

A photograph of a large, multi-story stone building with a prominent clock tower, surrounded by lush green trees and a well-maintained lawn. The scene is captured from a low angle, looking up at the building. The text is overlaid on the upper portion of the image.

# UNH Energy Project: EcoLine Landfill Gas Project

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# UNH Energy Initiatives

- 2001 DOE Recognition
  - UNH among top 5% of peer institutions for energy efficiency
- 2004 UNH Utility Infrastructure Project Approved
  - \$28 million investment in modern technology
  - Combined Heat and Power (Co-Gen) plant
    - Avoided significant investment in old technology boilers
    - Produce electricity as well as heat for campus
    - Enabled switch to cleaner burning natural gas as primary fuel vs. #6 oil used in old boilers
    - Substantially reduced purchase of electricity
- 2007 ECOline Project Approved
  - \$49 million investment in renewable energy



# Landfill Gas

## *The Opportunity*

- Naturally occurring
  - By-product of landfill decomposition
- Contains ~50% CH<sub>4</sub> (methane)
  - Commercial natural gas is >96% methane
  - Also contains H<sub>2</sub>S & VOC's
- Must be captured to control landfill odor
  - System of wells, piping and pumps already collects gas
- Turnkey Landfill (TLF) in Rochester, NH producing more gas than operator (Waste Management) can use
  - Gas can be used as fuel to generate electricity
  - WM Limited by emission permit and local electrical utility system capacity

# Serendipity Plays a Role

- Major Landfill nearby
- Landfill Operator willing to sell gas
- Reasonable route for pipeline
- Campus needs large quantities of gas for fuel

# Landfill Gas Project Concept



Dirty, low-energy gas



Processing Plant  
(Remove Contaminates)



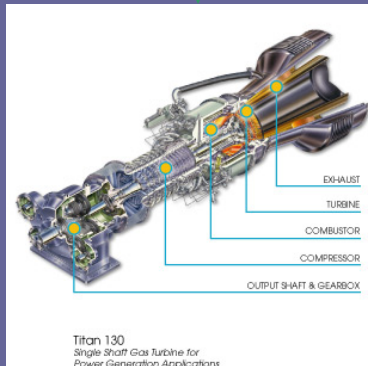
Flare Tail Gas and  
Unused Gas

Raw Landfill Gas

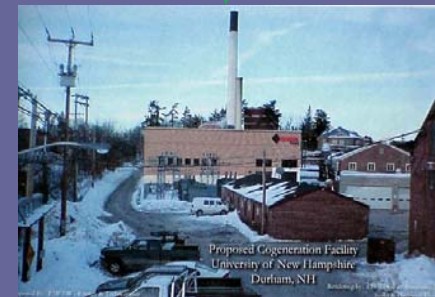
Clean, medium energy gas

Productively Use Excess

Campus needs



Electric Generators



UNH Co-Gen Plant



# Processing Plant Steps

Raw Gas



50%  
Methane

Sulfur Removal  
(Sulfa-Treat)



