

Building Energy Code Enforcement - The Next Big Challenge -



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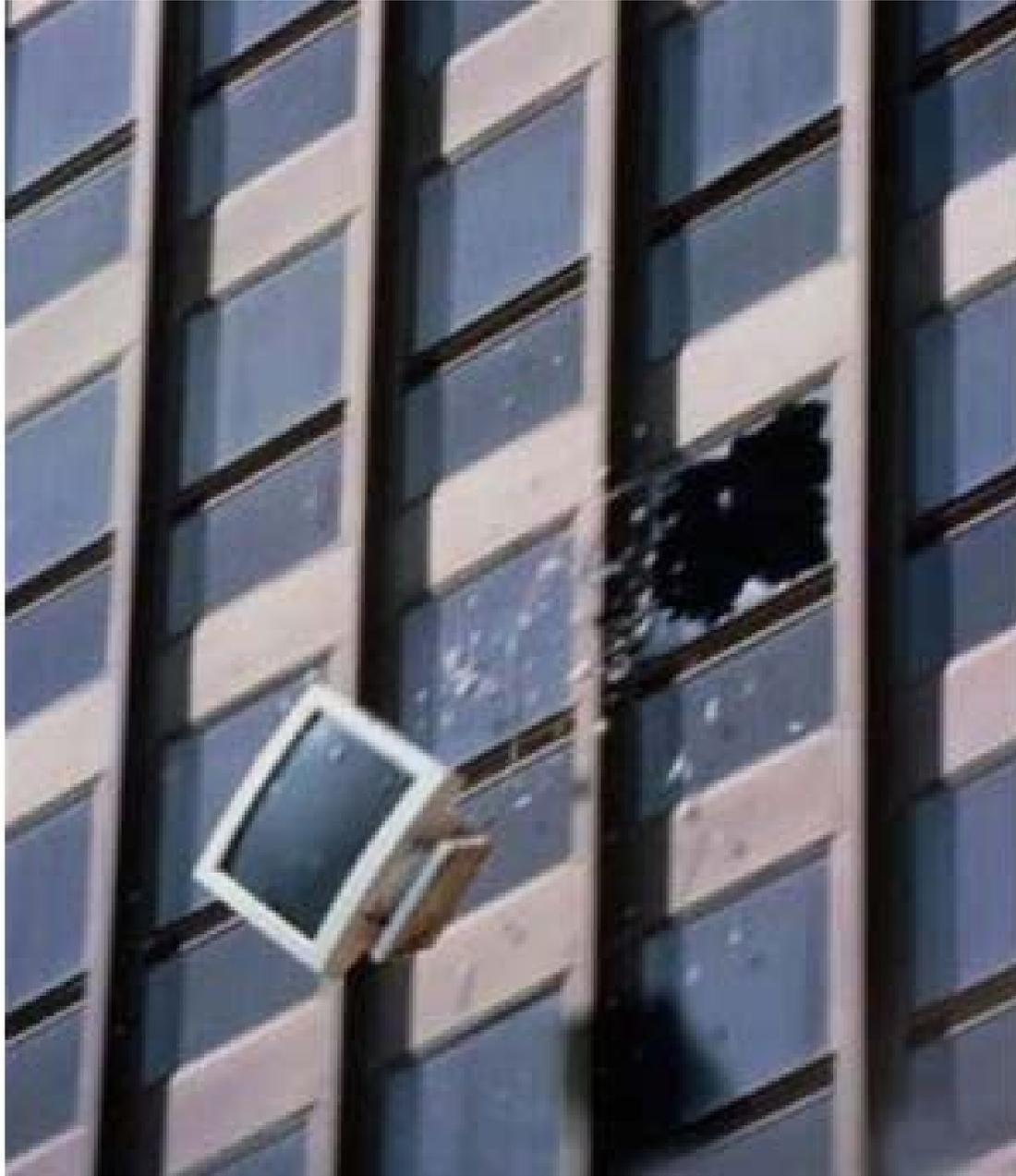
⌘ **Web Site:**

⌘ **commerce.wi.gov/SB/**





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Why is Energy Conservation Enforcement Frequency Low?



⌘ Energy is not viewed like a life/safety issue, unlike:

- ☑ Building Height & Area
- ☑ Fire rated construction
- ☑ General Bldg Construction
- ☑ Egress into & out of the building

Why is Energy Conservation Enforcement Frequency Low?



⌘ Energy is not viewed like a life/safety issue, unlike (continued):

- ☑ Accessibility
- ☑ Fire suppression & alarm systems
- ☑ Heating equipment, proper sizing, duct penetrations
- ☑ Gas line installations

Why is Energy Conservation Enforcement Frequency Low?

⌘ Which do you feel the local media would be more likely to write about?

