

**Association of University Architects
56th Annual Conference
University of Wisconsin - Madison
Thursday, June 23, 2011**

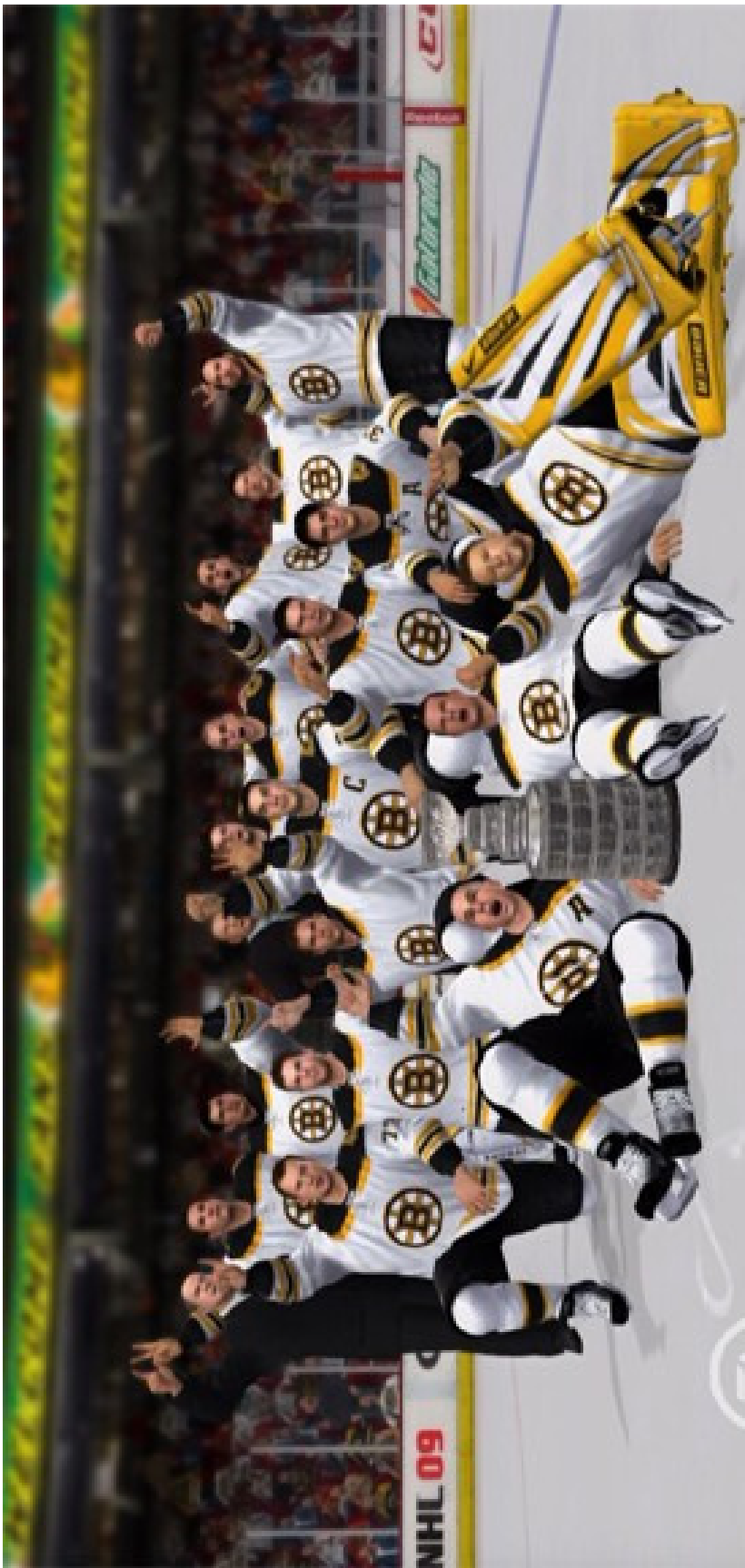


MAKING CONNECTIONS



The Rest of the Story about . . .





TRANSFORMING OUR CAMPUS ENERGY SYSTEMS

at the

UNIVERSITY of NEW
HAMPSHIRE

*a follow up to the presentation in
Saskatoon in 2009*

Current Campus Facts

1100 acres (300 acres is the campus proper)

180 buildings - 5,600,000 sf

12,300 undergrads - 2,400 grad students - 6,600 parking spaces



TRANSFORMING OUR CAMPUS ENERGY SYSTEMS

Begin with financial decisions that
become good sustainability
decisions

Which then becomes one of our
most marketable traits

CAMPUS ENERGY INITIATIVES

- Over 25 years of centralized energy management controls and incremental energy efficiency projects
- 2001 US Dept of Energy Recognition
 - UNH among top 5% of peer institutions for energy efficiency
- 2004 Utility Infrastructure Project Approved
 - \$28 million investment in Combined Heat and Power (Co-Gen) plant
 - Avoided significant reinvestment in old technology boilers
 - Produces 80% of electricity as well as heat for campus
 - Enabled switch to cleaner burning natural gas as primary fuel
- 2007 ECOLine Landfill Gas Project Approved
 - \$49 million investment in renewable energy



