

WASTE TO WATTAGE

CITY OF
Fargo

DIVISION OF SOLID WASTE

LANDFILL RENEWABLE ENERGY PROJECT

Terry Ludlum
Solid Waste Utility Manager

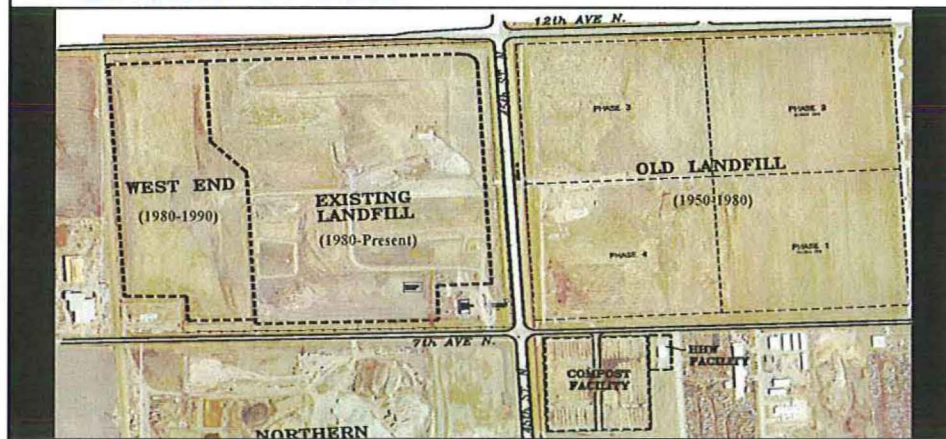
URBAN LANDFILL CHALLENGES

•Location



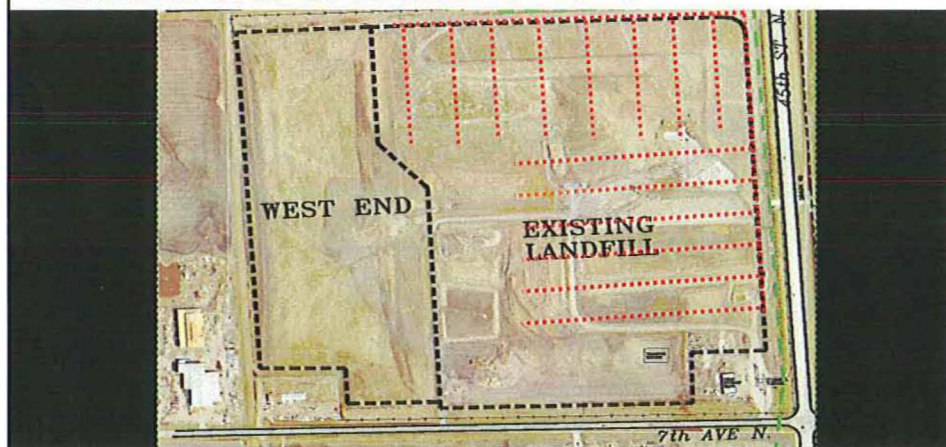
URBAN LANDFILL CHALLENGES

- Leachate
- Odor (landfill gas)
- Windblown Litter



LEACHATE SOLUTION

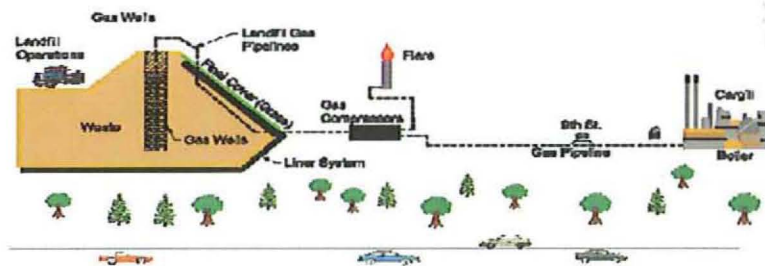
- Leachate Collection System
- City Sewer
- Wastewater Treatment Plant



