Old Tools, New Tricks

Andy Padian – Data and Kids
Thomas Holmes – Fixing Ventilation
Barry Stephens – Ventilation, Heat Recovery
Mark Pando – Airsealing PTAC units

Tom Sahagian- Water + Leaks
Dan Rieber – Boilers & DHW
Henry Gifford – Elevators & Booster Pumps
Andy Padian
Data and Kids
In 1989, a report written by Peter Judd noted that similar buildings ranged in energy usage by a factor of 7:1.
1996-2006 Range of Energy Usage in Buildings

All listed in Btu/ft²/HDD

- Single Family USA
- Low Income Single Family NYS
- Low Income Multi-Family NYS 1996
- Selected New Afford. Rehabs NYC 1996
- Middle Income Multi-Family NYS 2006
- Melrose Commons 2002

Categories:
- Heat
- Hot Water
Almost 300 NYS Buildings requesting NYSERDA Energy Audits 2001-2005 (BTU/ft2/HDD)
Data and understandable grades!

CPC Report Card Grades

- Electricity
- Water
- Heating
- Hot Water
How can we miss WATER?

- In many MF buildings, largest resource cost
- More than gas, oil, electric
- In some buildings, larger than property taxes
- Owners don’t believe leaks, toilets, showers, the problem
Two Case Studies 21-40% Savings
6 to 8 Month Payback

leftrightarrow 21%
Showerheads & aerators

40% →
Toilets Only
WWII vs LEED Gold?
Financing Improvements During Refinancing Removes “Payback” Chatter

- When done as part of refinancing, no pain
- Cash flow increases, rates lower costs
- Some banks now loaning against savings
- Innovative programs and incentives
- 3rd Party financing initiatives
But banks and other financiers won’t play unless:

- They have “comparables”
- Which means pre/post results
- DATA!
- Financing Session After Lunch
Auburn Housing Authority
188 Units, 24 Buildings
All furnaces, hot water makers replaced
Lighting and refrigerators replaced
50% gas savings.
Vacancy rate from 20% to 1%.
• 1873 Historic building
• Converted to senior housing
• Attic air sealing and insulation
• Heating and DHW replacement
• 20% savings
• No preservation alarms!
131 apartments, electric heated, individually metered
New Hot Water Makers, showerheads, aerators
Tightened apartments average 24%
**Apartment electric savings 25%!**
Gas use for hot water down 46%
Water use down 21%
North Street Apartments Canandaigua, NY
Rehab/Refi Huge Success

35 apts, 36,000 ft2

- Mod rehab + full weatherization package ($4000/apt)
- Boiler, airsealing, windows, insulation, better controls
- Oil usage declined (weather adjusted) 63.7%.
- Annual oil usage from $119,636 to $43,448
- Savings of $76,188 ($2177/apartment) per year.
So we have the data, the buildings, and most of the solutions!

Now do we have the kids to do the work?
kid¹

noun 1. (informal) a child or young person.

You kids could be struggling with leaving HS, college, or grad school.

Some of you kids are 30-50 years old and are in career transition.

Some of you kids are older than I, and you are trying to give back.
THE FUTURE

- That should be all of you
- The “kids” in the audience
- How do you assume our jobs?
- Who trains you?
- Real world meets the ivory tower
FERTILIZE.
MENTORIZE.
GET A BOARD OF DIRECTORS.
Continue to Learn

Each year, you should learn as much at work as you have in your entire previous career

You learn more from working than sitting in a classroom

...because there’s only two ways I’m leaving this business:
Thanks for listening!
Thomas Holmes
Fixing Multifamily Ventilation
Multifamily Ventilation
A Balancing Act