UNH MEDIA RELATIONS

2008

8 Garrison Ave, Durham, NH 03824

www.unh.edu/news/

First University In Nation To Use Landfill Gas As Primary Energy Source

University Of New Hampshire Will Power Its Campus With Renewable Landfill Gas From The Turnkey Recycling And Environmental Enterprise Facility Owned By Waste Management

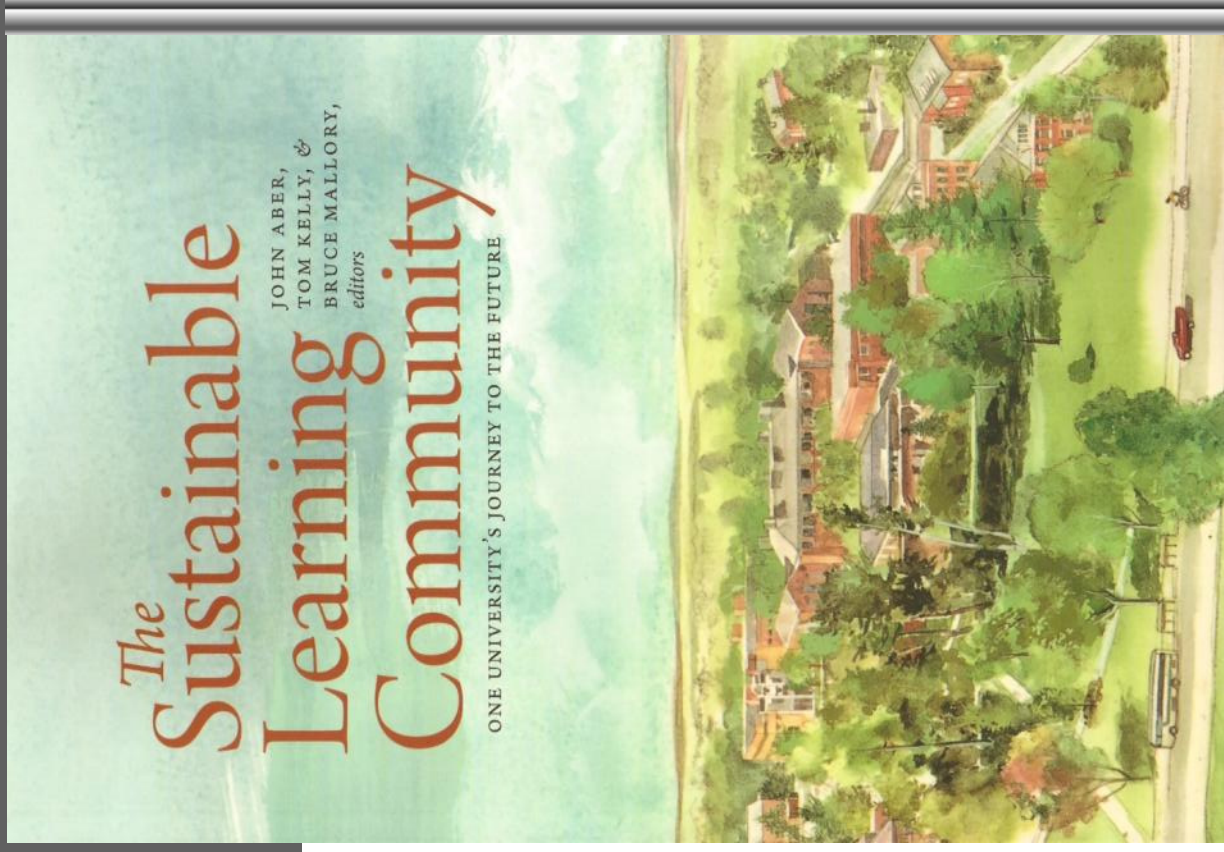


“By reducing the university’s dependence on fossil fuels and reducing our greenhouse gas emissions, ECOLine is an environmentally and fiscally responsible initiative. UNH is proud to lead the nation and our peer institutions in this landmark step toward sustainability.”

President Mark W. Huddleston

2009 THE HYPE

- Book published
- Lots of Press
- Many Awards
- Many Presentations
including AUA in
Saskatoon



