

Multifamily Gut Rehab: Energy Efficient Strategies

- *Illinois Energy Efficient Affordable Housing Construction Program*
 - *Maureen Davlin, Program Manager*
- Energy Efficiency
 - Insulation
 - Air Sealing
 - Ventilation
 - Heating/Domestic Hot Water



Illinois Energy Efficient Affordable Housing Construction Program

- Initiated in 1988
- 98 buildings (1,975 units) completed
- 78 non-profits have participated
- \$2,500 grant/unit
- Rehab costs around \$75/sqft



Multifamily Rehab

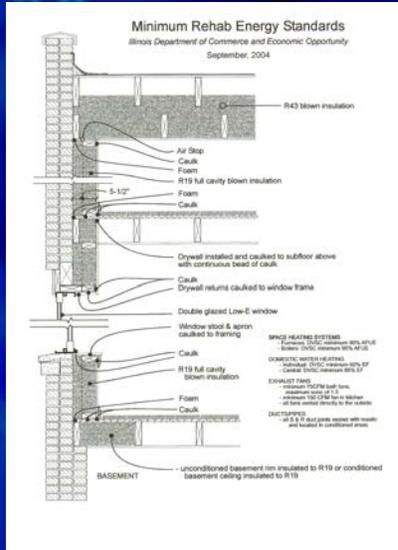
- 1,000 ft² average unit size
- \$400 average annual heating bill (@ \$.88/therm)
- \$1,022 without energy work
- 4 year payback



Energy Efficient Measures

- Insulation
- Air Sealing
- Ventilation
- Heating/Domestic Hot Water





www.illinoisenergy.org

Insulation

- Insulating value of a 12" brick wall is around 2.40.
- Batt insulation may be difficult to install properly on the walls



Batt Insulation



Spray Cellulose



Spray Cellulose

- Recycled newspaper
- R-value of about 3.75/in
- High density
- Treated with fire retardant



Spray Rock Wool



Wall Insulation

- Wall cavities completely filled with insulation
- Added R-value of 17.00



Spray Foam Insulation

- Spray foam injected behind plaster & lath
- Adds about an R4 to the wall
- Pulley wells are also filled



Spray Foam Insulation



Roof Cavity Insulation

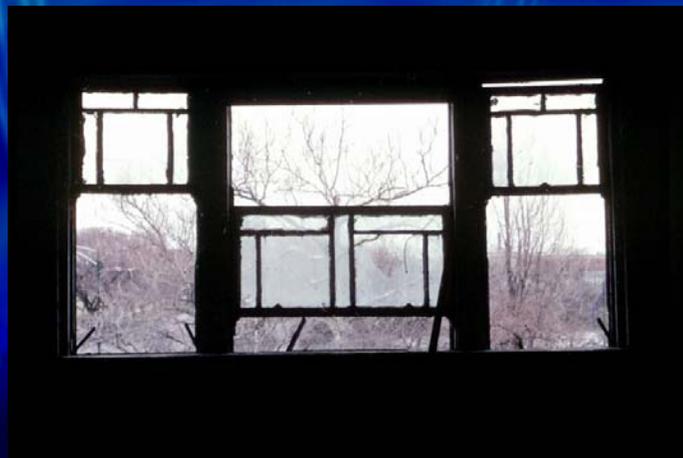


Roof Cavity Insulation



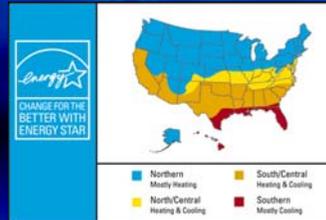
- Goal is to achieve R43 insulation

Windows



Windows

- Double glazed windows with a low-E coating



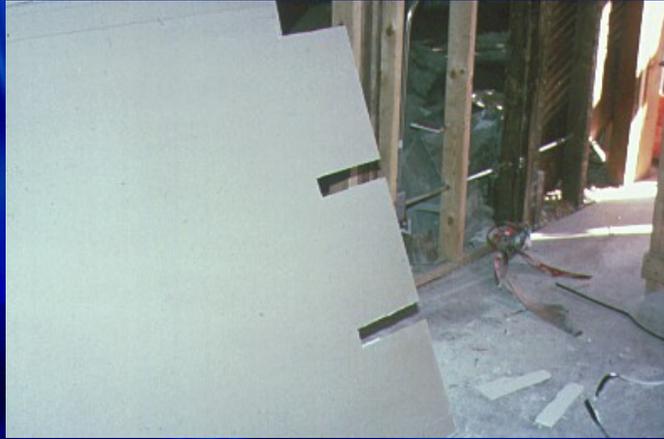
ENERGY STAR Qualification Criteria				
Climate Zone	Windows and Doors		Skylights	
	U-Factor ¹	SHGC ²	U-Factor (2001 NFRC rated at 20 degrees) ³	U-Factor (RES97 rated at 90 degrees) ⁴
Northern	0.35 or less	Any	0.60 or less	0.45 or less
North/Central	0.40 or less	0.55 or less	0.60 or less	0.45 or less
South/Central	0.40 or less	0.40 or less	0.60 or less	0.45 or less
Southern	0.65 or less	0.40 or less	0.75 or less	0.75 or less

