

Case Study Exercise



The Manor

- Size
 - 2 Stories, Garden Style, 84 Units
 - 75,602 square feet
- Age: 1984
 - Built in phases
- Structure
 - Concrete block walls
 - Concrete slab floors and wood framing roof
 - Brick veneer cladding
- Occupancy: Seniors, with rent and utility subsidies
- Utilities
 - Common areas are metered for electric and gas. Tenants are direct-metered for electric heat and domestic hot water.



Apartment Heating & Cooling

- Electric PTACs in the units for apartment heating & cooling plus electric baseboard in the bath



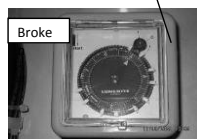
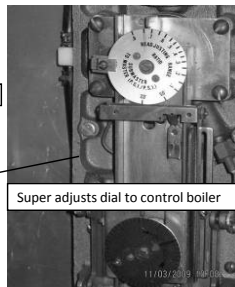
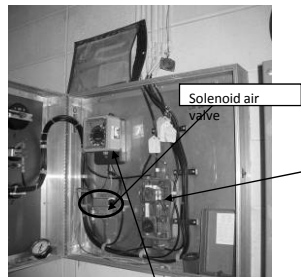
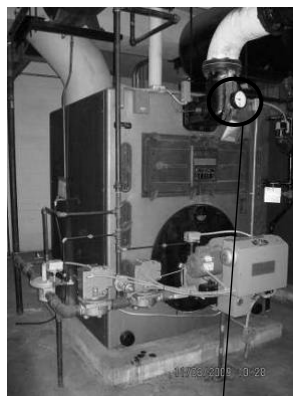
Apartment DHW

- Electric DHW makers in each unit

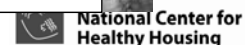
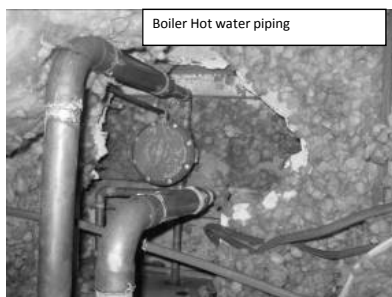


Boiler & Controls

- Gas-fired Weil-McClain hot water boiler for common areas supplies heat to ceiling units with 100% outdoor air and baseboard radiators
 - Broken pneumatic controls and no thermostats



Common Area Heating



Envelope



Apartment window with broken seal and unknown material settled in between panes.



enter for using

Envelope



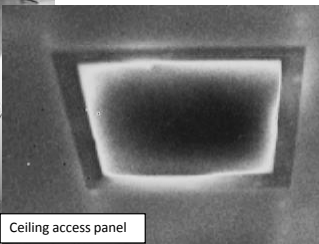
Outside view of typical windows



Roof/ Ceiling



Existing building B drop ceiling in hallway.



Ceiling access panel



Viewpoint up mansard. Missing soffit vent allows insects and pests to enter attic space.

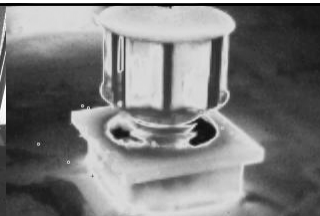
Air Leakage



Photo taken from inside roof cavity of a roof drain. Super stated two of the drains leak within the building.



Inoperable mechanical fan.



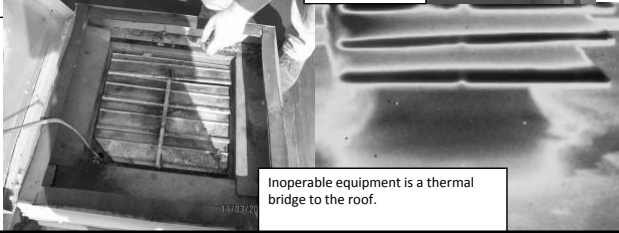
Inoperable mechanical system that is a thermal bridge to the roof.