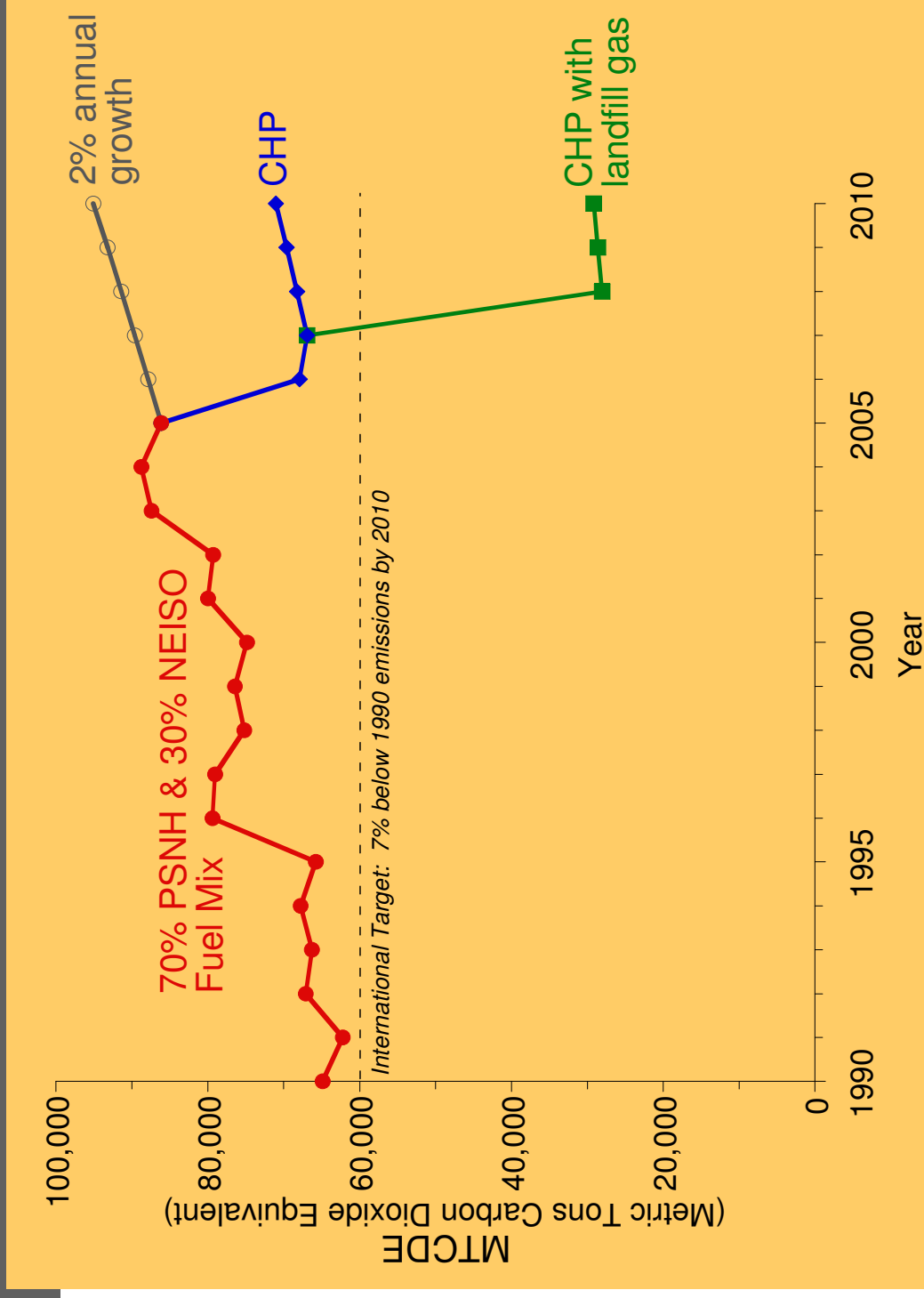
THE BENEFITS CLAIMED FOR USING THE ECOLINE LANDFILL GAS FOR THE CAMPUS

- 80% - 85% of campus energy can be from renewable energy
- Reduce exposure to energy market fluctuation and improve cost stability and predictability
- Carbon Emission Reduction



