



# Community-Based Landfill Gas Development In Ceará, Brazil

Appalachian Energy Center At  
Appalachian State University

Presented By Stan Steury  
Landfill Gas Program Manager

828-262-7515 or [steurysw@appstate.edu](mailto:steurysw@appstate.edu)





# Appalachian State University

- Boone, NC
- 17,000 Students
- Leader In
  - Business
  - Technology
  - Public Administration
  - Geography & Planning
  - International Studies
  - Economics

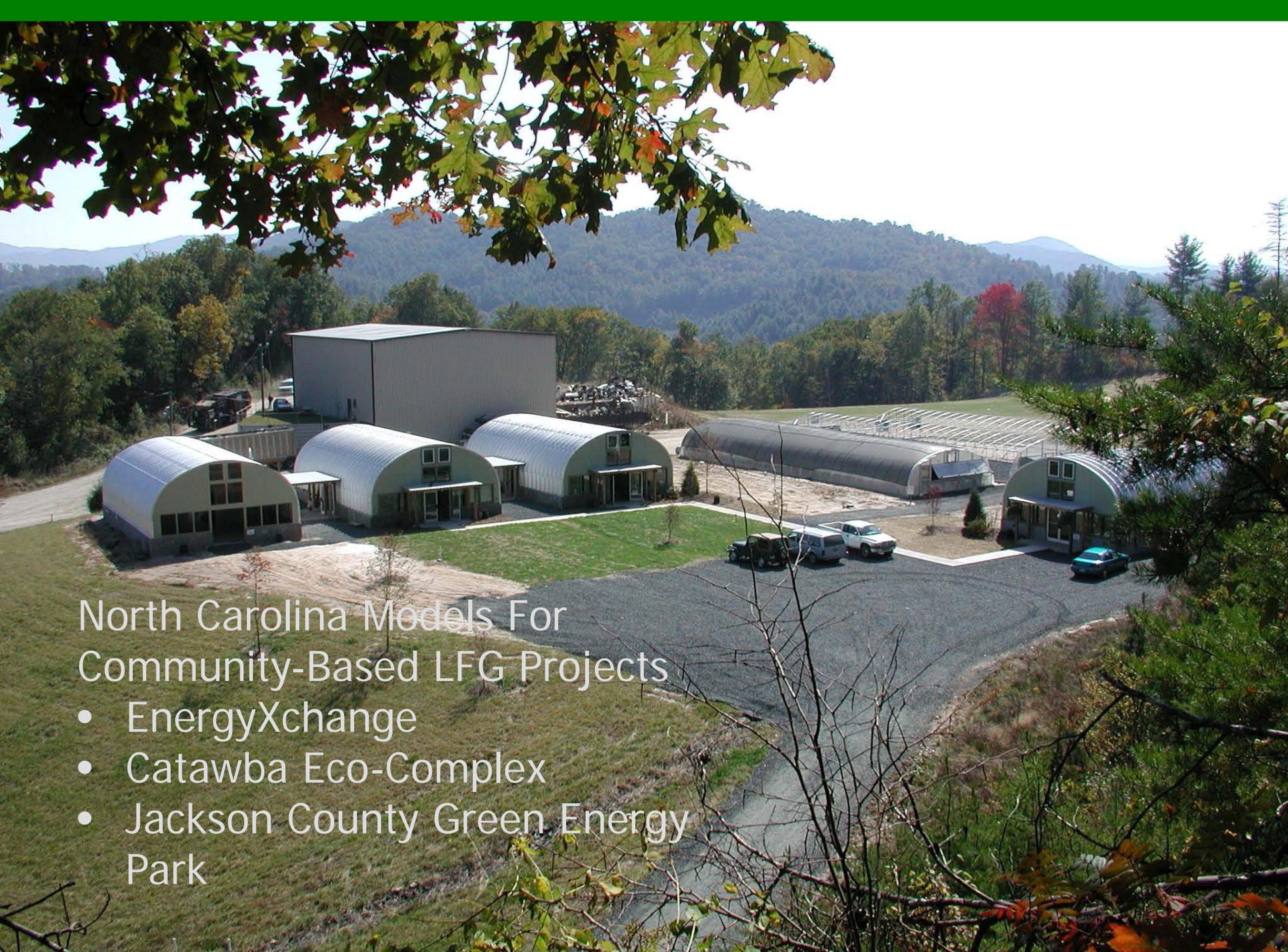




# Appalachian State University Energy Center (Est. 2001)

- Mission - Committed to research, development, policy analysis and demonstrations in all areas of energy, including...
  - Energy efficiency
  - Wind
  - Small hydro
  - Bio-fuels
  - Solar
  - Biogas and landfill gas





## North Carolina Models For Community-Based LFG Projects

- EnergyXchange
- Catawba Eco-Complex
- Jackson County Green Energy Park



# Landfill Gas Assistance Under Community TIES

- 34 Landfills - Small to Medium Sized
- Rural, Tier 1 Counties (Economically Challenged)
- Sweet potato dehydration, sweet potato fries, heat for ethanol, chicken litter to fertilizer plant, electricity generation (200-1,000 kW), pottery & glass, lumber drying, greenhouses for food crops & rare native medicinals, feed production, poultry processing.



# Universal Resource

Most Garbage In North Carolina and  
Ceará, Goes To A Landfill.  
Decomposing It Produces  
Landfill Gas



- Sources of energy, jobs, a rallying point, jobs for unemployed/underemployed, business incubation, improved quality of life, protection for the environment.