Tom Holmes
Remediation Specialists, Inc.
<table>
<thead>
<tr>
<th>DRIVE COMB.</th>
<th>RPM</th>
<th>TS</th>
<th>0’’ SP</th>
<th>1/8’’ SP</th>
<th>1/4’’ SP</th>
<th>3/8’’ SP</th>
<th>1/2’’ SP</th>
<th>5/8’’ SP</th>
<th>3’’ SP</th>
<th>1’’ SP</th>
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</thead>
<tbody>
<tr>
<td>R-1</td>
<td>730</td>
<td>2126</td>
<td>6.19</td>
<td>4.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-2</td>
<td>820</td>
<td>25</td>
<td>4.7</td>
<td>.02</td>
<td>4.0</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-3</td>
<td>910</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-4</td>
<td>1000</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1090</td>
<td>3174</td>
<td>7.0</td>
<td>.07</td>
<td>6.7</td>
<td>.08</td>
<td>6.3</td>
<td>.08</td>
<td>5.8</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>1200</td>
<td>3495</td>
<td>7.8</td>
<td>.10</td>
<td>7.5</td>
<td>.11</td>
<td>7.1</td>
<td>.11</td>
<td>6.3</td>
<td>.11</td>
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<tr>
<td></td>
<td>1310</td>
<td>3815</td>
<td>8.1</td>
<td>.13</td>
<td>8.5</td>
<td>.13</td>
<td>8.2</td>
<td>.14</td>
<td>7.0</td>
<td>.14</td>
</tr>
</tbody>
</table>

**System SP ≠ 5/8” WC**  
**Measured SP = 1/4” WC**

950 CFM
18 in²

3 in²
Balance
<table>
<thead>
<tr>
<th></th>
<th>Kitchens</th>
<th>Bathrooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>$60</td>
<td>$24</td>
</tr>
<tr>
<td>$0.49/ Therm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#2 Heating Oil</td>
<td>$244</td>
<td>$98</td>
</tr>
<tr>
<td>$2.99/ Gal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>District Steam</td>
<td>$375</td>
<td>$150</td>
</tr>
<tr>
<td>$38.50/ MLB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>$863</td>
<td>$338</td>
</tr>
<tr>
<td>$0.26/ kWh</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pre-2008 NYC Building Code  2008 NYC Adopted IBC/IMC

Possible Energy Savings

- Bathrooms
- Kitchens
Barry Stephens
Ventilation and Heat Recovery

Ventilation and Heat Recovery

BENYC
15 October 2015
Presented by Barry Stephens
Experience with cutting edge energy efficiency with Zero-Heating-Energy-dwellings Wädenswil, 1990

Comprehensive measures to reduce consumption and to use solar heat

600 pounds of wood/year for space heating/DHW
Determining Factors for Energy Use in Zero Energy Homes

Spec. heat consumption

- Building shape
- Orientation of windows
- U-value of windows
- U-value of roof, walls
- HRV
- 9m² solar coll. + storage
- +25m² solar collector
- 20m³ storage
- Waste water rec.

Effect of measures
Remaining needs

<table>
<thead>
<tr>
<th>Orientation of windows</th>
<th>U-value of windows</th>
<th>U-value of roof, walls</th>
<th>HRV</th>
<th>9m² solar coll. + storage</th>
<th>+25m² solar collector</th>
<th>20m³ storage</th>
<th>Waste water rec.</th>
</tr>
</thead>
</table>
Bath Fan vs. HRV Energy Usage

Assumptions:
* 3 Bedroom/1 bath apartment
* 1500 SF – 8 FT ceilings
* Passive House Ventilation
  0.3 ACH = 60 CFM
* Outside Air Temp: 30°F
* Inside Air Temp: 70°F
Bath Fan vs. HRV Energy Usage

Bath Fan case, 60 CFM continuous:
Energy Usage = (1.085)(60 CFM)(70°F - 30°F)(24 hours) = 62,496 Btu/Day

Bath Fan Case, 120 CFM intermittent (2 hours per day):
Energy Usage = (1.085)(120 CFM)(70°F - 30°F)(2 hours) = 10,416 Btu/Day

Ventilation Thermal Energy Usage

Make-up Air Temperature
75% Efficient HRV case, 60 CFM continuous:
Energy Usage = \((1.085)(60 \text{ CFM})(70^\circ F - 30^\circ F)(24 \text{ hours})(1 - 0.75)\) = \(15,624 \text{ Btu/Day}\)
Make-up air temperature = \(30^\circ F + (70^\circ F - 30^\circ F) \times (0.75)\) = \(60^\circ F\)
90% Efficient HRV case, 60 CFM continuous:
Energy Usage = (1.085)(60 CFM)(70°F - 30°F)(24 hours)(1 – 0.90) = 6,250 Btu/Day
Make-up air temperature = 30°F + (70°F - 30°F)*(0.90) = 66°F
Apply formula to 50 unit multi-family