CAMPUS ENERGY - SUSTAINABILITY

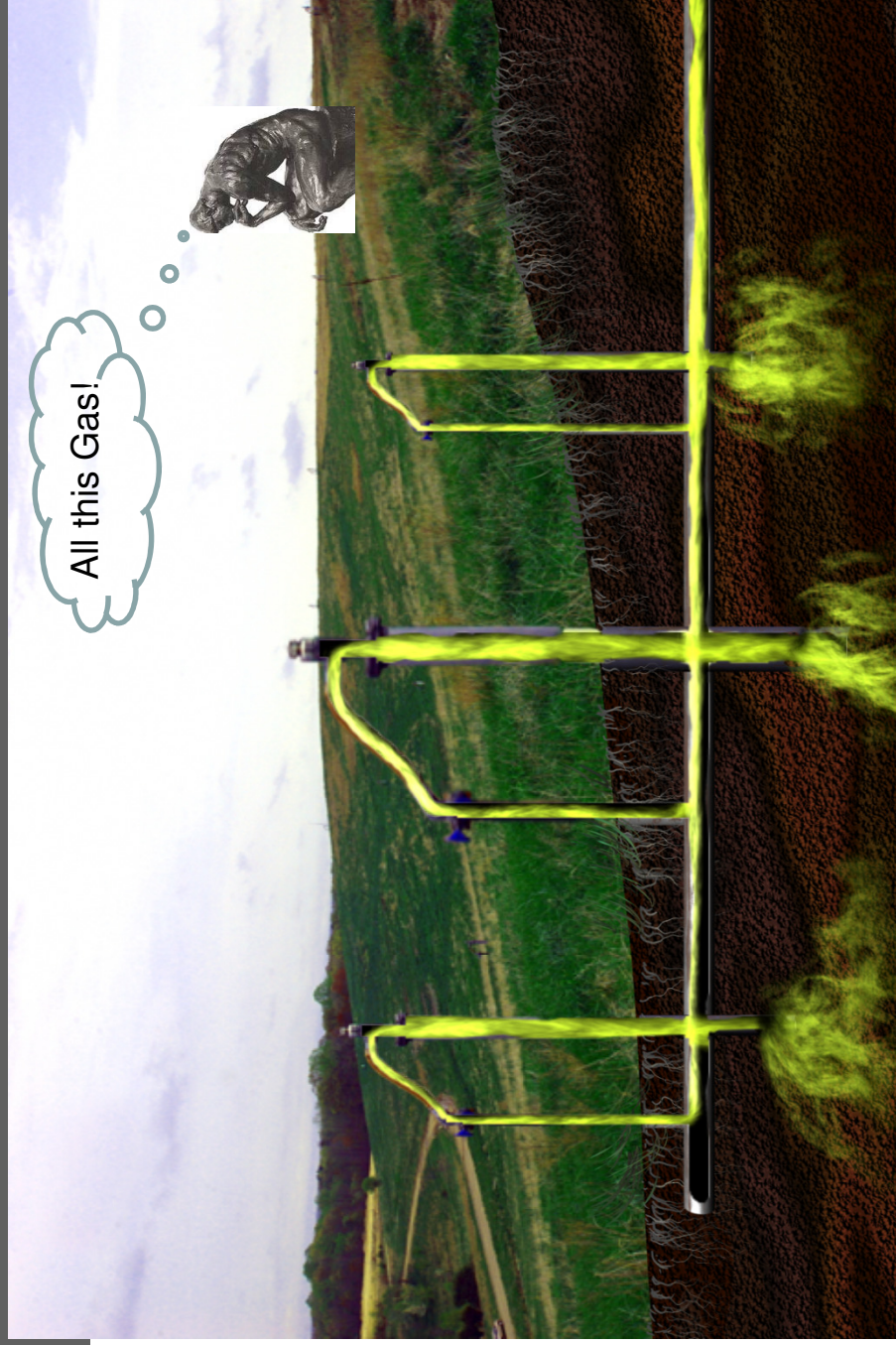
REDUCING CARBON EMISSIONS



The CoGen Plant and EcoLine's effect on our sustainability goals

University of
New Hampshire
commitment is an
80% reduction in
greenhouse gas
emissions by 2080
and 50% by 2020
because of this project

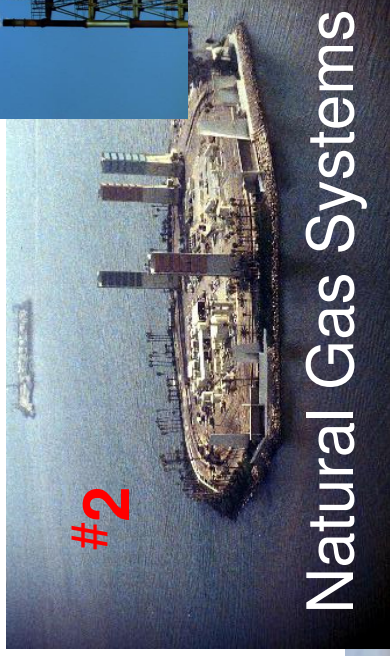
UNH NOW USES RENEWABLE LANDFILL METHANE GAS TO REPLACE NON-RENEWABLE NATURAL GAS AS THE PRIMARY FUEL FOR CAMPUS ENERGY NEEDS.



