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Priorities for Energy Efficiency for Home Construction in Florida

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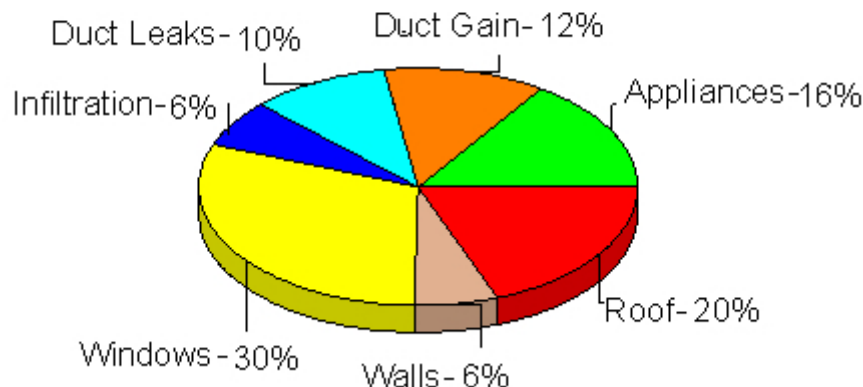
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Below we provide the priorities for obtaining an energy efficient building in Florida. The options are listed in order of importance:

New Buildings

1. North and south window orientation. Avoid the west and northwest walls. If a large window must face west in a plan (nice view, etc.), it is vital that it be shaded. (See #2)
2. Window shading. Provide at least 2 ft. overhang around the perimeter of the building, 3-4 ft. is preferable. Use natural shading provided by porches, awnings, shutters, trees and trellises. A wide porch is preferred on south facing windows. First floor windows on two story buildings need special attention. Unshaded windows should have a maximum SHGC (solar heat gain coefficient) of 0.4 installed. Insulated double-pane solar control glass with non-metal frames are preferred.

Annual Cooling Load Components Tampa FL, 2000 sqft Residence



3. Light colored exterior surfaces (roof and walls). Since a light color is a matter of choice rather than cost, this is one of the easiest measures to use and has a large impact on annual cooling. Roof: best is a white roof of pitched metal galvalum type which will maintain reflectance and reduce space cooling by 20% over shingles.

4. Insulation. R-30 ceiling insulation is adequate in hot climates if the roof is white. If a white roof is not specified then adequate attic ventilation should be provided with at least R-30 ceiling insulation and a truss mounted or deck applied radiant barrier system (RBS). Insulation on walls between conditioned and unconditioned spaces, especially vertical walls

in the attic (knee wall) should be carefully attached. Wall insulation is a low priority; proper shading can be more effective.

5. Low energy use appliances and lighting. Reduce the amount of electricity you are using. Generally, each 3 kWh (kilowatt hours) of energy saved will reduce the need for mechanical cooling by an additional kWh. Pay close attention to items that release heat to the interior, such as refrigerators and televisions. Insist on efficient models (use the Energy Star label to compare). LCD flat screen TV's often use much less energy than plasma models. Provide switches at the surge protector to turn off home computer equipment when not in use. Compact fluorescent lamps (CFL) use less electricity and produce less heat as a by-product. Use CFLs for most fixtures, and particularly for recessed lights, kitchens, and overnight outdoor fixtures.

6. Interior duct system. Bring the ducts and air handlers inside conditioned space. If they must be located in a hot attic or garage, a sealed and tested duct system is essential along with other measures to cool the attic. Maximum tested duct leakage should be 30 CFM/1000 sq. ft. of conditioned floor area at 25 Pa test pressure (using a DuctBlaster), which can reduce heating and cooling by 20%.

7. High SEER AC. Use minimum 15 SEER (Seasonal Energy Efficiency Ratio) with variable speed indoor fan units for new AC units. The AC unit should be sized using the Manual J procedure with 97.5% summer design temperature for the location and a 75°F indoor temperature.

8. Low friction loss duct system. Design duct system for 0.05 IWC/100 ft of equivalent length (duct slide rule input). Low duct friction loss will improve EER by up to 12%.

9. AC blower tested (at return grill). The blower should prove at least 375 CFM per ton of cooling capacity at the time of installation. Fan speed settings should be adjusted to achieve this target.

10. Central AC installed in interior, avoid the attic. Air handlers draw 30-60 CFM of air from their surroundings via leakage from the cabinet.

11. Tile floors. Take advantage of Florida's moderate ground temperatures, which can provide free cooling in three seasons, and can substantially reduce room temperature swings.

12. Solar hot water heating. A modestly sized solar water heating will provide 50-70% of an average household's hot water needs at low cost. Consider systems of 40 sq. ft. or less.

13. Cross ventilation. Cool with outside airflow that crosses through a room or house. Specify fully open-able windows: awning or casing types. Single, double hung and fixed windows less helpful, in the order given. Whole house fans can be useful, but nighttime use may lead to high interior humidity.

14. Ceiling fans. Choose Energy Star if possible. Fans should be operated from a wall switch rather than a pull chain to encourage turning fans off when the room is not in use.

15. Swimming pool pump. Pool pumps can be up to 20% of total electricity use. A very cost effective way to reduce this expense is to use 2" PVC pipe and an oversized cartridge filter, rather than 1.5" pipe. Locate a pump no larger than ½ hp per 10,000 gallons of pool volume. Use a timer to limit pump operation to no more than 5 hours per day in the summer and three hours per day in the winter. Otherwise, consider solar electric pool pumps which are commercially available.

16. Digital programmable thermostat will only save electricity if you use the programmable features. Otherwise, use a digital non-programmable thermostat with battery back-up. Each degree F which the house is cooled below 80°F increases annual cooling by 12%.

17. Energy meter. Consider installing a real-time meter that allows you to see your home's instantaneous energy use (The Energy Detective, The Energy Viewer, or Power-Cost Monitor.)

18. Use an Energy Star builder to obtain 15% savings over standard code.

Greater air tightness is not recommended because of already low natural air change rates in hot climate buildings. Testing in a large sample of Florida homes has shown a natural ventilation rate for sealed home is less than 0.2 ACH (air changes/hr). There should be a physical barrier between conditioned and non-conditioned space. As part of standard building practice seal top plates and connections between floors.

Existing Buildings

1. Light exterior surfaces. Use light colors for walls when repainting and light colored material when re-roofing.. Consider light or white for best performing roofs.

2. Improve attic thermal performance. Without a white roof, consider R-30 to 38 ceiling insulation with a truss mounted radiant barrier and better attic ventilation (soffit and ridge vents).

3. Sealed and tested duct system. Very important.

4. Everything listed for new buildings above (except for 1, 6, 8, 13). Whole house fans may improve cross ventilation. Window films, awnings, and shading devices can be used to improve problem windows. An appropriate window film will have an SHGC (Solar Heat Gain Coefficient) less than 0.45 and a visible light transmittance of at least 50%.

5. When purchasing a home, get an estimate of energy performance using a certified Florida Energy rater.