Ventilation Thermal Energy Usage (Daily)

<table>
<thead>
<tr>
<th>Type</th>
<th>Daily Energy Usage [btu/day]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Bath Fan</td>
<td>3,124,800</td>
</tr>
<tr>
<td>Intermittant Bath Fan</td>
<td>520,800</td>
</tr>
<tr>
<td>75% Efficient HRV</td>
<td>781,200</td>
</tr>
<tr>
<td>90% Efficient HRV</td>
<td>312,500</td>
</tr>
</tbody>
</table>
Apply formula to 50 unit multi-family

Ventilation KWh Equivalent (Daily)

<table>
<thead>
<tr>
<th></th>
<th>Daily Energy Usage [KWh/Day]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Bath Fan</td>
<td>916</td>
</tr>
<tr>
<td>Intermittant Bath Fan</td>
<td>153</td>
</tr>
<tr>
<td>75% Efficient HRV</td>
<td>229</td>
</tr>
<tr>
<td>90% Efficient HRV</td>
<td>91</td>
</tr>
</tbody>
</table>
Apply formula to 50 unit multi-family

<table>
<thead>
<tr>
<th>Ventilation KWh Equivalent (Yearly)</th>
<th>Continuous Bath Fan</th>
<th>Intermittent Bath Fan</th>
<th>75% Efficient HRV</th>
<th>90% Efficient HRV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly Energy Usage [KWh/Year]</td>
<td>167,170</td>
<td>27,922</td>
<td>41,792</td>
<td>16,607</td>
</tr>
</tbody>
</table>

Calculated with average temperature gradient from outside to inside of 20°F.
Ever seen one of these?

Rooftop AHU
Multi-Family Options

Install individual units in each Apartment.
Multi-Family Options

Individual Apartment Units
With Central Mechanical Room

Pros
• Good Compartmentalization
• Individual Control
• Boost Capacity
• Minimize Penetrations
• Centralized Maintenance

Cons
• Central Ductwork & Fire Dampers
• Loss of Floor Space for Shafts
• May be more expensive
• Energy paid by building owner
Mechanical Room Central Unit
Roof Top Unit
Determining Factors for Energy Use in Zero Energy Homes

Spec. heat consumption

<table>
<thead>
<tr>
<th>kBTU/ft²a</th>
<th>kWh/m²a</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>40</td>
<td>150</td>
</tr>
<tr>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>150</td>
<td>750</td>
</tr>
</tbody>
</table>

Effect of measures
Remaining needs

Building shape
Ø ZH 1990
Orientation of windows
U-value of windows
U-value of roof, walls
HRV
9m² solar coll.+ storage
+25m² solar collector
20m³ storage
Waste water rec.

Original dwelling Wädenswil
Mark Pando
Retrofitting PTAC Units
Mark Pando
Bright Power, Inc.

Retrofitting PTACS: A New Solution
Proof of Concept

- Electric Heat PTAC with Mini-Split Heat Pump
- “Outdoor Unit” mounted in expanded PTAC cavity in masonry wall
- Completed December 2014
PTAC Sleeves – Leaky Envelope
Out-Dated Technology

1909

2014

"D12cord". Licensed under CC BY 3.0 via Wikipedia -
Low temperature renewable heat energy recovered from the environment

Heat Pump

1kW Electrical power in
2kW
3kW High temperature heat output
Retrofits: What were our options?