ODOR SOLUTION

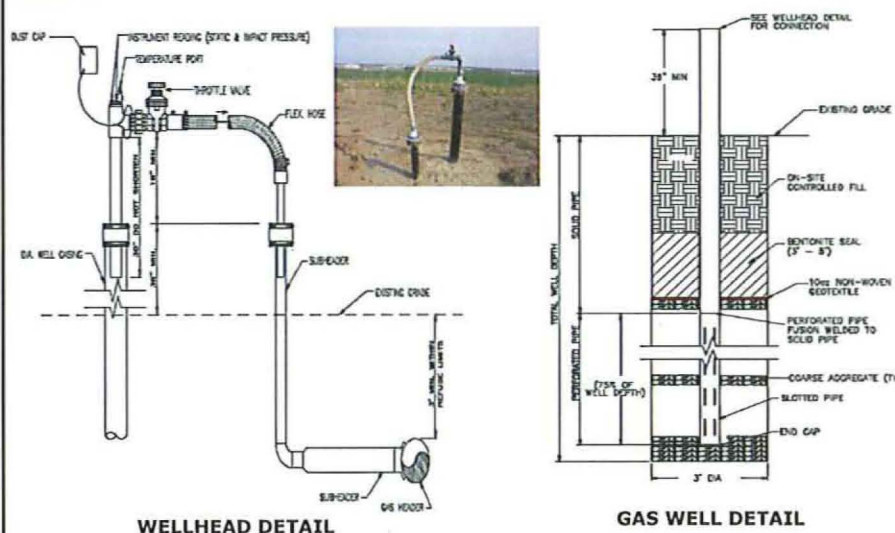
Landfill Gas Collection System

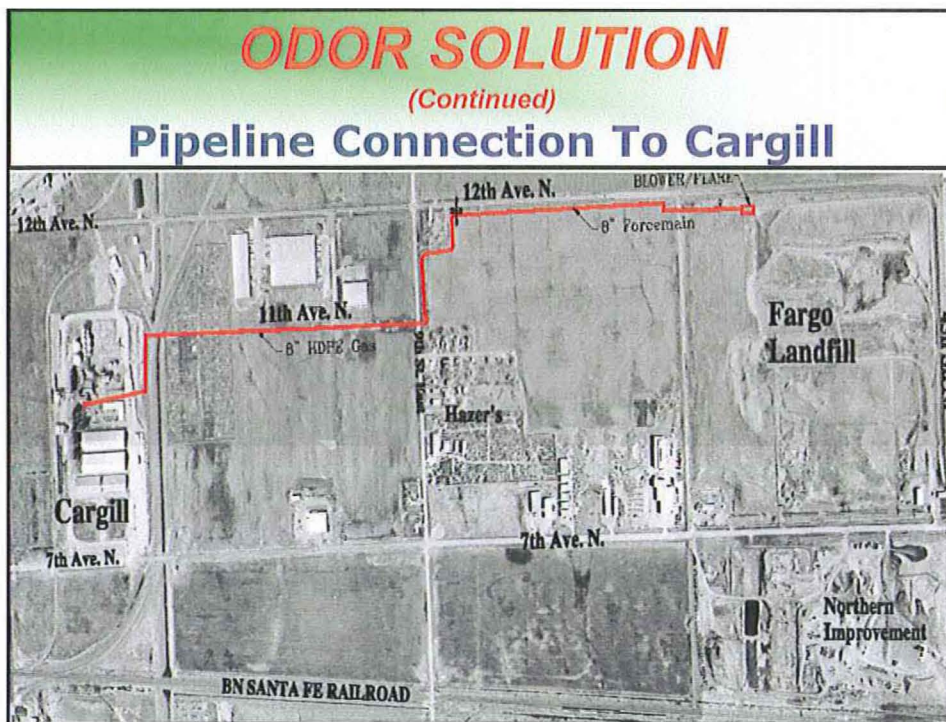
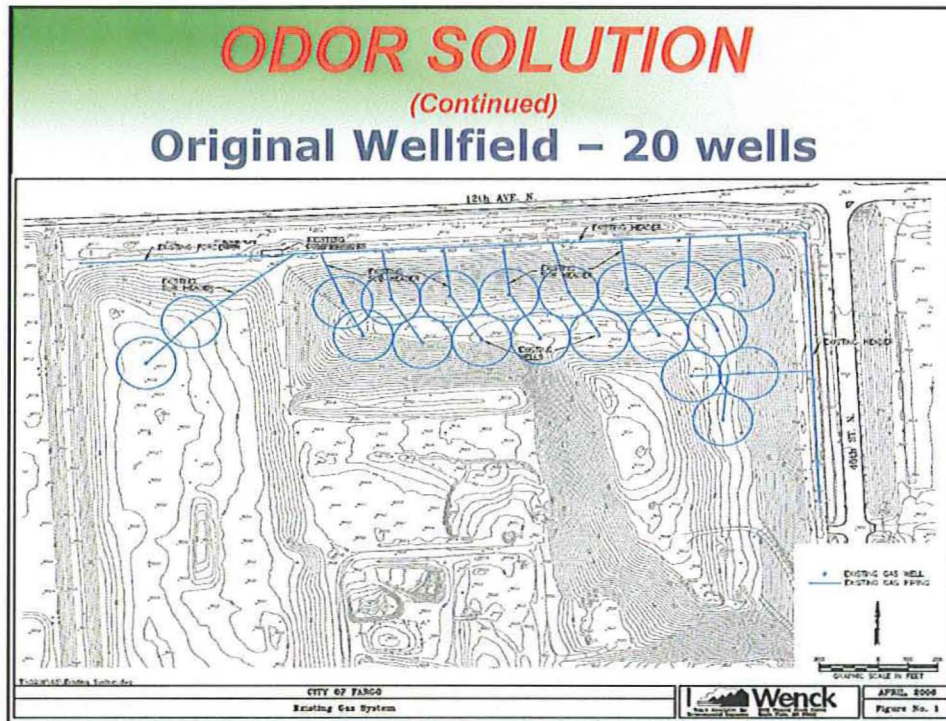
GAS COLLECTION SYSTEM