# Methane to Markets

- ASU Encouragement – Internally, externally
- From India To Brazil
- ASU Contacts In Ceará
- Brazil Demand For Renewable Energy
- Community-Based Planning A Good Fit
- ASU Available Resources



- Few Projects
- Large Landfills



23 MW LFG project in Sao Paulo



# State of Ceará, Brazil

- 8.5 M People
- 3.2 M Fortaleza
- Poor & Rural
- Semi-arid
- Solid Waste
- Industry Transition
- No LFG Projects



# Travel to Brazil

- Visited 7 Landfills, 8 State & Local Government Offices, 3 University Offices
- State Congressman
- Excellent Guide
- Portuguese Speakers
- 2<sup>nd</sup> Trip By University
- Coordinated by  
Chris Godlove, LMOP



# Maracanaú Landfill

- Opened 1999
- 1.7 million metric tons waste in place.
- Political Support
- Well Qualified Engineer & Good Management
- Industrial Center



- Catadores = Waste Pickers
  - 62 million worldwide
  - 300,000 to 1 M in Brazil
  - 10,000 in Ceará
  - 250 in Maracanaú
- Recycling System
- Government Regulation & Associations



- Safety & Health
- Income
- Ladder to Success
- Standard of Living
- Education
- Crime





# Ceará LFG Task Force Visits North Carolina

- Visited Community-Based Projects
- 8 people
  - Mayor of Maracanaú
  - Staff of Social Services
  - Landfill Engineer/  
Engineering Professor
  - Engineer with SEINFRA





# US Technical Consultants

- Small Amount of Grant Money
- Selected Carlson Environmental & Green Energy Partners – Price, Small Landfills Experience
  - Design & Cost Estimate LFG Collection System
  - Evaluation LFG Utilization Options
  - Future Vision – Waste Management Options
  - Work With Landfill Engineer at Maracanaú