<table>
<thead>
<tr>
<th>Hydronic Gas Plant</th>
<th>VRF</th>
<th>PTHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Piping Needed</td>
<td>Bldg Geometry Restrictions</td>
<td>Sleeve Size = Non Standard</td>
</tr>
<tr>
<td>No Space for new Plant</td>
<td>Refrigerant Piping Needed</td>
<td>Electric Ht. on Coldest Days</td>
</tr>
<tr>
<td>No Air Sealing</td>
<td>Metering Configuration</td>
<td>No Air Sealing</td>
</tr>
</tbody>
</table>
Solution: Mini Splits
Condenser Unit mounted in Wall Cavity
Condenser Unit Location
Enlarged grille
Air Seal Bedroom PTAC
Each PTAC occupied 8 sq. ft. of interior floor area
43% Reduction in Apartment Energy Usage
### HVAC Savings

<table>
<thead>
<tr>
<th>Indices</th>
<th>Pre-Retrofit - Owner</th>
<th>Post-Retrofit - Owner</th>
<th>Difference</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Index</td>
<td>43 N/A</td>
<td>27 N/A</td>
<td>-39%</td>
<td>-16.0 kBTU/ft²/yr</td>
</tr>
<tr>
<td>Cooling Index</td>
<td>5.4 D</td>
<td>3.1 C</td>
<td>-43%</td>
<td>-2.30 BTU/ft²/CDD</td>
</tr>
<tr>
<td>Heating Index</td>
<td>5.6 A</td>
<td>2.5 A</td>
<td>-56%</td>
<td>-3.10 BTU/ft²/HDD</td>
</tr>
<tr>
<td>Electric Baseload Index</td>
<td>2,555 A</td>
<td>2,574 A</td>
<td>~</td>
<td>19.0 kWh/unit/yr</td>
</tr>
</tbody>
</table>
## Big Picture

<table>
<thead>
<tr>
<th>Region</th>
<th>Electric Heating Usage</th>
<th>Potential Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MWh</td>
<td>MWh</td>
</tr>
<tr>
<td>NY State</td>
<td>2,102,000</td>
<td>1,346,000</td>
</tr>
<tr>
<td>New England</td>
<td>2,330,000</td>
<td>1,492,000</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>4,432,000</strong></td>
<td><strong>2,838,000</strong></td>
</tr>
</tbody>
</table>

*Source: RECS 2009 Data*
Tom Sahagian
Water Leak Warning System
Water Leak Early Warning System

Tom Sahagian
BE-NYC
October 15, 2015
Typical DEP Meter
DEP AMR Data-Gathering System
Typical DEP Graph

Hourly usage for 01/15/15

CUBIC FEET

1 AM 3 AM 5 AM 7 AM 9 AM 11 AM 1 PM 3 PM 5 PM 7 PM 9 PM 11 PM
Water Submetering is Not New
What to do?
More Difficult Meter Installation
May Require a Shutdown
Meter Installation Technique
Note the Condensation
Note the Condensation
Internet Issues
Obvious Leak
<table>
<thead>
<tr>
<th>Leak (GPM)</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>$337</td>
</tr>
<tr>
<td>0.1</td>
<td>$673</td>
</tr>
<tr>
<td>0.2</td>
<td>$1,347</td>
</tr>
<tr>
<td>0.5</td>
<td>$3,367</td>
</tr>
<tr>
<td>1</td>
<td>$6,734</td>
</tr>
<tr>
<td>2</td>
<td>$13,467</td>
</tr>
</tbody>
</table>
Wireless System -- Gateway
Wireless System -- Sensor
How Much Does it Cost?

Vendor Installed Cost Per Meter

<table>
<thead>
<tr>
<th>Meter Size</th>
<th>Vendor 1</th>
<th>Vendor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4-inch</td>
<td>$935</td>
<td>$625</td>
</tr>
<tr>
<td>1-inch</td>
<td>$1,230</td>
<td>$975</td>
</tr>
<tr>
<td>1-inch Hot</td>
<td>$1,350</td>
<td>$1,250</td>
</tr>
<tr>
<td>1.5-inch</td>
<td>$1,988</td>
<td>$1,725</td>
</tr>
</tbody>
</table>

Typical All-in Installed Cost Per Meter

10-Meter System

<table>
<thead>
<tr>
<th>Meter*</th>
<th>Logger**</th>
<th>Wiring</th>
<th>Other Labor</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,000</td>
<td>$200</td>
<td>$800</td>
<td>$524</td>
<td>$2,524</td>
</tr>
</tbody>
</table>

1,800 Hours
204 Meters
8.8 Hours per Meter
$150 Hourly Labor Rate
$1,324 Wiring Cost per Meter (includes Other Labor)

*Includes pulse output capability

**Logger costs about $2,000 or $200/meter for 10 meters

Installed cost can easily be reduced
Thank you

ts.conserve@gmail.com
Dan Rieber
Boilers and Domestic Hot Water
• A common sense solution to replace a Steam boiler and add separate DHW.
• Converting to Hydronic heat, or insulating walls with cellulose and converting to Hydronic Heat.
• Either way it’s a home run, because Weatherization Works!