- ☑ Not enough exits discovered AFTER fire
- ☑ No accessible handicapped seating in a new arena
- ☑ Undersized footings & foundations create tilted building
- ☑ Fire rated assemblies incorrectly installed
- ☑ Required sprinkler system not installed

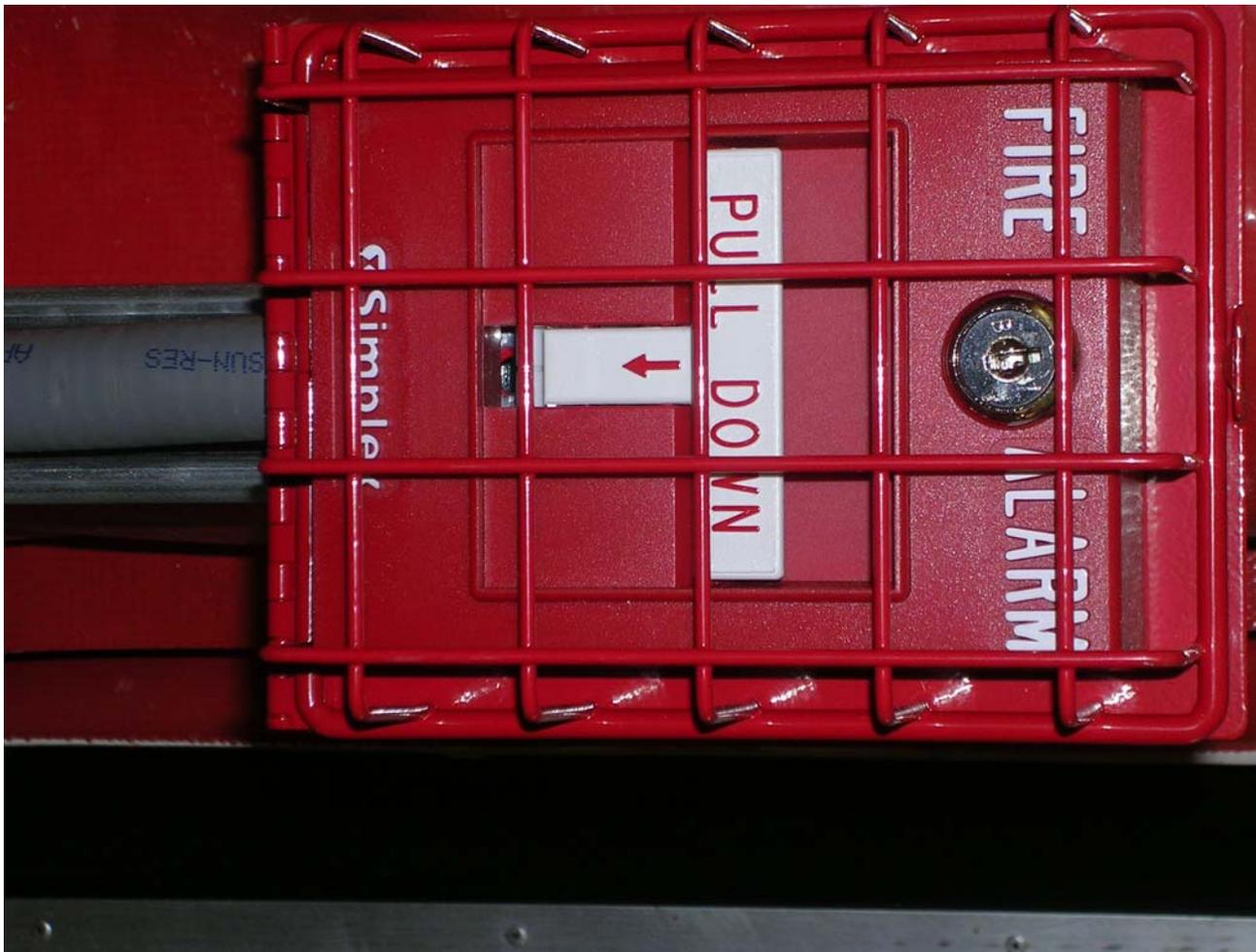
Why is Energy Conservation Enforcement Frequency Low?