METHANE IS ONE OF THE LARGEST SOURCES OF GREENHOUSE GASSES AND THESE ARE THE BIGGEST CONTRIBUTORS



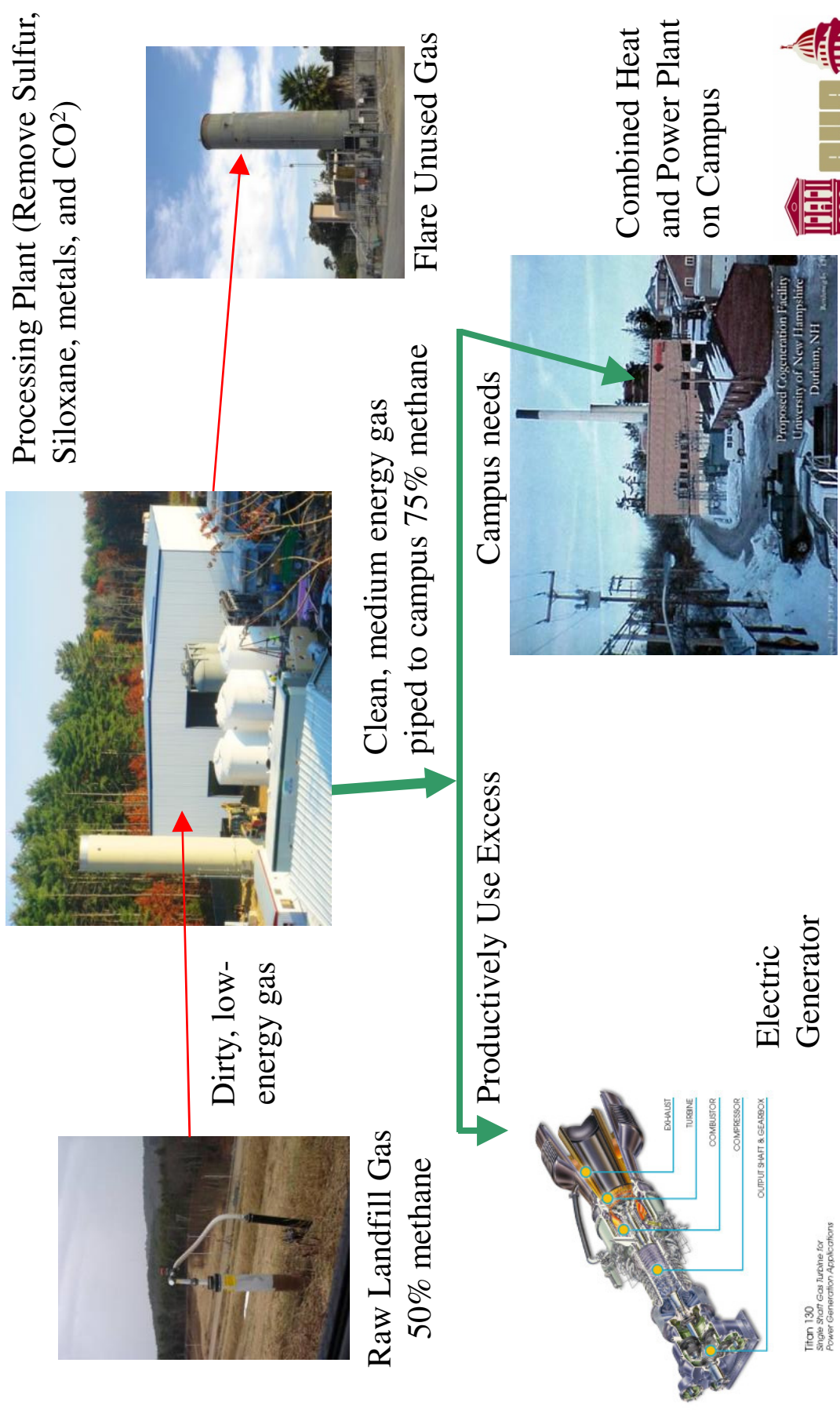
Can you
guess
#3 & #5 ?



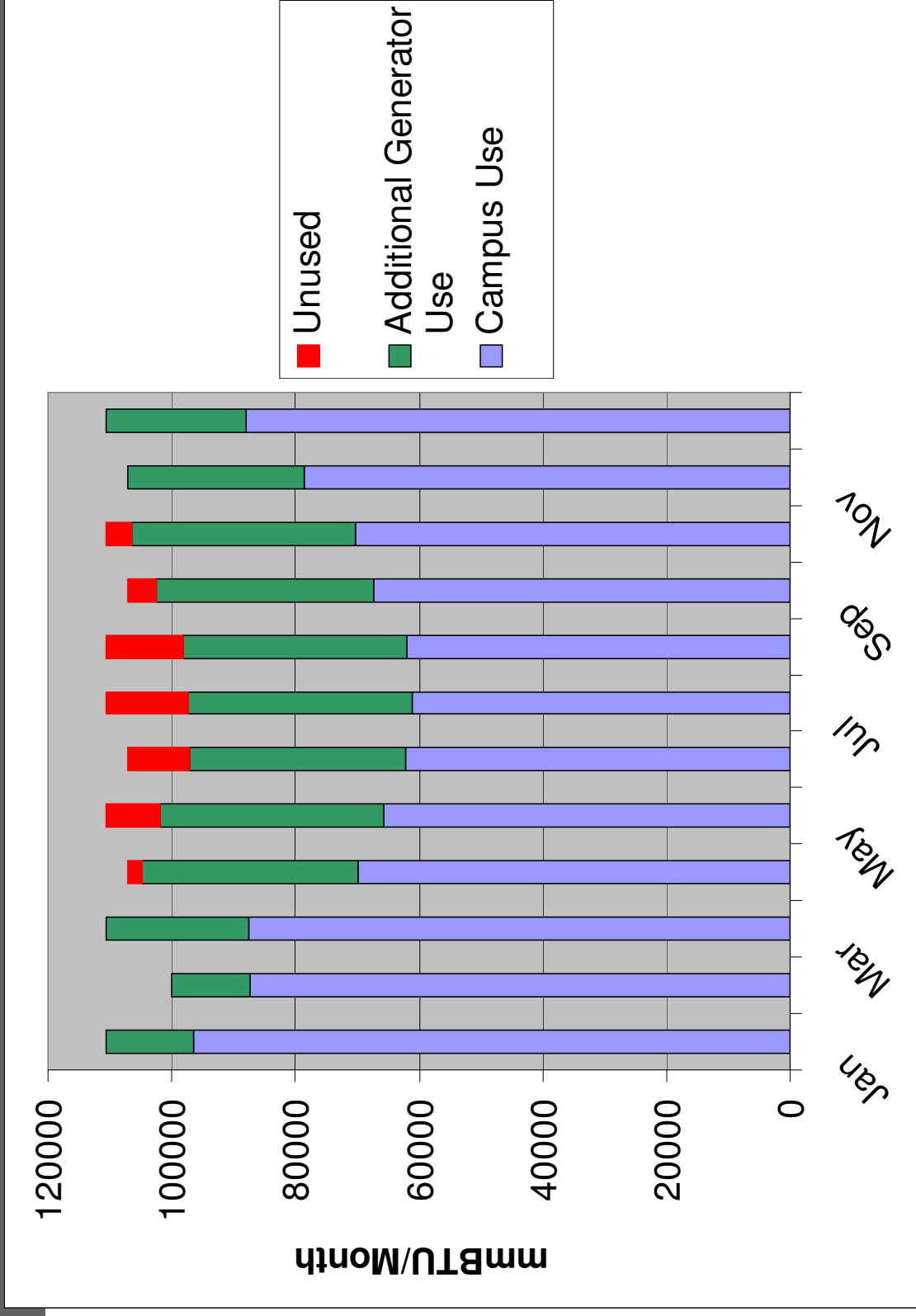
RUMINANT DIGESTION (#3) AND MANURE MANAGEMENT (#5) ASSOCIATED WITH DOMESTIC LIVESTOCK