Inoperable vents

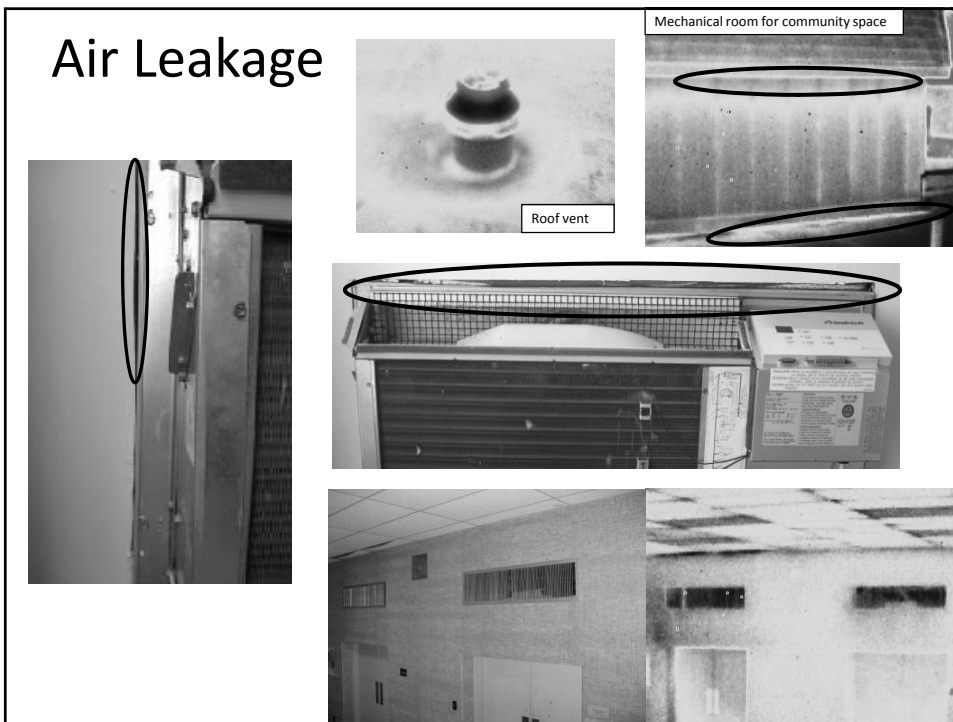


Inoperable supply air unthandler.



Inoperable equipment is a thermal bridge to the roof.