ODOR SOLUTION

Landfill Gas Collection System





WINDBLOWN LITTER SOLUTION

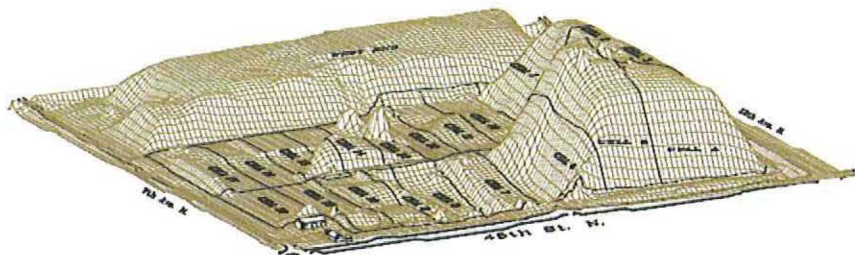
Transfer Station and Baling Facility

- Landfill Gas (Heating)**
- Solar Energy (Electricity)**
- Wind Energy (Electricity)**



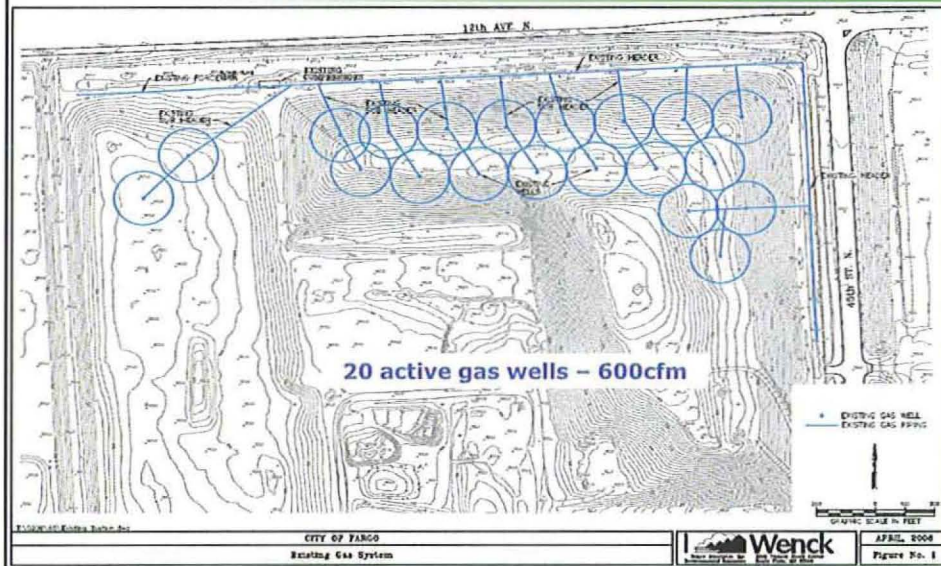
FARGO LANDFILL

2001



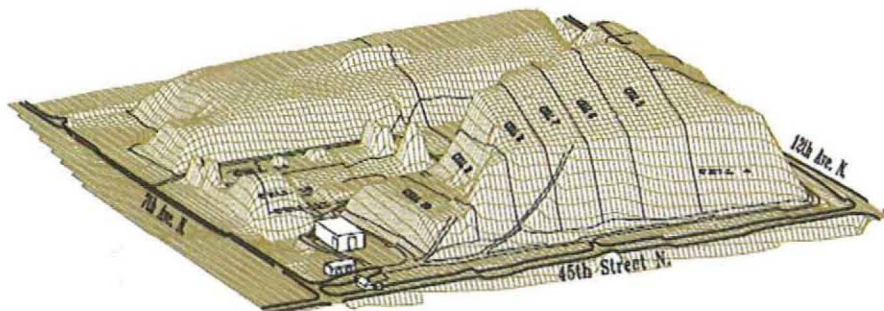
LANDFILL GAS COLLECTION SYSTEM

Original Wellfield – 2001