THE WAY THAT ECOLINE WORKS



MAXIMUM USE OF THE GAS



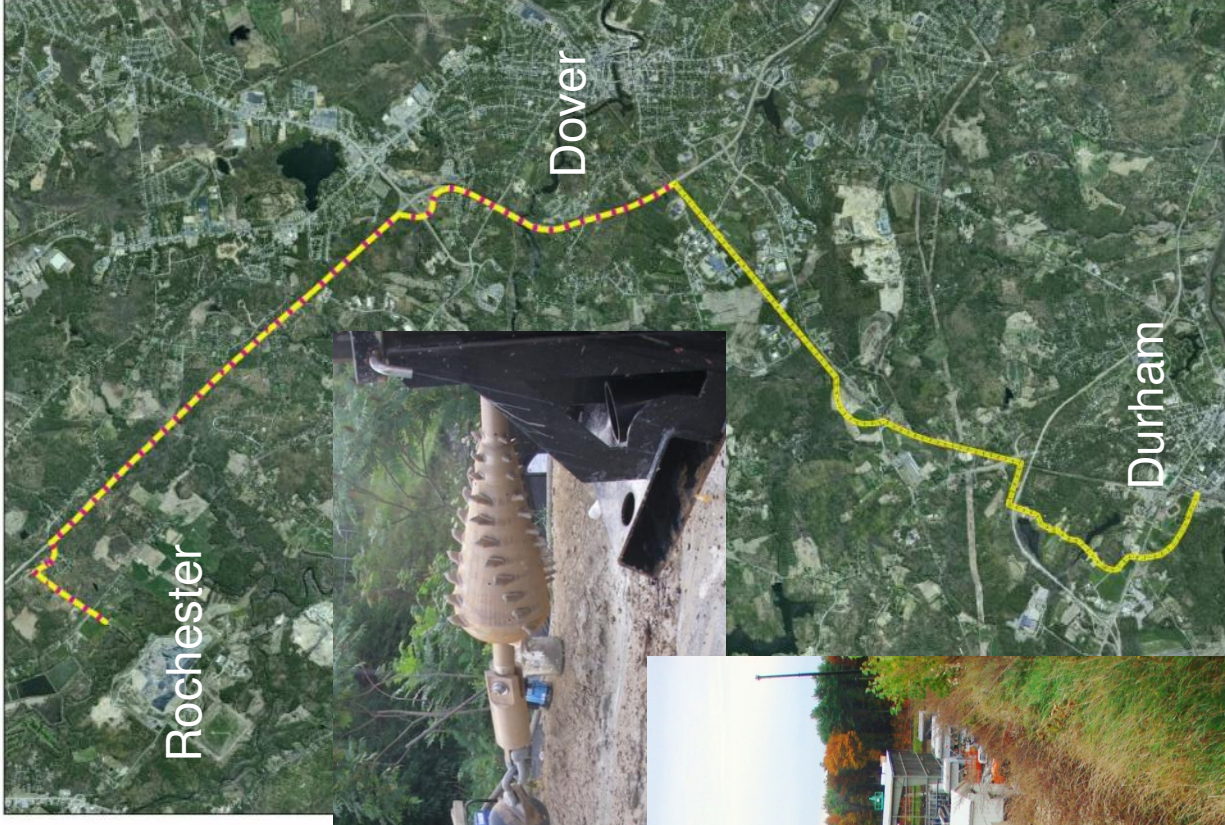
THE REALITY OF USING LANDFILL GAS



SIX AREAS OF RISK

- Capital Cost Escalation due to unknowns
- Air and Wetland Permits
- Natural Gas Market Price Fluctuations
- Actual Operating Costs
- Plant Reliability
- Quality and Quantity of Landfill Gas

The permitting and construction of the processing plant and the pipeline was a success.



