BEYOND SMART CITIES

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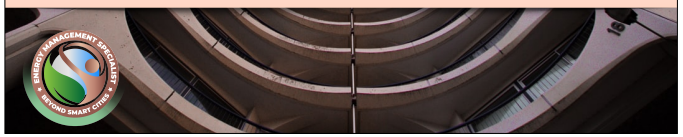

BEYOND SMART CITIES

SOURCES OF BUILDING HEAT GAIN/LOSS

FOR ENERGY PROFESSIONALS

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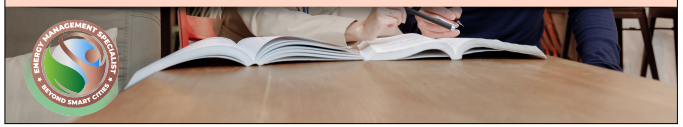
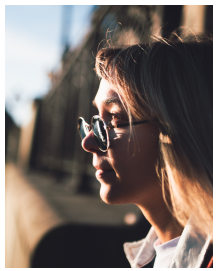
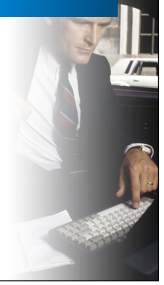


WHAT SHOULD YOU LEARN



Sources of Building Heat Gain/ Loss



SOURCES OF HEAT GAIN AND LOSS

Heat gain can drastically undermine your cooling efforts, particularly in our warm Doha, Qatar climate with its abundant sunshine. Going room b y room in your house, you can find ways to prevent heat gain and boost your cooling, thereby increasing efficiency and lowering bills.

Heat gain, also known as thermal or solar gain, occurs in several ways:

- ☑ Conduction, when heat travels through walls and ceilings.
- ☑ Radiation, when sunlight penetrates windows and skylights.
- ☑ Infiltration, where warm air and moisture penetrate through cracks in walls.
- ☑ Indoor heat, generated by people and appliances.

Here are some prime spots in your home to concentrate on when preventing heat intrusion.

SOURCES OF HEAT GAIN AND LOSS

Windows :

Forty-eight percent of thermal gain comes through windows. To prevent radiation intrusion, block sunlight by planting trees and installing awnings and screens. Inside the home, add shutters, blinds and curtains, or add tinted film.

Walls and Doors :

About 19 percent of thermal gain intrudes through windows, doors and ceilings. Painting outside walls a light colour can cut down on conductive thermal gain. Insulation in walls prevents infiltration from warm air or moisture. R-19 is appropriate for exterior walls, and at least R-30 is recommended for ceilings.

SOURCES OF HEAT GAIN AND LOSS +

Interior Sources :

People and appliances account for about 14 percent of thermal gain. Avoid using the worst heat or moisture generators such as washers, dryers and dishwashers during the hottest part of the day. Avoid cooking when it's hottest.

Weatherizing :

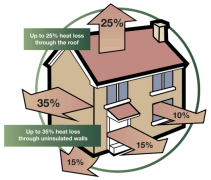
Air and moisture leaks through cracks and gaps generate 13 percent of heat gain through infiltration. Repair weather stripping around windows and exterior doors, sealing cracks and gaps so that air doesn't leak into the home. Use caulk around window frames, as well as penetrations such as cables, vents, electrical boxes and pipes. Install foam gaskets and insulation on switches and outlets. Make sure windows and doors are tightly shut, and that fireplace dampers are closed.

Ceiling :

Six percent of thermal gain occurs through ceilings. Install ventilation in the attic to prevent overheating.

SOURCES OF HEAT GAIN AND LOSS +

Because a house remains roughly the same temperature over the course of a year its heat gains are equal to its heat losses. We can thank the first law of thermodynamics for this.



Heat gains come from heating systems, the sun's warmth and internal gains from things like appliances and body heat. Heat losses occur through convection in the walls, floor, roof, windows and doors or via ventilation in the form of air leakage.

In the image above I've shown the typical shares of heat gains and heat losses for an average European home. The major sources of losses are walls (35%), roof (20%), windows (15%), ventilation (15%), floor (10%) and doors (5%).

SOURCES OF HEAT GAIN AND LOSS +

When you see figures like this it is important to remember they are only generalisations. If you live in an mid story apartment with neighbours above, below and to your sides, your floor and roof heat loss will be non-existent. Windows, external walls and ventilation will instead dominate heat loss.

Reducing heat loss reduces heating needs, and hence bills. This can be done by improving the insulation of your building's envelope, improving air tightness or turning down the thermostat.

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