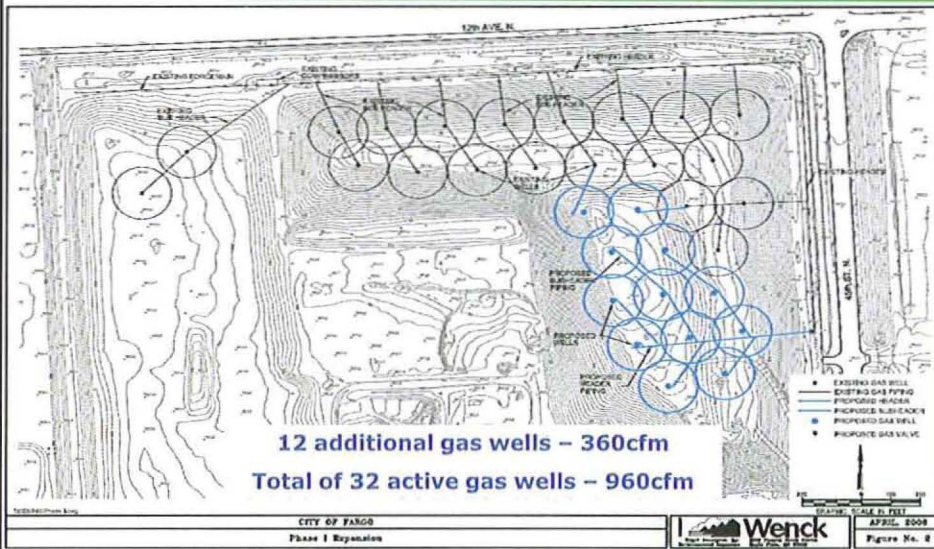
FARGO LANDFILL

2006



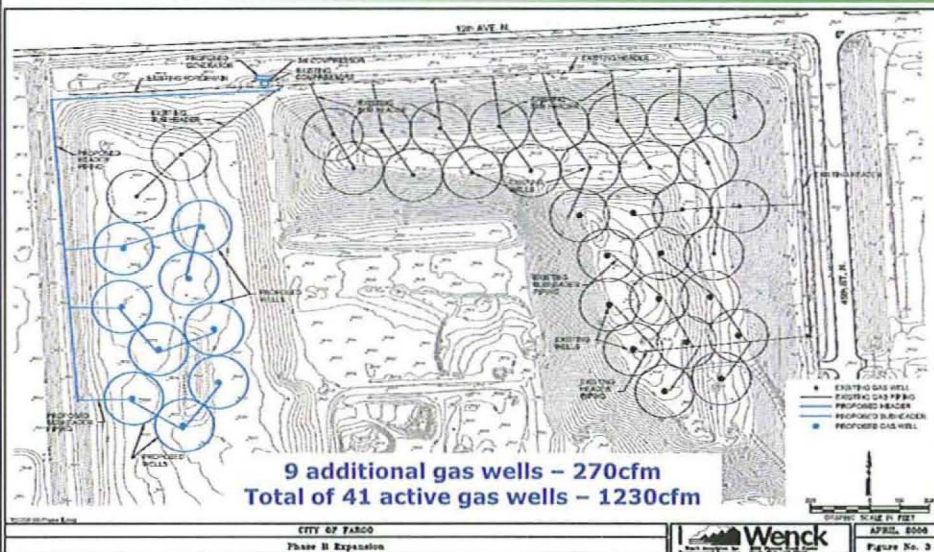
LANDFILL GAS COLLECTION SYSTEM

Phase 1 Expansion - 2006



LANDFILL GAS COLLECTION SYSTEM

Phase 2 Expansion - 2007



LANDFILL GAS UTILIZATION

- Sell to Cargill for Thermal Processes
- Transfer Station Boilers for Heating
- Generator for Electricity



LANDFILL GAS UTILIZATION

GAS AVAILABILITY:

TOTAL GAS PRODUCTION	= 1230 cfm
CARGILL COMMITMENT	= 450 cfm
TRANSFER STATION COMMITMENT	= <u>260 cfm</u>
AVAILABLE	= 520 cfm

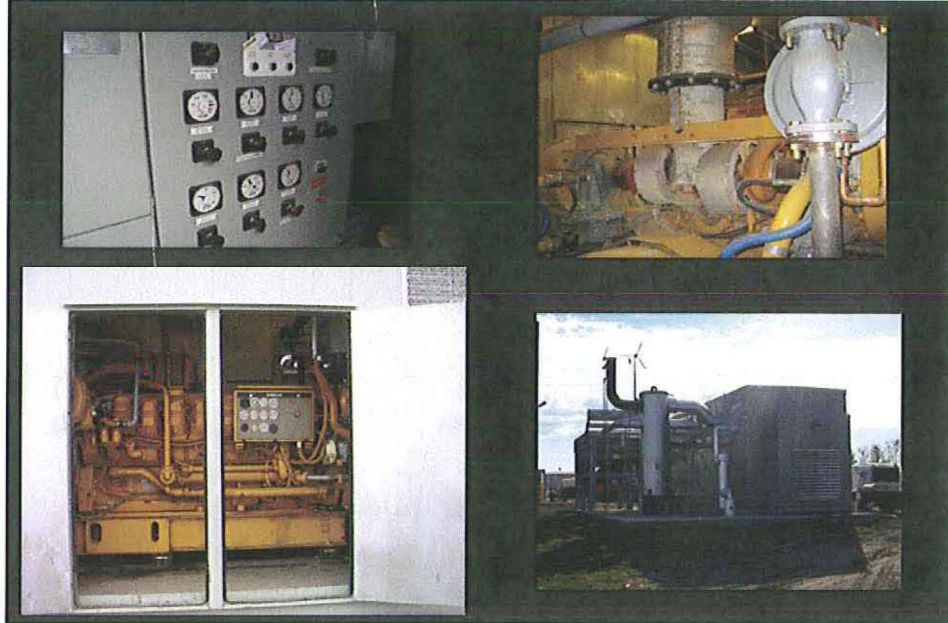


RENEWABLE ENERGY PROJECT:

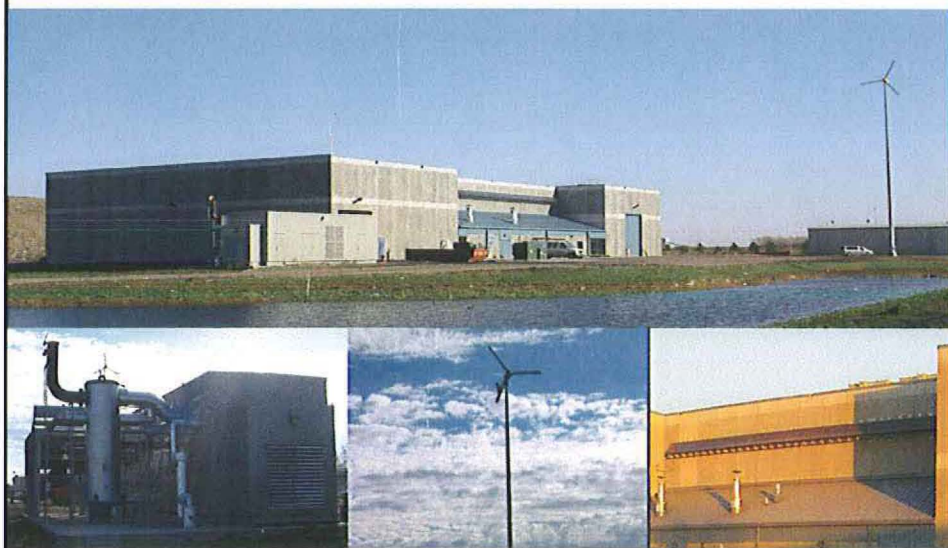
EQUIPMENT	Caterpillar 925 kW generator
POWER PRODUCED BY GENERATOR	7.3 megawatts annually (700 homes)
WASTE HEAT PRODUCED BY GENERATOR	1,560 decatherms annually

INCOME FROM POWER SALES	\$ 312,000/year
AVOIDED COST TO HEAT TRANSFER STATION	\$ 70,500/year

LANDFILL GAS GENERATOR



Transfer Station and Baling Facility



ECONOMIC EVALUATION

Cost

Boiler Equipment	= \$ 17,400
Solar Equipment	= \$ 58,000
Wind Equipment	= \$ 78,000
Landfill Gas Generator	= \$713,000
Heat Recovery Equipment	= \$ 65,000
Transformers and Meters	= \$ 17,000

Subtotal = \$ 948,400

ND DoE Grant = (\$ 20,000)

Total = \$928,400

Benefits

Electricity Sales	= \$ 312,000/yr.
Avoided Natural Gas Cost	= \$ 70,500/yr.
CREB's Interest Accrual	= \$ 45,000/yr.