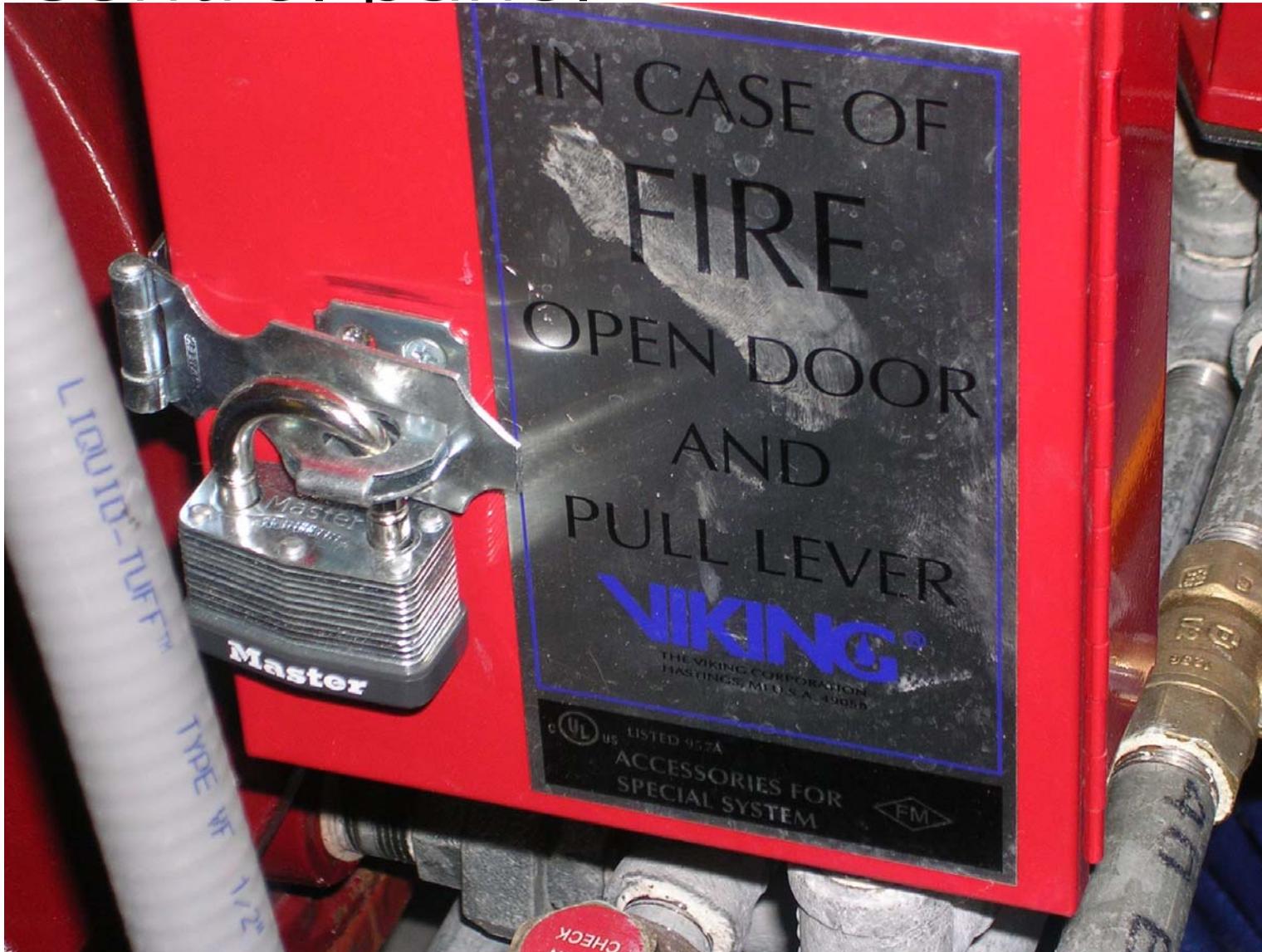
⌘ Which do you feel the local media would be more likely to write about?

- ☑ Visible/audible alarm system not operating
- ☑ Water pipe freezes & breaks due to undersized HVAC equipment, floods basement
- ☑ Natural gas leak forces building evacuation, building later explodes

Alarm not readily accessible



Inaccessible Fire Dept. control panel





LET'S PLAY A GAME--WHERE'S THE ROOF TOP UNIT ?

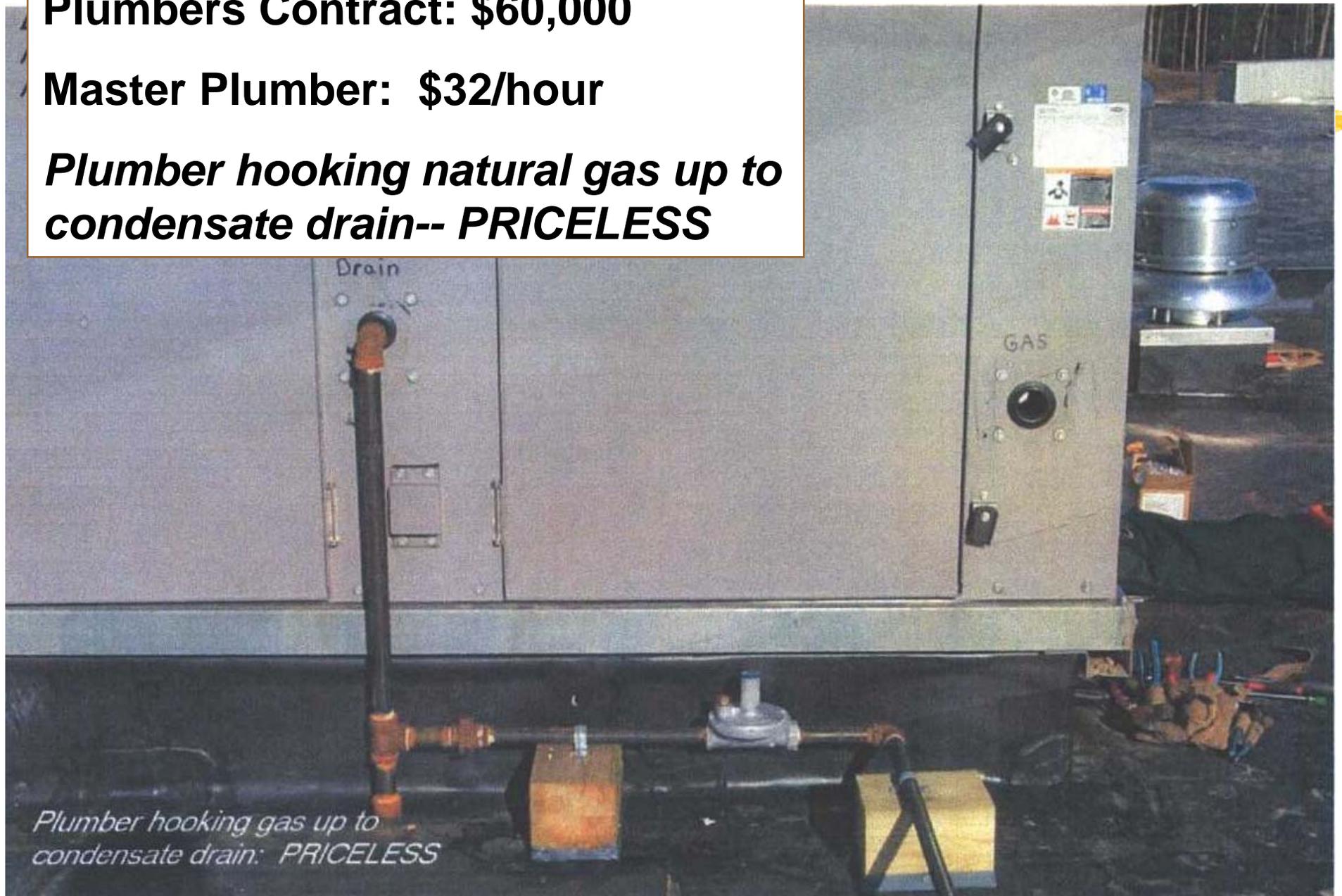
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Employee Break Room: \$2 Million

