and installed pilot systems at two local farms: Against the Grain (ATG) farm and Springhouse farm. The pilot system includes a biochar kiln, solar collector, food dehydrator, heat storage, and root zone heating, designed to collect and transfer heat in a unique and effective way. The system helped the farmers cut their energy cost significantly.



Small-scale anaerobic digester for energy and fertilizer

The HomeBiogas® system is an anaerobic digester that converts organic waste (livestock manure, food waste, etc.) generated on the farm into biogas and liquid fertilizer. We are working with local partner farmers (ATG, Small Axe farm, and Heritage Homestead goat dairy) to explore how to use digesters efficiently in a temperamental climate.





Site tour:

The site is located at the Watauga County landfill and is open to the public by appointment to see the technologies at work:

694 Landfill Road, Boone, NC 28607

If you would like to see the pilot system at our partner farms, please let us know. We will schedule a guided tour for you.

Opportunity for cooperation:

Would you like to join our project? Our research has been successful by working with local farms. Collaborating with community members is important, as the Nexus project aims for the sustainable development of the region. If you are interested in our research and would like to collaborate, please do not hesitate to contact us.

Help designing your greenhouse heating system:

With the knowledge and experience gained through years of research and collaboration with local partner farms, we hope to help you design efficient greenhouse energy systems. If you would like help designing a sustainable greenhouse heating system that reduces energy costs, please contact us!

**Contact Us
Investigators:**

Dr. Jeremy Ferrell
(Sustainable Technology & the Built Environment)
Phone: 828-262-8818
Email: ferrelljc@appstate.edu

Dr. Jim Houser
(Sustainable Technology & the Built Environment)
Phone: 828-262-3123
Email: houserjb@appstate.edu

Dr. Ok-Youn Yu
(Sustainable Technology & the Built Environment)
Phone: 828-262-2527
Email: yu@appstate.edu
Web: ok.tec.appstate.edu/biomass

Ms. Hei-Young Kim (Appalachian Energy Center)
Phone: 828-262-7289
Email: kimh2@appstate.edu

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**THE NEXUS:
INTEGRATED
SUSTAINABLE
ENERGY FOR
ENHANCING FARM
PRODUCTIVITY**