NATURAL GAS MARKET FLUCUATIONS HURTING MORE THAN HELPING

Natural Gas prices dropped significantly and have stayed down, which dampens our cost for raw landfill gas, but

This means our savings are not as great as planned, which slows down our debt payments.

OPERATIONAL COSTS MIXED FOR NOW

Processing Plant costs are in line with budget.

Cogeneration Plant costs have room for improvement relative to the energy produced

THE OPERATIONS COST CHALLENGE

The CoGen plant needs a steam load to make it financially effective, this is fine in the winter, but what about the summer?

We are now investing in steam absorption chillers for our major science and academic buildings that need summer chilling



PLANT RELIABILITY

VERY GOOD

Processing Plant and Cogeneration Plant are both operating at 95% effectiveness. Level of complexity of operations is high, resulting in significant stress on personnel at all levels.

QUALITY OF LANDFILL GAS

VERY GOOD

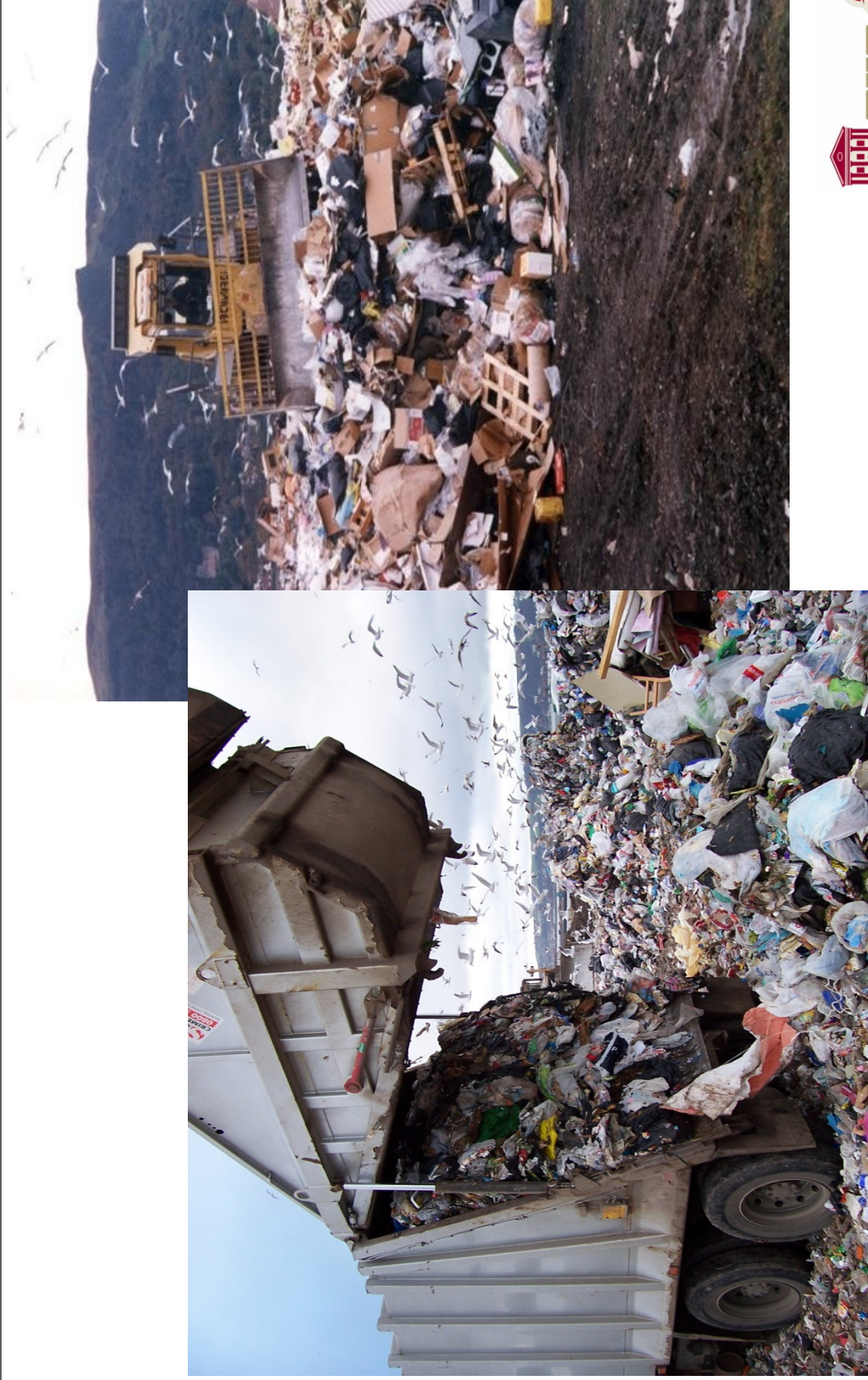
This was a great concern going in, but
so far it has been fairly consistent,
and not an issue

QUANTITY OF LANDFILL GAS ON AVERAGE ABOUT 70% OF ANTICIPATED

This is by far the biggest deviation from
the plan.

WHY IS IT HAPPENING?