Plumbers Contract: \$60,000

Master Plumber: \$32/hour

***Plumber hooking natural gas up to
condensate drain-- PRICELESS***

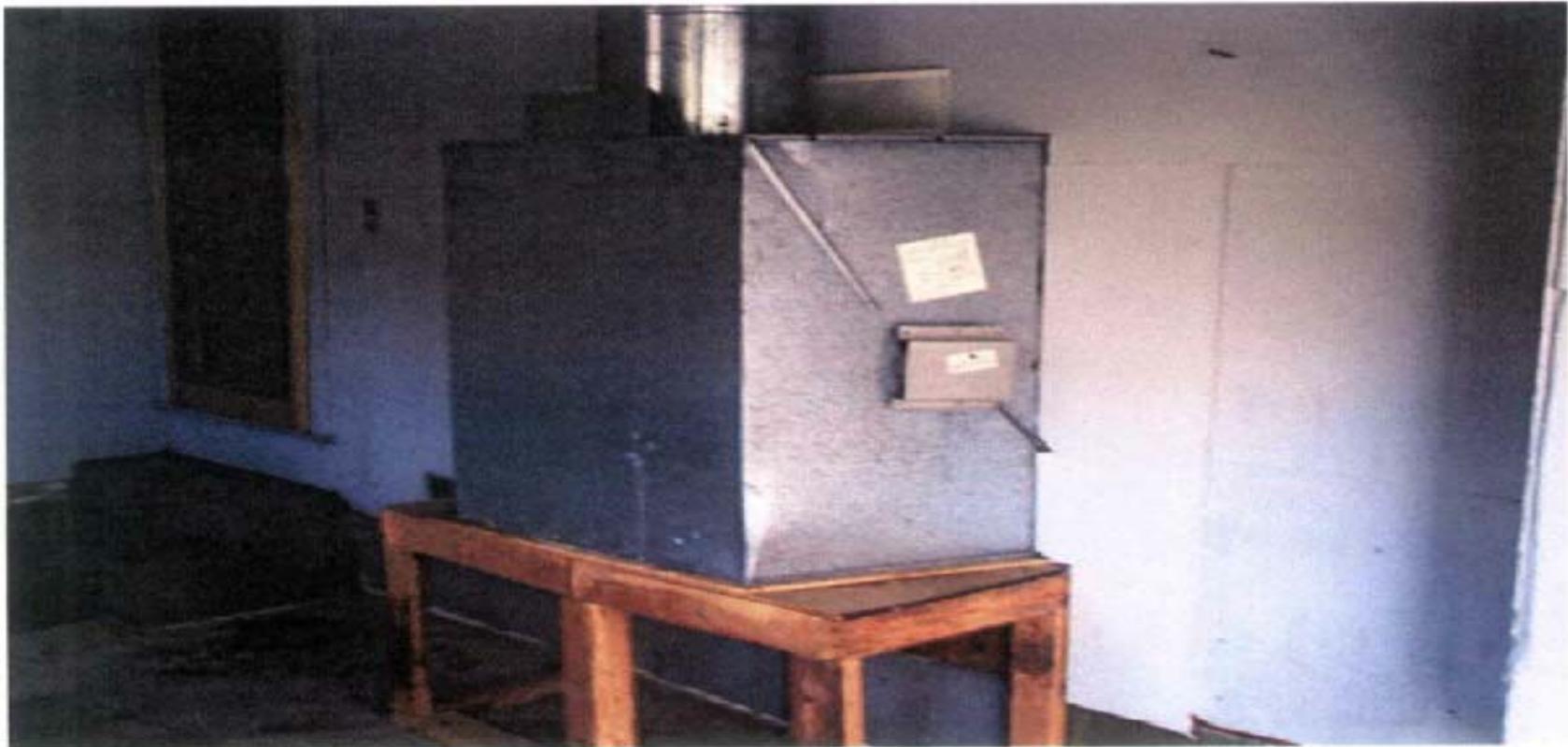


*Plumber hooking gas up to
condensate drain: PRICELESS*

Do you see any problem(s) with these 1A flammable liquid containers with no lids with some liquid still in them & an atmospheric combustion furnace?



Wood burner must meet clearance to combustibles requirements & be labeled for use in a garage....



Boiler in hospital mechanical room with PVC intake; and collapsed "B" vent Note difference in "B" vent size!!!!

Manufacturer stated double walled vent "cavitated"

Boiler was AGA listed for 500,000 btu/hr output; power exhaust vent sized for 750,000 btu/hr.

Picture by Terrence Waldbillig, Boiler inspector 5/5/04





The grease hood location relative to the electrical metering equipment, openable windows, and most importantly, open stairs which can readily accumulate exhausted grease.



Note the close locations of the air intake relative to the exhaust and condensing units. Also note location of exhaust fan relative to openable door and window.



Per the Vent Product Listing?

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Why is Energy Conservation Low on the List of Enforcement Actions?

⌘ Which do you feel the local media would be more likely to write about(or probably not)?

- ☑ Not enough roof insulation found in building addition
- ☑ Too much lighting installed after lighting fixture change-out occurs in tenant space
- ☑ Inefficient equipment chosen for installation in new building
- ☑ Pool missing pool cover

Why is Energy Conservation Low on the List of Enforcement Actions?



⌘ Fact: There is limited:

- ☒ **Funding** for plan review & building inspection, and the training required
- ☒ **Time** to fulfill needs of the plan review & building inspection, and the training required
- ☒ **Staffing** for the review and inspection of each building, and the training required
- ☒ **Consumer Appreciation**—but this may be changing

Why is Energy Conservation Low on the List of Enforcement Actions?



⌘ Energy conservation is not given a high priority:

☑ When all the other issues associated with buildings are listed

☑ Due to its fit based on life/safety/welfare

What can be done to Prioritize Energy Issues?



- ⌘ Stress financial savings of energy efficient buildings, ie. return on investment at the design & building owner level
 - ☑ Create interactive on-line computer program providing insight on building operation costs based on type of fuel expected to be used & costs based on proposed building location