Dan Rieber
Weatherization
Director, NMIC
danrieber@nmic.org
Steam boiler replacement with separate DHW

• 42 unit, 6 story elevator building built in 1910
• 1974 Gas fired Steam Boiler and unused oil tank.
• Old boiler is way oversized 100 HP or 4 million btu’s.
• Take advantage of space in boiler room to reduce boiler size and add a separate DHW maker.
• Pre WAP btu/sqft/hdd =20.37
Where is this building?

Right Here
Typical Washington Heights pre-War building
We did a temperature study
<table>
<thead>
<tr>
<th>Floor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Supts</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>108.00</td>
<td>132.00</td>
<td>72.00</td>
<td>36.00</td>
<td>40.60</td>
<td>86.00</td>
<td>82.70</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>61.50</td>
<td>68.00</td>
<td>60.00</td>
<td>38.00</td>
<td>64.00</td>
<td>78.00</td>
<td>66.00</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>36.00</td>
<td>42.70</td>
<td>32.50</td>
<td>40.00</td>
<td>52.00</td>
<td>78.00</td>
<td>65.00</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>53.30</td>
<td>65.00</td>
<td>32.00</td>
<td>40.00</td>
<td>45.00</td>
<td>96.00</td>
<td>104.00</td>
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<tr>
<td>2</td>
<td>61.50</td>
<td>48.00</td>
<td>27.50</td>
<td>45.00</td>
<td>42.00</td>
<td>65.50</td>
<td>84.00</td>
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<tr>
<td>0</td>
<td>48.70</td>
<td>36.00</td>
<td>56.00</td>
<td>40.00</td>
<td>0.00</td>
<td>64.00</td>
<td>60.00</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>369.00</td>
<td>392.00</td>
<td>280.00</td>
<td>298.00</td>
<td>243.60</td>
<td>469.30</td>
<td>482.00</td>
<td>0.00</td>
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</tbody>
</table>

NOTE: Estimated values in red
*Includes estimates for removed radiators

STEAM BOILER SIZING CALCULATION

<table>
<thead>
<tr>
<th># of Sections</th>
<th>EDR</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>21.5</td>
</tr>
<tr>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td>10</td>
<td>26.67</td>
</tr>
</tbody>
</table>

RADIATOR HEAT LOAD

<table>
<thead>
<tr>
<th>Total Radiator</th>
<th>Btu/hr Net</th>
<th>Btu/hr Gross</th>
<th>Boiler HP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2475.0</td>
<td>593,988</td>
<td>791,984</td>
<td>23.66</td>
</tr>
</tbody>
</table>

DOMESTIC HOT WATER LOAD

<table>
<thead>
<tr>
<th>DHW Gallons Per Hour</th>
<th>Max Temp Rise [deg F]</th>
<th>Btu/hr Gross</th>
<th>Boiler HP</th>
</tr>
</thead>
<tbody>
<tr>
<td>840.00</td>
<td>100</td>
<td>699,720</td>
<td>20.90</td>
</tr>
</tbody>
</table>

TOTAL BOILER CAPACITY = 44.56

1,491,704 btu/hr
1,492 MBH
The old boiler was a Rockmills MP100
The Boiler is leaking
The leak revealed
Let's put in a 50HP boiler and a new 750,000 btu DHW maker.
DHW boiler Laars Pennant 750,000 btus

Exhaust

Fresh air intake
## LAARS

**Gas Boiler**

- **Model:** G15-20BB57
- **Serial Number:** C15-20BB57
- **Manufactured Date:** Jul 14, 2015
- **Rated Input:** 62,000 Btu/hr (Natural Gas), 50,000 Btu/hr (Liquid Propane)
- **Maximum Input:** 63,000 Btu/hr (Natural Gas), 53,000 Btu/hr (Liquid Propane)
- **Efficiency:** 94.2%
- **Combustion Air:** 79% (Natural Gas), 81% (Liquid Propane)
- **Blower:** 1060 CFM