Subtotal = \$ 427,500/yr

Operating and Maintenance = (\$ 76,000)

Total = \$ 351,500/yr.

Simple Payback = 2-1/2 years

ENERGY PRODUCTION

<http://apps.cityoffargo.com/solidwaste/energyproduction>



[City of Fargo home page](#)

JANUARY 10, 2008

Current energy production at the landfill

One kilowatt hour (kWh) is enough energy to power a 100-watt light bulb for 10 hours.

The average house uses 938 kWh per month, which is about 30.8 kWh per day. At this rate, the generator should produce enough energy to power 700 homes every day.

Energy produced (measured in kilowatt hours)

	Wind	Solar	Methane	Total
In the last 15 mins.:	0.16	0.03	225.88	226.07
Past 24 hours:	1.47	4.97	21,762.5	21,768.94
Since coming on-line:	2,704.36	1,400.11	2,187,207.92	2,191,312.39

[View Larger Table](#)

Value of energy sold (in the last hour): \$38.89

Value of energy sold (since coming on-line): \$44,049.84

Projected annualized value of energy sold: \$321,249.81

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ENERGY PRODUCTION

EMISSION REDUCTION & ENVIRONMENTAL ENERGY BENEFITS

- New Revenue from the sale of **Carbon Credits**
- First required membership with the CHICAGO CLIMATE EXCHANGE
 - Third Party Verification (CCX certified verifier)
 - CCX Application Submittal
 - CCX Membership Approval
- Third Party Verification
- Baseline Emissions Report
- Valuation of Verified Carbon Credits

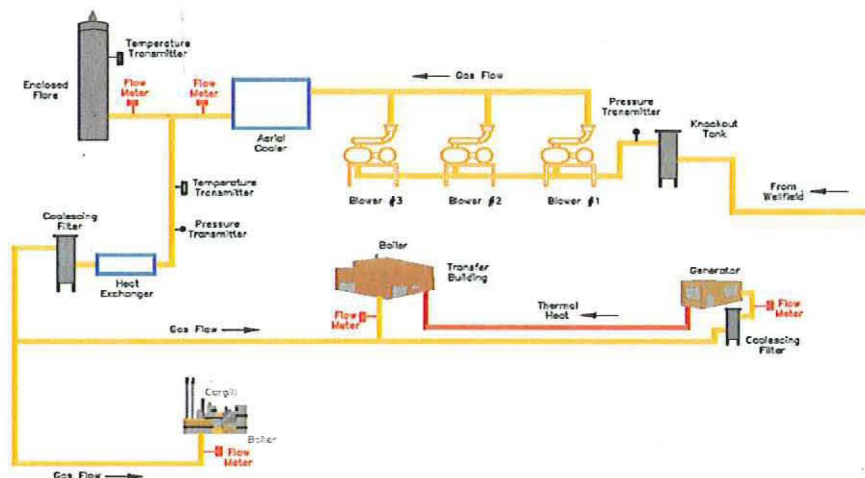
CARBON CREDIT REVENUE SUMMARY

Historic Credits (2003-2007) = \$700,000
Annual Credits (2008-2010) = \$400,000/yr.

CCX MEMBERSHIP

Step 2: Verify GHG Captured & Destroyed

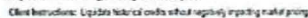
LANDFILL GAS FLOW RATES



<http://www.chicagoclimatex.com>

- City of Aspen
- City of Berkeley
- City of Boulder
- City of Chicago
- City of Fargo
- City of Melbourne, Australia
- City of Oakland
- City of Portland

Step 2: Verify GHG Captured & Destroyed



**Annual Credits
(2008-2010) =
\$400,000/yr.**

SUMMARY

Landfill Benefits of Utilizing Renewable Resources

- ***Solved Odor Problem***
- ***Helped Pay Capital and O & M Costs of New Transfer Station (decreased blowing debris problem)***
- ***Identified Sustainable Source of Revenue***



QUESTIONS?