 - ☑ You may want to review: <http://hes.lbl.gov/>
Perhaps need to create public awareness of this and other energy programs availability

What can be done to Prioritize Energy Issues?



- ⌘ Educate owners, designers inspectors & installers on priority of energy conservation through efficiency programs, and rebate/grants/funding
 - ☑ Provide examples & comparisons, and make them readily available to the public for review
 - ☑ Reference new technology & justify its use (There are many institutional friendships--- such relationships don't drive advancement in technology—yet another hurdle)

What can be done to Prioritize Energy Issues?



- ⌘ Designers/builders/inspectors continue to have confusion about energy fundamentals-- this leads to poor compliance
 - ☑ Example: Confusion about interior vapor retarders versus exterior moisture membranes
- ⌘ Provide training & education so as to clarify misunderstandings

What can be done to Prioritize Energy Issues?



⌘ Create hands-on, on-site, training

- ☑ Work with building owners, contractors & local inspectors to recognize standard, as well unusual, buildings in one community
- ☑ Use these buildings in a 1 day field training session to show those in attendance the proper ways to install various energy items
- ☑ Also explain how NOT to install various items, & provide the reasoning on why. Install fixable items incorrectly to drive home point

What can be done to Prioritize Energy Issues?

- ⌘ Create staging for new bldgs, bldg alterations & additions for checks and balances:
 - ☑ Discuss needs, options, priorities between owner, designer, & authority having jurisdiction
 - ☑ Design the building, contacting authority having jurisdiction (AHJ) as needed as questions arise
 - ☑ Review/approve of bldg plan by AHJ
 - ☑ Inspect building (as needed) by AHJ
 - ☑ Issue occupancy permit after receiving compliance certificate from designer & final inspection

What can be done to Prioritize Energy Issues?



⌘ For 1 & 2 Family Dwellings in Wisconsin:

☑ Required inspections include erosion, footing & foundation, construction/framing, electrical, plumbing, HVAC, basement drains, **insulation inspection**, & final inspection prior to the issuance of an occupancy permit

What can be done to Prioritize Energy Issues?



⌘ For Commercial Buildings in Wisconsin

☑ Has one (1) required field inspection

☒ Why?

- Funding
- Time
- Staffing
- Consumer Appreciation

☑ Energy is under greater scrutiny & change may soon be coming...