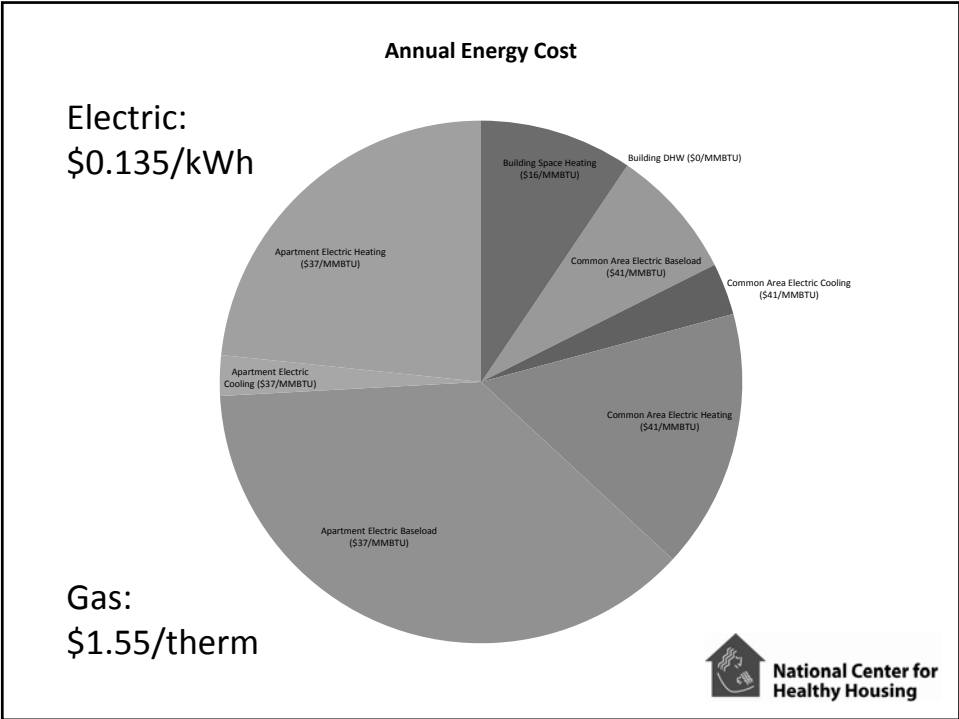
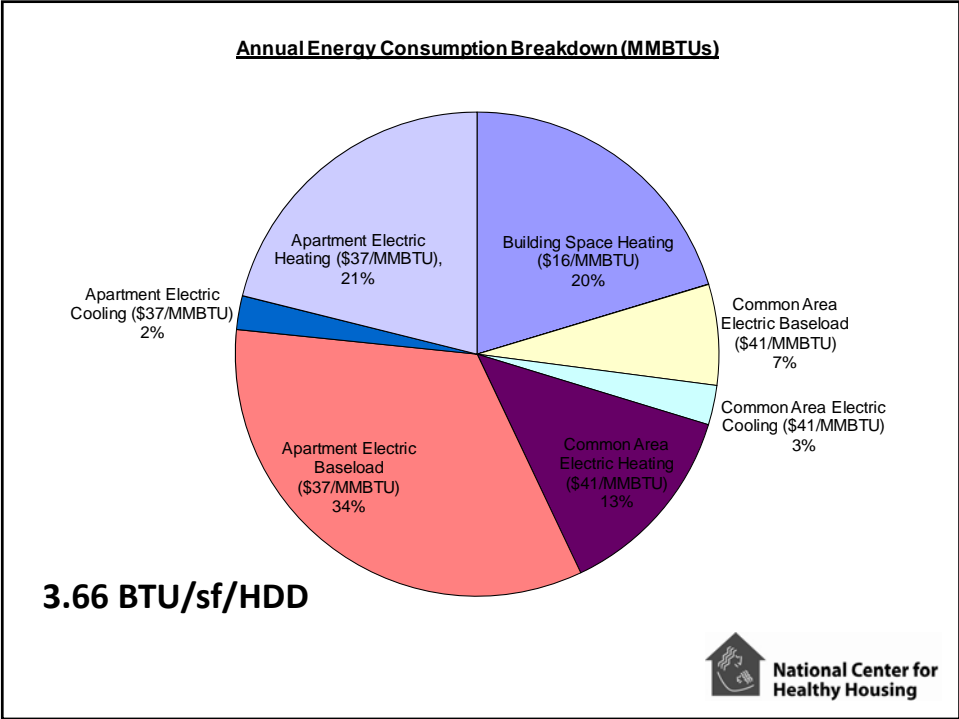
Air Leakage