TRASH VOLUMES ARE DOWN BECAUSE OF THE RECESSION



ORGANICS IN LANDFILL TRASH

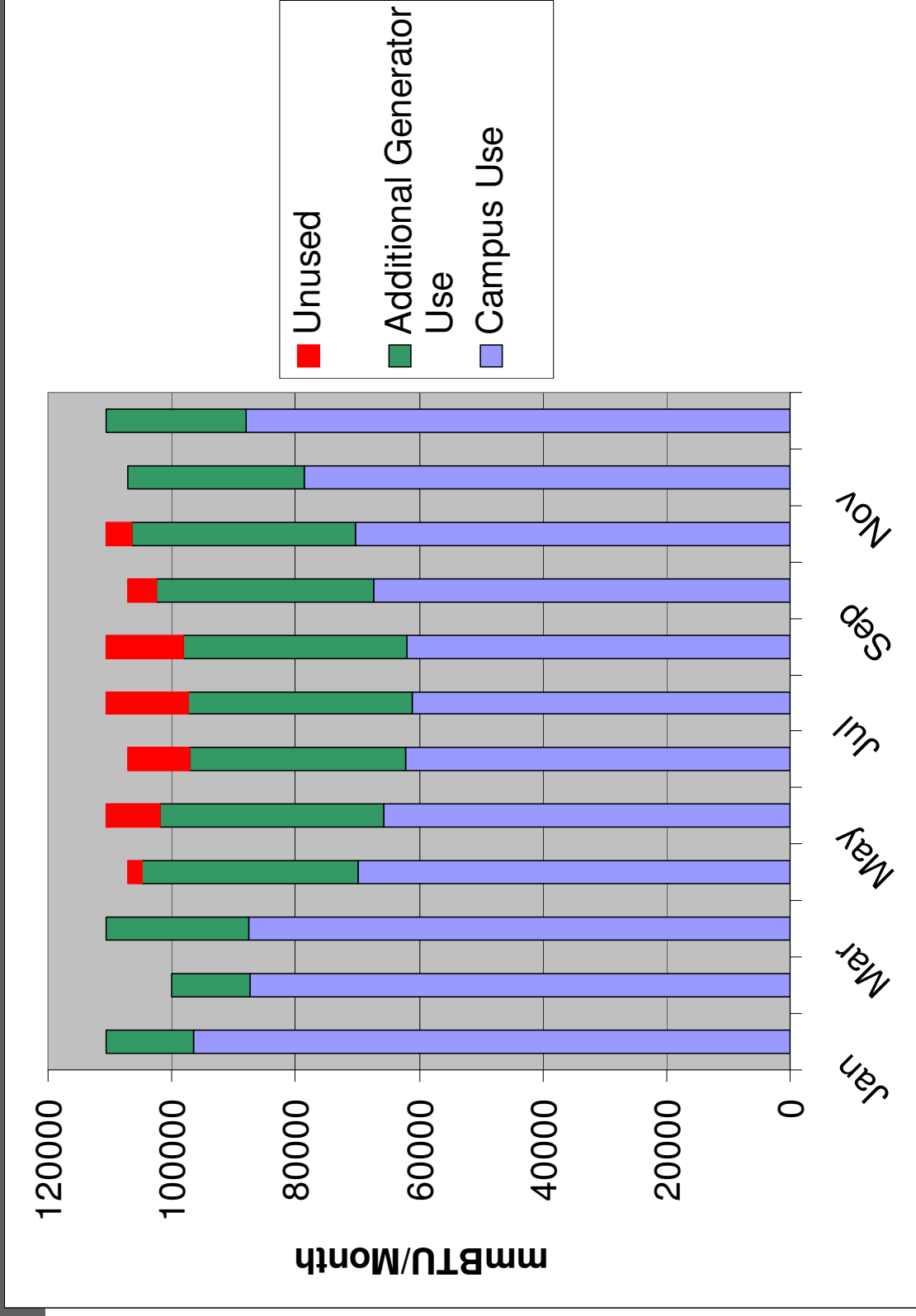
THE KEY TO RENEWABLE



LANDFILL MANAGEMENT IS
AS MUCH ART AS IT IS
SCIENCE

SPEEDING DECOMPOSITION
MANAGING WATER
BALANCING ORGANIC WITH
INORGANIC

MAXIMUM USE OF THE GAS



THE GOOD NEWS

The CoGeneration Plant is producing
80% of our electricity and our heat
as anticipated.

We are increasing our usage of steam
in the summer which will make our
energy much more cost effective

THE PRETTY GOOD NEWS

Renewable Energy Credits (RECs)

market has been down, but we still make about \$1 million per year

The majority of our total energy comes from renewable landfill gas, but not 80-85% as we had hoped.

We have been creative in using low priced natural gas to augment as needed.

THE SORT OF GOOD NEWS

Our Sustainability goals remain intact,
but are dependent on improvements
in gas quantities and how long we
must sell RECs to make the \$\$ work.

The life of the landfill is greater than
planned as long as trash supplies stay
down.

THE NOT SO GOOD NEWS

As long as natural gas prices stay low,
and the quantity of landfill gas is
limited, it will take us longer to pay
off the project debt.

THE UNIVERSITY OF NEW HAMPSHIRE WELCOMES YOUR ORGANIC TRASH CONTRIBUTIONS!!