⌘ Now for the Good, the Bad and
just plain UGLY,

..... and then some thoughts on
what we might choose to do to
be even better than we are.....



Here is an acceptable installation of a vapor retarder on a wood framed wall.

This Attic Has Been Insulated To



R-

By A Professional Insulation Contractor

The insulation in this attic was installed by a qualified professional Contractor to the R-value stated above



Certificate of Insulation

BUILDING ADDRESS:

CONTRACTOR:

Installation Date: _____

License #: _____

Area Insulated	R-Value	Installed Thickness	Settled Thickness	Installed Density	No. Bags	Sq. Ft.
Attic						
Walls						
Floors						

I, _____, (print name) certify that this



A certificate of insulation such as this provides the inspector and others detailed information on insulation products and materials installed on-site.



The contractor said he was “done”, but there is no protection from the sun and the protection doesn't extend a minimum of 6” below grade



Insulation protection & extension

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Example of Poorly Installed / Non-Code Compliant Insulation



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12" on center stud cavities "stuffed" with 14-1/2" wide fiberglass batt insulation



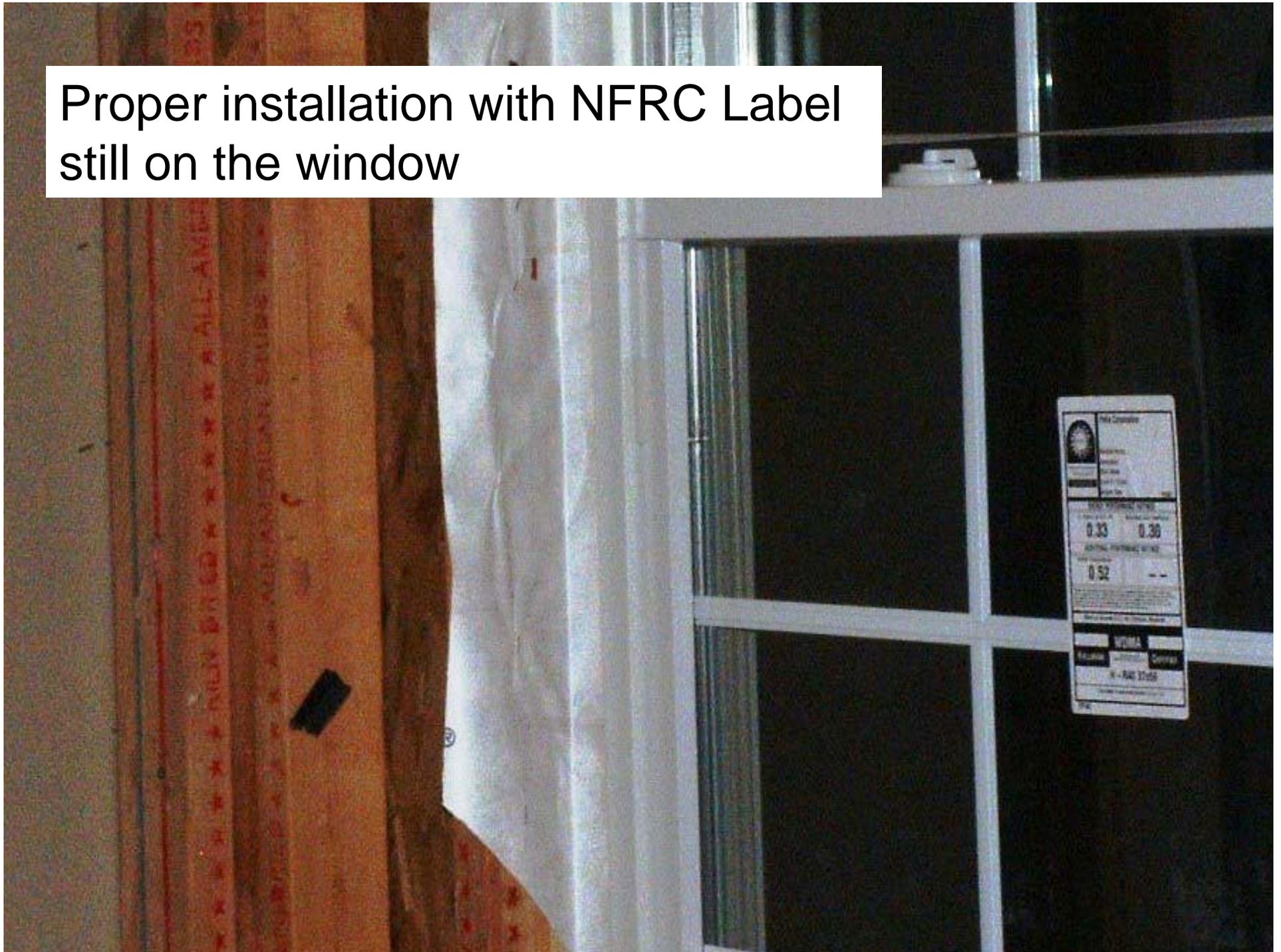
Single pane windows, no insulation in the roof or wall (wood only), & no insulation in the basement.....