### Water Heating Specifications

- **Max. Water Temperature:** 210 °F (99 °C)
- **Pressure Relief Valve:** 30 psig (208 kPa)
- **Recovery Rate:** 2.8 gallons per minute (10.8 liters per minute)
- **Flue Gas Temperature:** 275 °F (135 °C)

### Thermal Efficiency

- **Natural Gas:** 94.2%
- **Liquid Propane:** 94.2%

### Electrical Specifications

- **Voltage:** 120 VAC
- **Current:** 62.5 amps
- **Input:** 7500 W (Natural Gas), 6000 W (Liquid Propane)

### Physical Specifications

- **Dimensions:** 32 x 24 x 24 inches (813 x 610 x 610 mm)
- **Weight:** 630 lbs (285 kg)
- **Noise Level:** 2.8 Sones

### Installation Instructions

- **Fuel Connection:** Natural Gas or Liquid Propane
- **Installation Location:** Outdoor or Indoor
- **Horizontal or Vertical Installation:** Suitable for Water Supply and Heating"
TURBOMAX® THREMO 2000®
Indirect water heater 119 us gal.
Richmond, Qc, Canada
JOB 2H9, 888-884-1111

MODEL NO. TURBOMAX 109
SERIAL NO. T0191506289

MAX. TANK PRESSURE WATER 150 PSI EAU
MAX. COIL PRESSURE WATER 150 PSI EAU

MAX. TEMPERATURE DOMESTIC HOT WATER 195° F
MAXIMUM TANK TEMPERATURE 210° F

This tank is NOT designed to receive domestic water or open circuit water. The warranty shall be null and void if the fluid velocity in the coils is excessive (see warranty note). The heat transfer medium liquid must be nontoxic and only additives recognized as safe by the USFDA shall be used.

Ce réservoir n’est PAS conçu pour recevoir de l’eau domestique ou provenant d’un circuit ouvert. La garantie sera nulle si la vitesse du fluide dans les serpentin’s est excessive (voir la notice de garantie). Le liquide utilisé comme véhicule de transfert de chaleur ne doit pas être toxique. Uniquement des additifs reconnus comme sécuritaires par la USFDA doivent être utilisés.

Refer to installation manual for additional instructions
Se référer au manuel d’installation pour des directives additionnelles

CANADIAN PATENT # 2,038,520
USA PATENT # 6,165,472
TURBOMAX 1090
T0191506289R

Made in Canada / Fabriqué au Canada
www.thermo2000.com
Oh and Steam to Hydronic Conversion works. It just costs a lot!
New Gas Hydronic Heat & DHW
179 Henry St. New York, NY

Background:
• 12 floors
• 50 Units
• 60,400 Heated SqFt
• HUD regulated senior housing

The cost for the new Heating/dhw/ & distribution system... $593,137.00 + Temp Service $16,087 = Grand Total of $609,224.00

Workscope:
1. Conversion from steam to hydronic hot water system
2. Conversion from #6 oil to gas
3. Common area lighting upgrade
4. Apartment lighting upgrade

Savings:
• 47% Total Energy Reduction
• $83,000 First Year Savings

179 Henry St. Heat Index

<table>
<thead>
<tr>
<th>btu/sq.ft./HDD</th>
<th>Pre WAP</th>
<th>Post WAP</th>
</tr>
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<tbody>
<tr>
<td>27.04</td>
<td>9.04</td>
<td></td>
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67% reduction in heat index

Annual Heating Cost

<table>
<thead>
<tr>
<th>Over $83,000 saved per year</th>
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<tbody>
<tr>
<td>$128,954</td>
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<tr>
<td>$45,776</td>
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The Academy Street Project
NMIC and L&W

Gut Rehab of 5 buildings on Academy Street in the Inwood section of Northern Manhattan.

NMIC provided Roof insulation and Wall insulation
L&W as part of the rehab converted to Hydronic heating.
An uninsulated wall

An Insulated Wall

New baseboard hydronic radiators
High Eff Condensing boilers with DHW storage, by Lochinvar

Thank you and enjoy the rest of the Conference.