VOC, Siloxane  
Removal



Thermal Oxidizer  
(Destroys



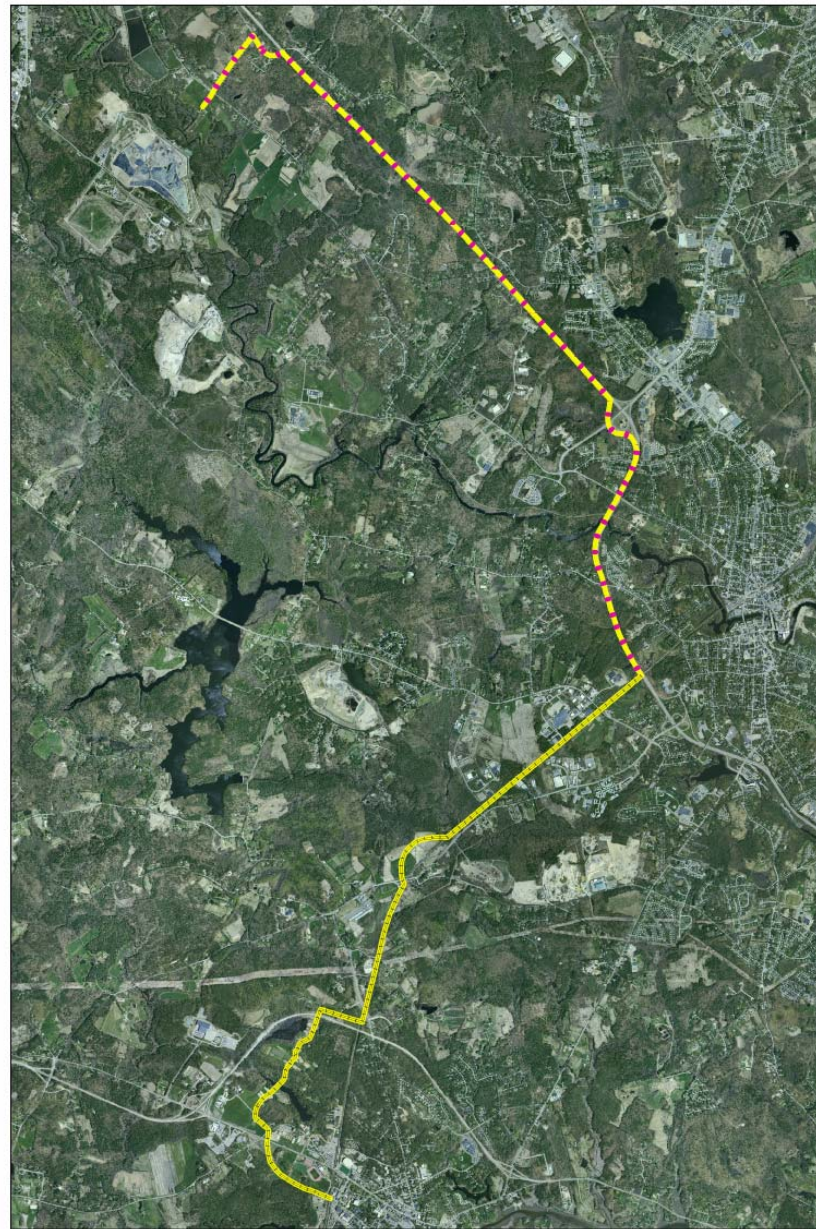
control



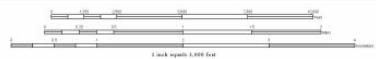
Add Odorant



# Pipeline Route



PROPOSED PIPELINE  
DURHAM TO DOVER  
DOVER TO ROCHESTER



Using Geographic Data Files: Coordinate System  
North American Datum 83  
UTM Zone  
University of New Hampshire  
Planning Information Technology  
GIS Division