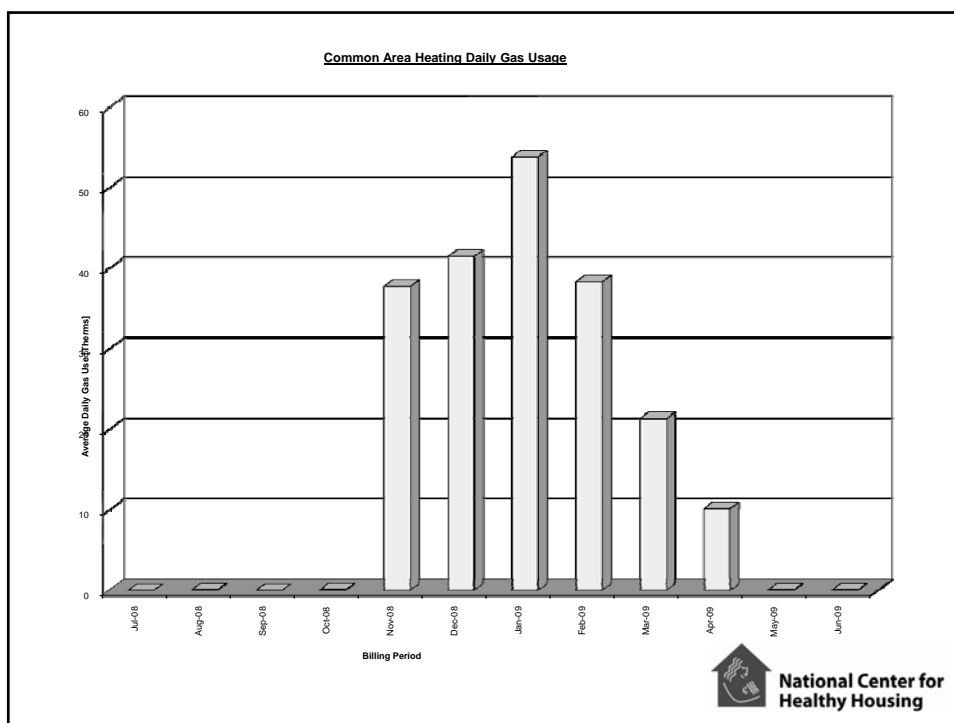
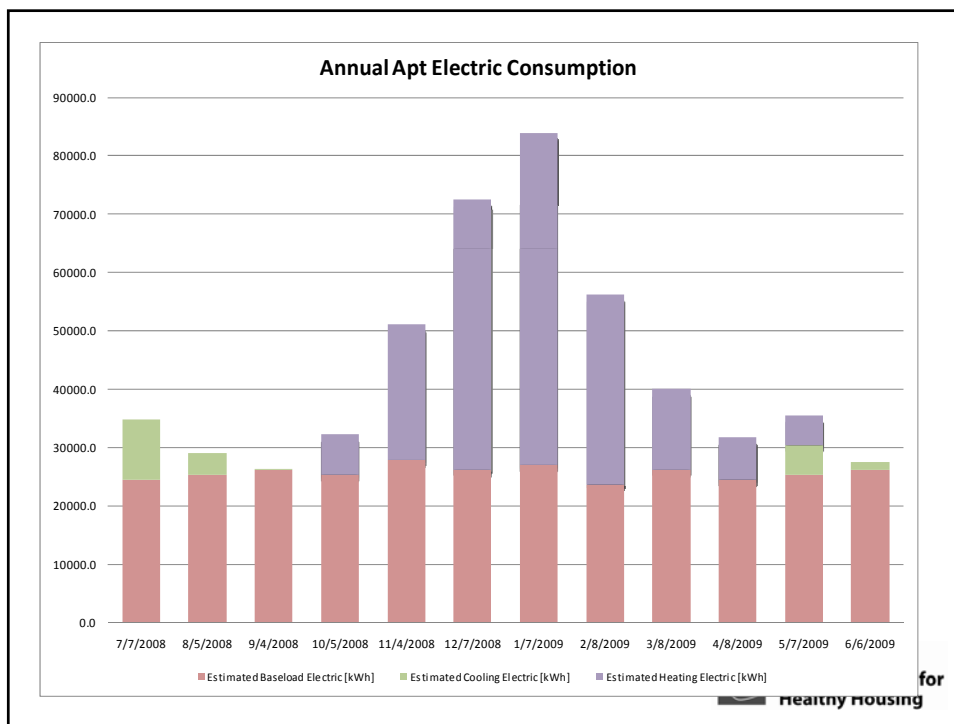


Lighting & Appliances



- All lights were T12 or incandescent
 - The building manager had taken out bulbs of every other fixture in the hallways
- Appliances were mostly original (1987)





What can we do in a building that runs at 3.66 BTU/sf/HDD but has serious infiltration issues and high tenant bills?



What's the low hanging fruit for the tenants?




What's the low hanging fruit for the owner?