Air Sealing

Effective Air Barrier?



Air Tight Drywall Approach



Air Tight Drywall Approach



Air Tight Drywall Approach



- Drywall sealed to framing members with caulk or foam

Air Tight Drywall Approach



- Drywall sealed to subfloor

Seal all holes in exterior drywall



- Drywall returns caulked to window frames

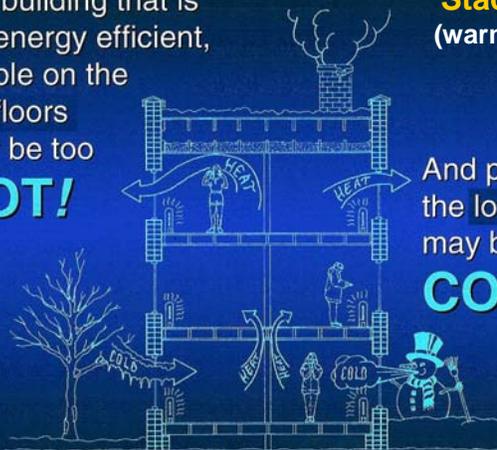
In a building that is not energy efficient, people on the top floors may be too

HOT!

Stack Effect
(warm air rises)

And people on the lower floors may be too

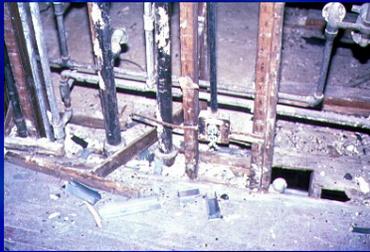
COLD!



Stack Effect



Plumbing Walls



- Plumbing walls sealed at each floor

Attic Bypasses

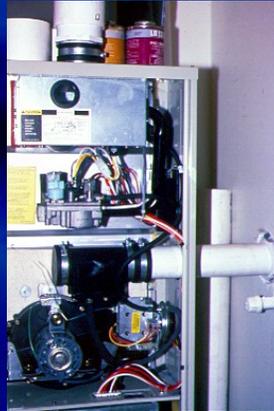
- Seal all openings in top floor ceiling



Heating/Water Heating



Direct Vent Sealed Combustion



- 90% furnaces

Direct vent sealed combustion



- Water heaters

Central Heating Systems



Weil-McLain GV4
Boilers
105,000 Btuh



A.O. Smith Cyclone
Water Heaters
125,000 Btuh (60 gallons)

Blower Door Testing





The blower door test can be a “hair raising” experience



Ventilation



- Both bathrooms meet code

Bathroom Exhaust Fans

- Minimum 75 CFM at 0.25" wc
- Vented to the outside
- Low sone (1.5 or less)



Kitchen Exhaust Fans



- 150 CFM vented to the outside (no recirculating fans)

847 W. Sunnyside (12 units) 4130 N. Kenmore (14 units)

- Buildings completed, August 1992
- R11 batts w/ metal framing
- Airtight Drywall Approach
- DVSC Furnaces, 90% AFUE
- Central domestic water heater (standard efficiency)
- Double-glazed low-E windows



	<u>Initial</u>	<u>2004-05</u>	<u>%</u>
847 Sunnyside:	\$243	\$279	+ 15%
4130 N. Kenmore:	\$264	\$277	+5%

963 W. Cullerton (25 units)

- Completed October, 1997
- Wet spray cellulose in sidewalls
- High efficiency boiler
Lochinvar, 87%
- Airtight Drywall Approach
- Double glazed low-E windows



	<u>Initial</u>	<u>2004-05</u>	<u>%</u>
963 W. Cullerton:	\$231	\$212	-8%

**If housing is to be truly affordable,
it has to be energy efficient.**