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Knowing when & where insulation is required can sometimes be a battle with installers

Proper installation with NFRC Label still on the window





Flexible duct located in the attic not acceptably installed





**6" diam flex
duct on 2 x 4
wall with 5" R-
13 insulation
behind the duct**

Upon closer inspection....



Note the minimum “clearance” from the insulation....



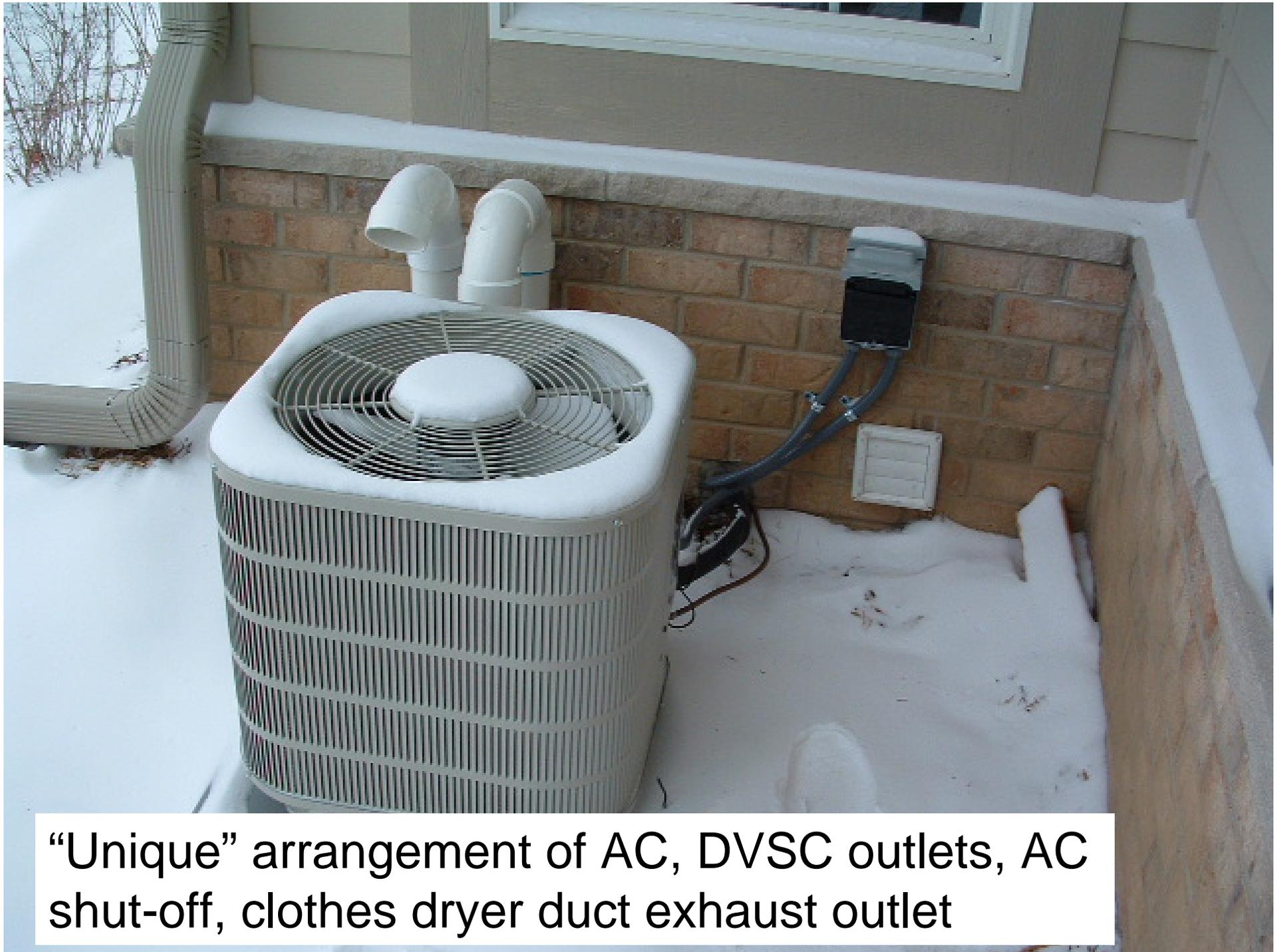


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- ⌘ **Large House in a Country Setting -- \$1,000,000;**
- ⌘ **3 Sports Cars -- \$150,000;**
- ⌘ **Forgetting to shut your water off prior to leaving Wisconsin for the winter -- Priceless**

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“Unique” arrangement of AC, DVSC outlets, AC shut-off, clothes dryer duct exhaust outlet



Foam insulation blown into a box sill

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Structurally, do you believe this roof can hold the load?



Space can be can an issue, but good judgment must prevail



But then again maybe not....



Duct sealing, volume dampers,
register location...



**Typical Excess Ells
Inhibits air flow**



This was a plumbing vent that was “integrated” with a bathroom exhaust fan duct



There are times that you simply do not have enough space....



As they say, location, location location.....

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Wood burning boiler as located near a lot line, a LP tank, and an electrical pole



This wood/oil burning heating will come in handy, but appears a bit close to the wood pile. By the way is that unit listed?.....