HEALTH & SAFETY MEASURES	EST. COST
Moisture Issues Verify perimeter drainage system operation, slope ground away from building & fix gutters. Repair connection between the drain on the roof and the roof membrane. Install vapor barrier over floor in crawlspace. Close off grille between stairwell & crawlspace. Note: moisture levels must be reduced before building air sealing work can begin.	\$44,389
Apartment Exhaust Venting: Option 1 Upgrade bathroom vents in Building B and C to exhaust to the outside using current controls.	\$10,000
Apartment Exhaust Venting: Option 2 Upgrade bathroom vents in Building B and C to continuously exhaust to the outside.	\$16,000
Cleaning and Sealing Clean grilles and ducts for laundry, bathroom and kitchen vents. Seal all exhaust ductwork that is accessible. Clean fan coils and filters in PTACs.	\$20,000
Other Install new soffit vent	\$60
Educate Tenants: Maintain DHW settings at 120F Temperature setting of 120F is low enough to reduce the risk of scalding but high enough to prevent bacteria called Legionella from growing in the DHW tank.	N/A
Install CO Detectors Install 2 CO detectors near the boiler room.	\$130



Energy Recommendation Measures (SIR >1.0)	MMBtu	kWh	Est. Cost	Est. Annual Savings	Measure Life	Life Cycle Savings (2009 \$)	Simple Payback (Years)	Savings-To-Investment Ratio	Savings Benefit
Low Flow Devices Install Low Flow Device on faucets and shower heads	0	32,926	\$2,550	\$4,939	7	28,221	0.52	12.1	Tenant
Apartment Lighting Apartment Bulk CFL Bulb Purchase (approx. 8 bulbs per unit)	-19	16,637	\$2,125	\$2,183	10	16,496	0.97	8.8	Tenant
Energy Star Clothes Washers Install(4) front loading units WF ≤6.0 MEF≥2.0	0	4,136	\$4,000	\$579	14	2,540	6.9	1.6	Tenant
Common Area Lighting (Option 1) Remove T12 lamps in stairwell, hallways, offices and common area. Install T8 lamp and electronic ballast. Replace incandescent bulbs with screw-in CFLs. Replace 25watt bulb with LED in exit sign. Replace hallway timer with photocell sensor.	-35	34,526	\$48,000	\$4,852	15	9,099	10	1.2	Owner
Exterior Lighting Upgrade Replace metal halide lamps in parking lot with high pressure sodium lamps.		2,629	\$3,000	\$394	10	\$362	7.61	1.1	Owner
Airsealing	41	17,399	\$60,000	\$5,180	15	1,839	11.58	1.0	Both
Apartment PTAC Replacement	0	99,382	\$165,000	\$13,913	15	1,098	12.2	1.0	Tenant
Combined Package	-13	207,636	\$284,675	\$32,040		\$59,654	9	1.2	


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Energy Measures, Not Recommended (SIR <1.0)	Est. Cost	Est. Annual Savings	Measure Life	Life Cycle Savings (2009 \$)	Simple Payback (Years)	Savings-To-Investment Ratio	Savings Benefit
Common Area Lighting (Option 2) Remove T12 lamps. Install bi-level T8 lamps and electronic ballast with sensor (occupancy or photocell where skylights are present). Replace incandescent bulbs with screw in compact fluorescent bulbs.	\$68,000	\$5,244	15	-5,397	13	0.92	Owner
Skylights Replace two skylights, install new flashing	\$5,000	\$275	20	-909	18.2	0.82	Owner
Roof Insulation Additional cellulose insulation in building B and C	\$25,592	\$978	25	-8,562	26.2	0.67	Owner
Thermostatic Control Install thermostat on hallway baseboard	\$8,500	\$500	10	-4,235	17	0.5	Owner
Energy Star Refrigerators Install (64) Energy Star refrigerators	\$38,400	\$1,507	15	-20,410	25.5	0.47	Tenant
Upgrade Boiler Install two sealed combustion boilers (includes modulating burner, outdoor reset, time clock, repair controls)	\$65,000	\$1,646	20	-40,512	39.5	0.38	Owner
Energy Star Window Replacements Replace compromised windows with new units with U-value <0.35 (approx 5)	\$5,000	\$82	25	-3,572	61	0.29	Owner
ERV Install energy recovery ventilation system to precondition the outdoor air delivered to hallway ceiling heating units. (If option 2 for ventilation)	\$6,000	\$100	15	-4,806	60	0.2	Owner
Remove inoperable mechanical equipment. Patch roof membrane.	\$26,000	N/A	N/A	N/A	N/A	N/A	Owner


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