EnergyXchange: Still in Business After 12 Years

15th Annual LMOP Conference and Project Expo
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Discussion Items

• History Of EnergyXchange
• Recent Upgrades
• Successes
• Challenges
• Acknowledgements
History of Energy Exchange

• Created Through a Partnership of Three Organizations:
  – Blue Ridge Resource Conservation and Development Council (USDA)
  – HandMade in America
  – Mayland Community College

• Purpose
  – Utilize the LFG from the closed landfill
  – Utilize waste and establish renewable energy resources
  – Promote and improve the local economy
  – Protect the environment
  – Educate the public
Artist Incubator

• Ceramic and glass arts are very popular in this area
• Energy costs for these media are very expensive
  – LFG and wood waste allows financial flexibility for artists to perfect their craft and develop their business
• 4 ceramic and 2 glass artists are selected by a jury process to have a 3-year term
• 23 artists have completed the program
  – Many have started new businesses in the area
Ceramic and Glass Products
Project Branch-Out

- Propagation of rare and native ornamental plants
- Growers used to remove plants from wild, depleting population and causing erosion
- Plants are grown from seed and young stock is sold to wholesale growers
- Use of LFG (and wood waste) facilitates low-cost greenhouse operation
Greenhouse Products

Catawba Rhododendron  Mountain Laurel  Bakeri Azalea

Flame Azaleas, Pinkshell Azaleas, Sweet Azaleas, Doghobble, Mountain Ivy, Blueberries.
Greenhouses
Focus of Recent Upgrades

- Reduced dependency on declining LFG
- Improve GCCS operations and reliability
- Increased usage of wood waste
  - Pallets
  - Unadulterated wood waste
- Implementation of solar energy
  - Electric
  - Thermal
- Improve overall energy efficiency
- Greenhouse upgrades and new shade houses
Landfill and Landfill Gas History

- Municipally-owned and operated landfill servicing Mitchell and Yancey Counties
- Opened 1973, closed in 1994
- ~385,000 tons of waste, 7 acres
- GCCS start-up in 1999
- 2011 GCCS improvements
  - New blower and control system
  - Two new remote wells
  - New well heads
  - Improved LFG recovery and system reliability
Landfill Gas Modeling/Data

LANDFILL GAS GENERATION AND RECOVERY RATES
YANCEY/MITCHELL COUNTY LANDFILL

[Graph showing LFG Flow at 50% Methane (cfm) from 1970 to 2030 with LFG Generation, LFG Recovery, and Actual Recovery curves.

1/1/2012 SCS ENGINEERS
Landfill and Blower/Flare
Solar Power

• Photovoltaic Cells
  – 5.52 kW of PV as “sell-all” to Progress Energy with RECs from NC GreenPower
  – 1.52 kW of PV as “net metering” for facility

• Thermal Solar
  – Designed new boiler house for extensive thermal solar development
EXC - Solar PV
Location for New Thermal Solar
World’s First Whole Pallet-Fired Kiln

- NC banned pallets from landfills
  - What to do with the growing pile of pallets?

- Wood-firing for pottery is an ancient method of firing

- New kiln burns ~ 130 pallets per firing

- Kiln designed to allow use of whole pallets
  - No need to break-down pallets before use
Whole Pallet-Fired Kiln
Glass Furnace Upgrade

• Glass furnace requires LFG
  – Not enough on-site PV generation potential to operate an electrical glass furnace
  – Wood does not reach high enough temperature

• Improve Efficiency
  – New furnace design
  – Waste heat recovered to for combustion air
  – Reduction in LFG demand by glass studio operations to 14 scfm of LFG
Reconstructed Glass Furnace
Energy Distribution System

• Hydronic heating system for buildings and greenhouses

• All thermal energy generation systems feed a 10,000 gallon insulated storage tank

• Thermal energy is dispatched via thermostat controls in each building and greenhouse
Energy Distribution System

- WOOD WASTE BOILER
- LANDFILL GAS BOILER
- PROPANE BOILER
- SOLAR PANELS?
- HOT WATER STORAGE TANK
- BUILDINGS
- GREENHOUSES
Energy Distribution
Wood-Waste Boiler

- Max-Ox Wood Gasification Boiler
- 0.9 MMBtu/hr heat input
- 165 tons of wood waste needed per heating season
- County receives and processes approximately 2,000 tons per year of wood waste
- Reduction in wood waste disposal costs
  - $50/ton to haul, $8/ton to grind and process
Wood Waste for Heat
LFG and Propane Boiler

• Old LFG boiler failed due to cracked heat exchanger
  – Power outage and hard freeze
• LFG still good option for heat
  – 1 MMBtu/hr rated ~ 33 scfm of LFG
• Propane boiler included for back-up heat when power fails
  – Can run off emergency generator
  – LFG not option as emergency generator would also have to run blower/flare
LFG and Propane Boilers
Other Conservation Upgrades

- Insulation of buildings
- Energy-efficient light bulbs
- Automated irrigation system to conserve water and reduce labor requirements
- Heat mats in greenhouses to reduce heating needs for germination room
- New, small tractor for moving wood wastes and pallets (as opposed to large loader at transfer station).
Successes

• We’re still here!

• Significant improvement in plant quality and sales

• Diversification of renewable energy resources

• Reduction in County’s wood waste disposal costs

• Marked impact in local economy
  – New businesses (artists and local growers)
  – Green Tourism
Challenges

• Maintaining board interest and enthusiasm

• Economic slowdown

• Grant funding
  – We’re not the new thing in town!
  – Most grants are capital focused, so how do you pay the power bill?
  – Increased competition for grant funding

• Operating budget issues
  – Shut-down of the Avery County operation
  – Mothballed the hydroponic growing system, aquaculture project, and associated thermal solar heating unit
  – Maintaining staff
Shameless Plug

• Consider Corporate Sponsorship
  – Various levels of support
  – High-end: Building Names
  – Medium: Company Name at Tour Station
  – Low-end: Company Logo on Website

• Think about EnergyXchange Products for Client Gifts and Office Décor!

• On-line Donations Accepted
  – www.energyxchange.org
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