A clothes dryer exhaust outlet located within the building soffits. Hot air rises. So where do you think the warm moist air from the clothes dryer is going to go? It's acceptable but.....

Do you see an “Air Quality” problem?



Service clearance problem??? Nice “custom” economizer hood field cut so it could be installed next to the nearby appliance. The code is meant to save energy, not roof space????





Low voltage lighting and other power systems are indeed the way to go...

Innovation and Awareness of our Surroundings



- ⌘ Improve existing buildings to make them not only more energy efficient but more usable using socially acceptable methods
- ⌘ Rooftops are vastly underutilized spaces in the urban environment, yet it is possible for any landscape, plaza, or garden to be installed on a building or structure

Chicago City Hall (Before 2001)



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Chicago City Hall (After 2001)



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Innovation and Awareness of our Surroundings



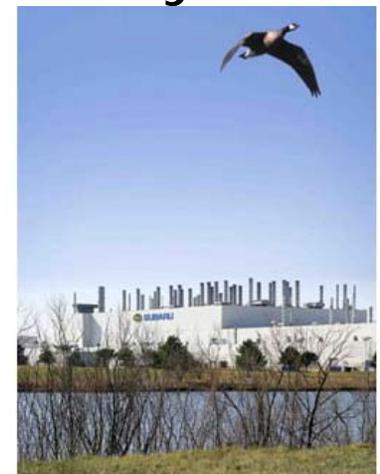
- ⌘ The building's flat roof is over 100 years old
- ⌘ Results from monitoring the cooling effects during the garden's first summer showed a roof surface temperature reduction of 70°F & an air temperature reduction of 15°F resulting in significant energy savings, and an improved working environment

Innovation and Awareness of our Surroundings

⌘ Subaru of Indiana Automotive (SIA) and its efforts of Corporate Social Responsibility

- ☑ Unique and extensive efforts in reducing, reusing, & recycling, in ways not taken by any other auto manufacturer
- ☑ Now looking at solar & wind power

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Personal Thoughts Collected on Ways to Improve Building Efficiencies



- ⌘ Mandate that all outside air intakes have motorized outside air dampers, except for those buildings in Zones 1 & 2
- ⌘ Require boilers $< 500,000$ Btuh to be DVSC
- ⌘ Require all residential furnaces, and general use unit heaters $\leq 120,000$ Btuh to be DVSC
- ⌘ Require lower economizer thresholds for those areas/zones of the country that have climate appropriate for economizer use

Require the use of Air Turn-Over Units in factory buildings with excess process heat with ceilings > 30 ft & >10,000 sf of space



Personal Thoughts Collected on Ways to Improve Building Efficiencies



- ⌘ Create more restrictive requirements on when an energy recovery ventilation system is required to be installed (Easier to justify w/higher energy prices)
- ⌘ Mandate the need for full floor insulation of minimum R-value under hydronic systems for those zones w/viable paybacks



Personal Thoughts Collected on Ways to Improve Building Efficiencies



- ⌘ Require a min. of 95% of luminaires taking 4 ft lamps to use low ballast factor High Performance T8 systems
- ⌘ Require multi-scene/parallel system lockout controls
- ⌘ Residential—Require efficient lighting in kitchens, bathrooms, laundries, corridors, garages. Set minimum efficacy requirements (see CA requirements)

Personal Thoughts Collected on Ways to Improve Building Efficiencies



⌘ Require daylighting controls

- ☑ Step dimming or continuous dimming in areas of occupation
- ☑ On/off photocell controls in corridors, atriums, lobbies, stairwells or other places where the public does not have access to controls (areas requiring emergency lighting to meet appropriate requirements)

Personal Thoughts Collected on Ways to Improve Building Efficiencies

- ⌘ Emergency lighting to have either an integral transfer switch or circuit based transfer switch to allow for automatic shutoff of luminaires when not required by code, building safety or security. The use of night lights on 24/7 operation to be minimized & used only when justified

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Personal Thoughts Collected on Ways to Improve Building Efficiencies



- ⌘ Require Pulse Start HID lighting for all exterior fixtures within a wattage range (i.e. ≤ 500 W)
- ⌘ Require a minimum efficacy for certain lamp types
- ⌘ Require a minimum of 95% of down lights to utilize compact fluorescent sources with a minimum efficacy of 75 lumens per watt

Personal Thoughts Collected on Ways to Improve Building Efficiencies

- ⌘ The wattage for track & busway line voltage lighting to be the volt-ampere rating of the branch circuit feeding the luminaires, or an integral current limiter controlling the luminaires, or the higher of the minimum relamping rated wattage of the all luminaires included in the system, or 30 W/linear ft.



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Personal Thoughts Collected on Ways to Improve Building Efficiencies



⌘ Require all motors installed within building systems to be “energy efficient”

Examples:

☑ Ceiling Fans

☑ General Exhaust Fans (stove, bath room, etc)

☑ Roof/Attic Fans

☑ Booster Fans

It's how you look at things: Some say this is part 710...



....Others would say this is just an upside down oil cap