# Planning Meeting

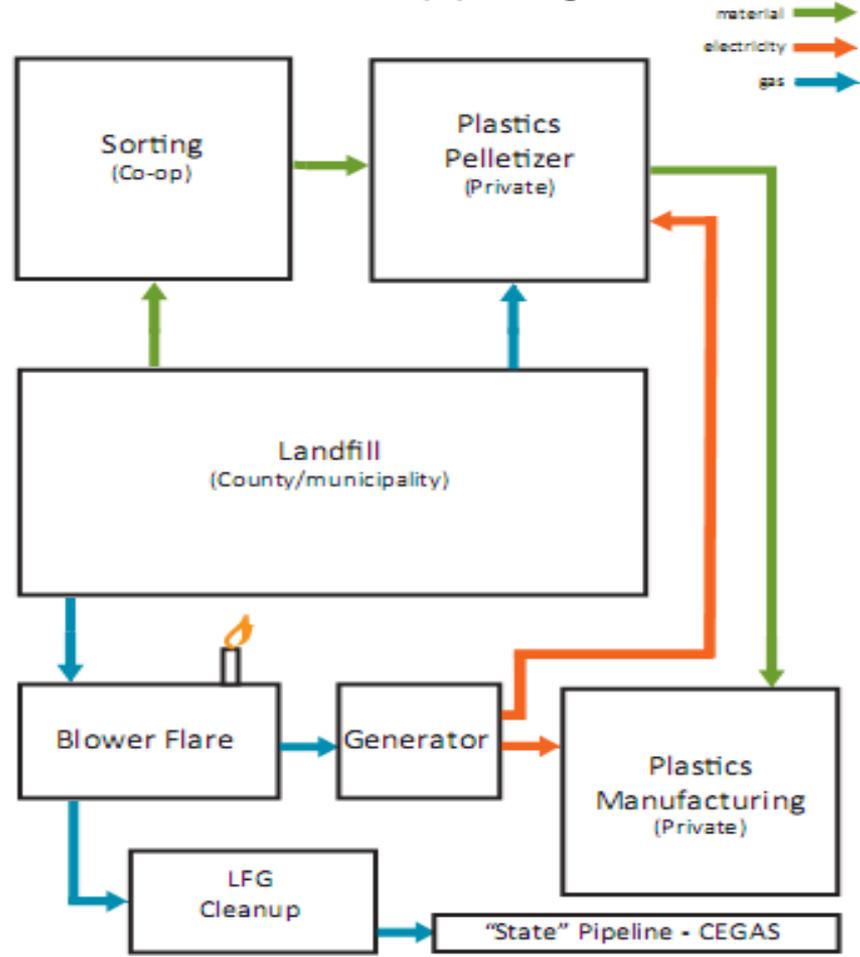
- After Visits, At Appalachian State
- Ceará LFG Task Force, Appalachian State University Personnel, US Consultants
- Identified Local Needs
- Vision of Uses For LFG
- Collection System In Phases
- Public/Private Partnerships
- Energy Park





# Maracanaú Conceptual Plan

Maracanaú Landfill Project  
Chart from 6/17/10 meeting



# Sorting Facility





# Energy Park

- Combined Heat & Power
- Value Added Processing – Recyclables
- Food Processing and/or Cold Storage
- Future Waste Digesters or Gasifiers
- Public/Private Partnerships
- Expand Industrial Park





# Combined Heat & Power

- Affordable
- Simple Technology
- Ease of Maintenance
- ASU/Watauga Small Generator Testing Center





# Industrial Recruitment

- Maracanaú Industrial District – 200 Facilities
- Fruit Biss – Ice Cream Interest
- Bricks & Tile – Major Industry, Deforestation, Carbon Credit Double Dip



- Construction Design LFG Collection
- Preliminary Design Energy Park
- Construction Grant – Other Sources
- Continue Development LFG Task Force
- Collection System Construction Supervision
- Seed For Ceará LFG Development Plan