# Pipeline Construction



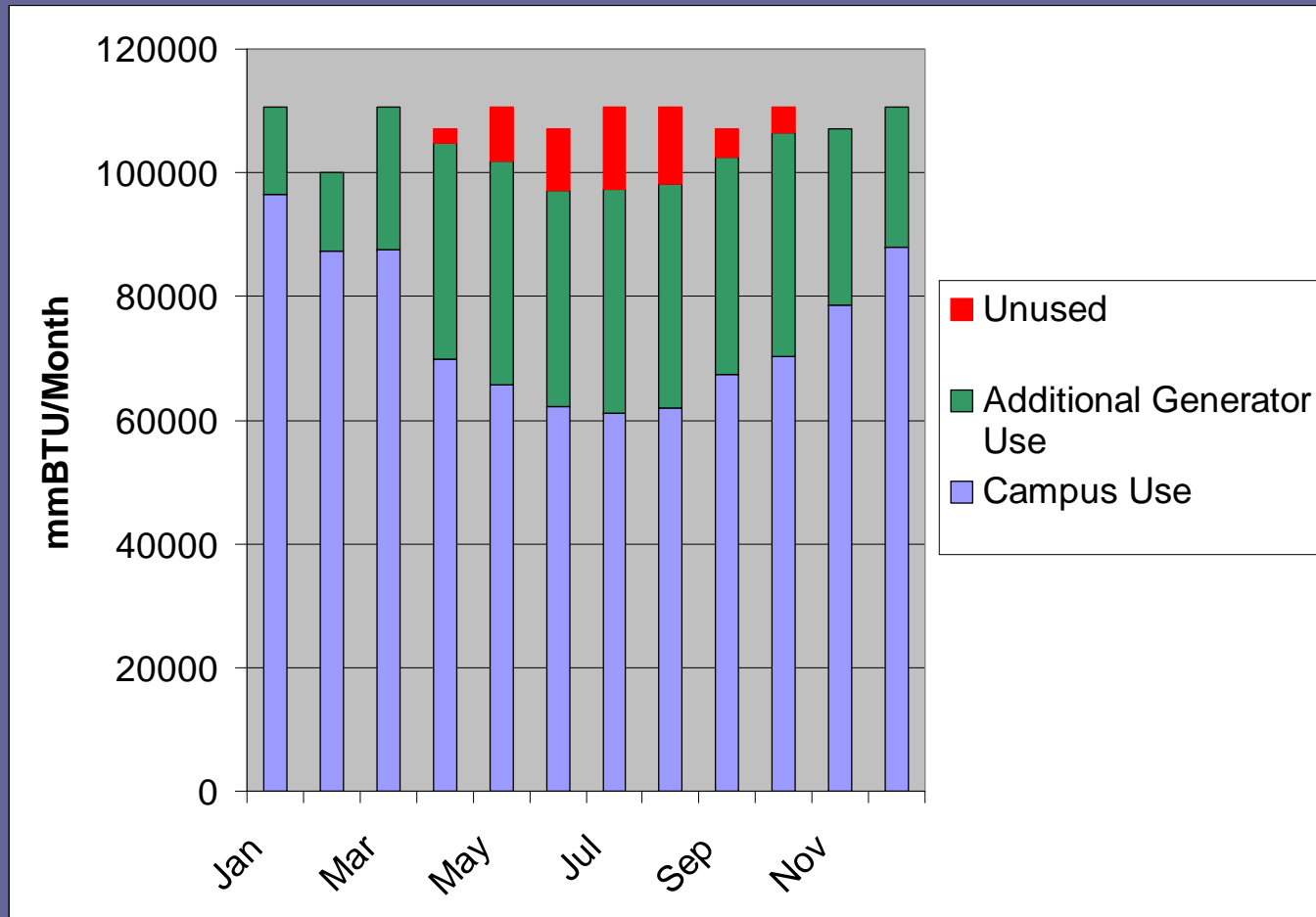
# Pipeline Direction Drilling



# Co-Gen Plant Interior View



# Maximize Landfill Gas Use



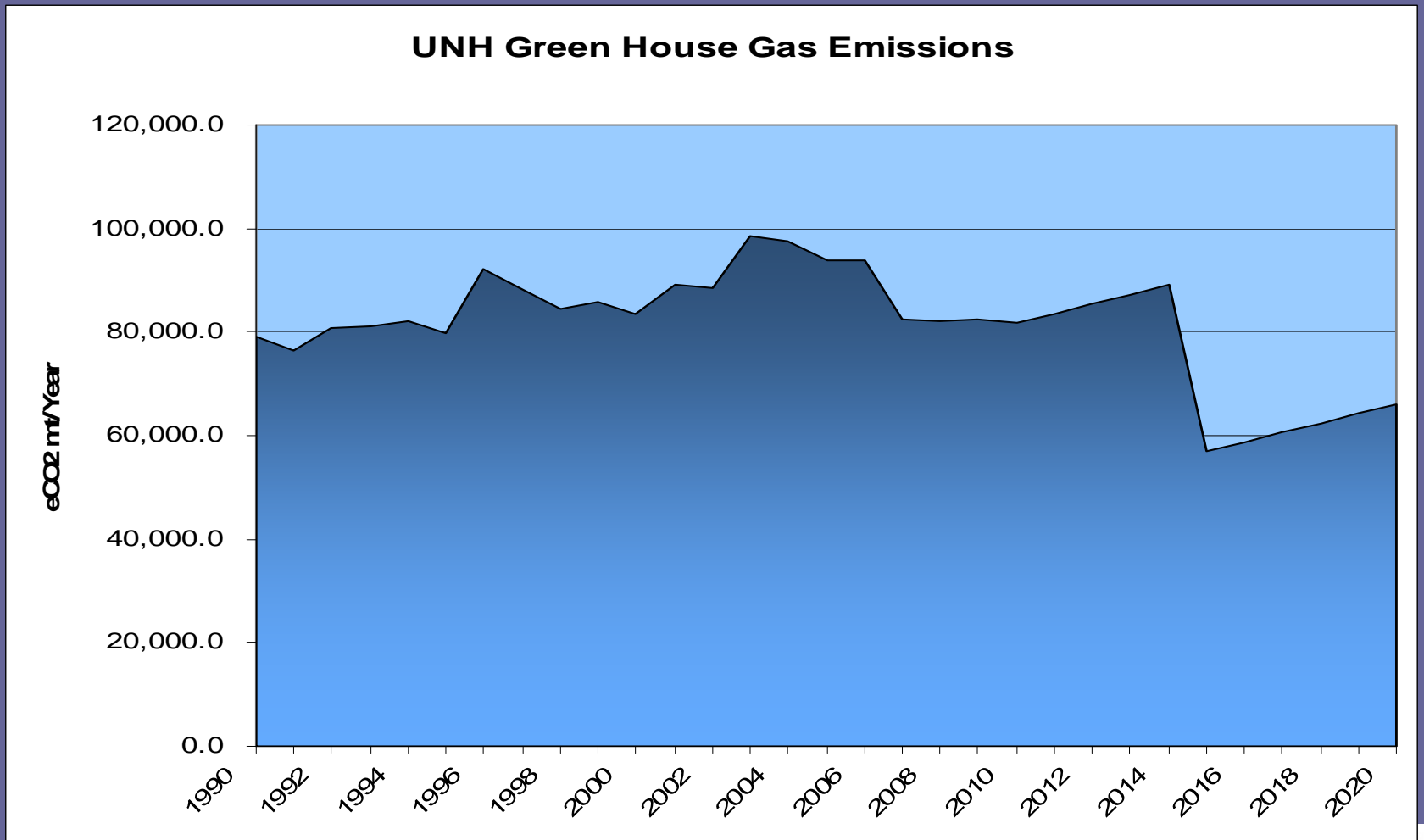
# EcoLine Financing

- \$45 million HEFA Bond
- \$4 million internal borrowing
- Repay from savings in 10 years
  - REC Sale Revenue part of financial strategy
- Stabilize Campus energy costs
- No State Funding
- No Tuition or Student Fee Increase



# Landfill Gas

## *The Benefit*



# Challenges

- Variable Fuel Supply vs. Fuel Stability Requirements
  - Biological Process generates landfill gas
  - Rigid fuel specification for turbine
- Approvals
  - Trustees
  - Permits and Easements
- Coordination
  - 3 major contracts
  - Modification of existing, operating plant
    - Safety
    - Fuel Management
    - No disruption to campus
    - Testing while “Live”



Thank-You