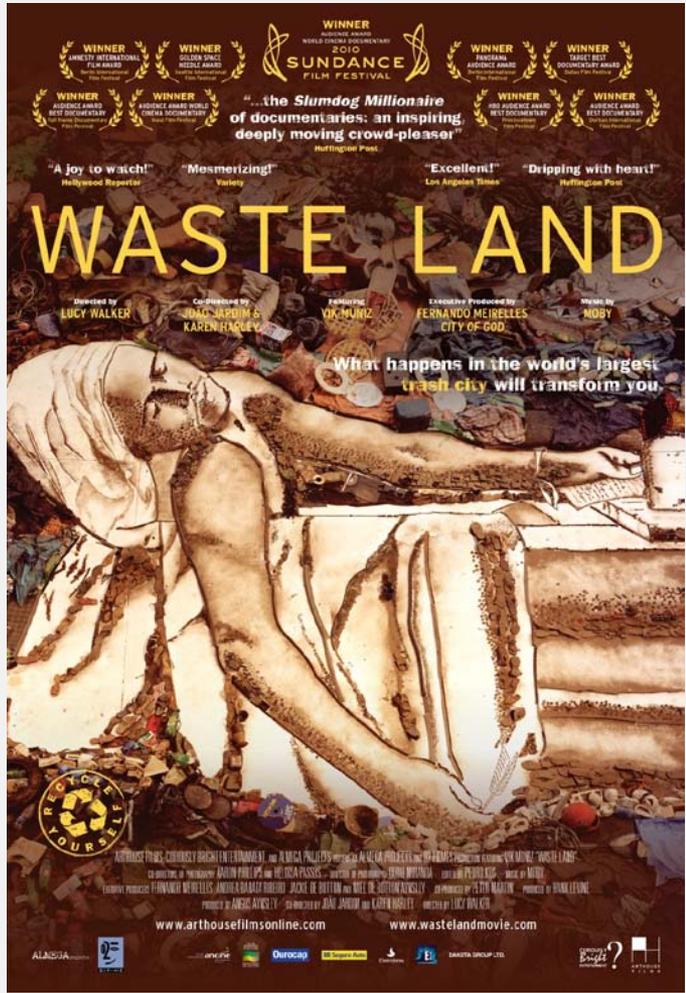


# Project Financing

- Grants
- Corporate Donations
- Carbon Trading
- Financing – Federal, State, Banks, International Programs



- Waste Land Movie
- Vik Muniz
- Cross Trade
- Enviroglass
- Poor Communities
- Adjacent to Landfills
- Waste Sorting Efficiency
- Mayor' Vision
- Industrial Instead of Arts





# Lessons Learned

- Must Have Local Involvement/Support
- Team Members Understand Culture
- Overcome Preconceived Notions
- LMOP Guidance Necessary
- Must Develop Local Expertise
- Dedicated Project Manager



- Better Sorting Than U.S.
- Value-added Technologies - Recyclables
- Gasification, Anaerobic Digestion
- Other Countries
- Network with NGOs, International Programs, Industry, Foreign National/State Agencies





# Expand Community-Based LFG Program Worldwide

- Document Problem Of “Waste Pickers” Worldwide
- Other Countries More Severe Problems
- Network With NGOs, Industry, International Programs, Foreign National/State Agencies





# Why Appalachian State University?

- Energy Center
  - LFG Facilitation & Consulting
  - Watauga LFG Small Generator Testing Center
- Departments of Technology, International Studies, Sustainable Development, Biology, Chemistry, Economics, Walker School of Business
- Faculty, Students, Staff





# Appalachian State University

- International Studies in 35 Countries on all Continents
- Exchange Study Programs in 4 Focus Countries  
India, China, Brazil, South Africa
- Energy Center Director now teaching in South Africa, The University of the Free State for 6 months





# Community-Based Landfill Gas Development In Ceará, Brazil

Appalachian Energy Center At  
Appalachian State University

Presented By Stan Steury  
Landfill Gas Program Manager

828-262-7515 or [steurysw@appstate.edu](mailto:steurysw@appstate.edu)

[www.energy.appstate.edu](http://www.energy.appstate.edu)

