- Air conditioning

HOW TO

PREP YOUR A/C FOR SUMMER





By *Popular Mechanics* Editors and Contributors

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PHOTOGRAPHY BY THOMAS HENGGE

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With the last two years being the hottest on record, in many parts of the world, an air conditioning system isn't just a luxury; it's a lifesaver. Taking good care of your A/C is therefore essential. Neglecting upkeep could lead to worsened indoor air quality, higher utility bills, and a shortened life span of your unit. Some repairs are best handled by a professional, but there are several maintenance tasks you can manage yourself. Here's how to set up and look after your A/C to ensure efficiency, smooth running, and a cool(er) summer.

CLEAN YOUR FILTER

A typical residential central air conditioner moves something like 350 to 400 cubic feet of air per minute per ton of capacity (and residential air tonnage varies between 1.5 and 5 tons, typically). That air filter is the last line of defense to clean air that's emitted from the appliance. If the filter is dirty, it will cause the appliance to work harder than it should. Any air conditioner in a garage, shop, or industrial work environment will become dirty very quickly. In that case, the appliance or its filter may need weekly attention to keep it clean and working properly.

Most filters are washable, but keep in mind that not all last a lifetime. A/C filters should be cleaned monthly at a minimum—and that's during the cooling season. One exception is a central air conditioner, where you should replace the filter every one to three months.

Most appliances don't require tools to remove the filter—you can clean it yourself in a few steps:

SLIDE IT OUT → This step is very similar for all types of A/Cs.

- The filter from a window unit normally slides out from the side.
- A portable A/C has a slide-out air filter on the back of the appliance. Some of these units may have two filters. Several older models may have a single sheet-metal screw holding the filter's cover in place.
- Most mini-split air conditioners have a tilt-up cover. Slide the filter down and out.
- A central air conditioner has a removable panel concealing the air filter. It's particularly important with central air conditioning systems to place the filter into its chamber with the airflow arrow pointing in the correct direction. Reversing that would lead to dirty air, a quickly degraded filter, and strain on the system.

VACUUM, WASH, AND DRY → Use your vacuum's hose to remove dust and other particles, then rinse using warm water. If you detect a film of greasy dust, gently scrub the filter with a little dish

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detergent before rinsing it clean. It's not a bad idea to vacuum the surfaces behind the filter or wipe dust from the control surfaces. A cleaner air conditioner is a healthier one.

If you clean your air filter frequently, it may just need a light rinse in the kitchen sink.

Never install a wet air filter in an air conditioner, as it will become a breeding ground for mold. Pat the filter dry with a paper towel, then allow the filter to thoroughly air-dry before reinstalling it.

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CHECK YOUR DRAINAGE SYSTEM

All air conditioners pull warm and humid indoor air over a coil of cold tubing. The moisture vapor suspended in the air condenses on the coil. The resulting liquid water, called condensate, drips off the coil into a pan underneath it and drains down a pipe.

A backed-up drain can cause significant damage to your heating, ventilation, and air conditioning (HVAC) system, says Pat Porzio, owner of Dayspring Home Inspections in northern New Jersey. The first thing you want to do is find where the drainpipe ends—it differs for various units. If your A/C is located in the attic, for example, your pipe drains into your gutters. But it can also connect to your sink drain or be located outside your house.

You should never see any liquid coming out of your A/C inside the house. If moisture starts leaking from your unit, you want to do three things:

- For systems that drain by gravity, be sure the condensate is flowing freely to the outside; the drain line (especially the elbow) may be plugged with mold and slime.
- For systems with a condensate pump, make sure the pump hasn't failed—it could lead to water backing up in the system and overflowing the pan.
- Check that the large pan below the cold coil (called the condensate pan) isn't rotted and full of holes, and leaking water into the house. In most cases, replacing the pan isn't something a homeowner should tackle; a leaking pan is almost always better repaired by a licensed HVAC contractor.

The slow and steady drip of moisture is enough to support slime and mold—especially given the lack of sunlight along with the presence of dust, pollen, and warm air. Turn off your unit and clean out the little plastic elbow that leads from the condensate pan. Sometimes it's so plugged with slime that you have to cut it out and replace it. To clean the condensate drain, hook up a shop vacuum to the end of it, cover or cap the vent in the condensate drain (if there is one), and run the shop vacuum for a few seconds to pull any dried or wet slime out of the line. Remove the shop vacuum's paper air filter to do this. You should not use anything more invasive than plain water to clean the pipes—no detergents or any other chemical cleaners.



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MAKE SURE THERE IS NO DEBRIS ON YOUR OUTDOOR UNIT

For the exterior unit (sometimes also called the condenser) to work properly, it needs an unobstructed flow of air around it. Make sure there is at least two feet of clear space around the unit, free of shrubs, wood piles, and low-hanging branches.

The condenser's fan spent all of last summer sucking air, leaves, debris, and pollen into it. To prep it for the upcoming season, use a wet/dry vacuum and then spray it down with a garden hose. Manufacturers recommend using nothing more powerful than water from a garden hose.



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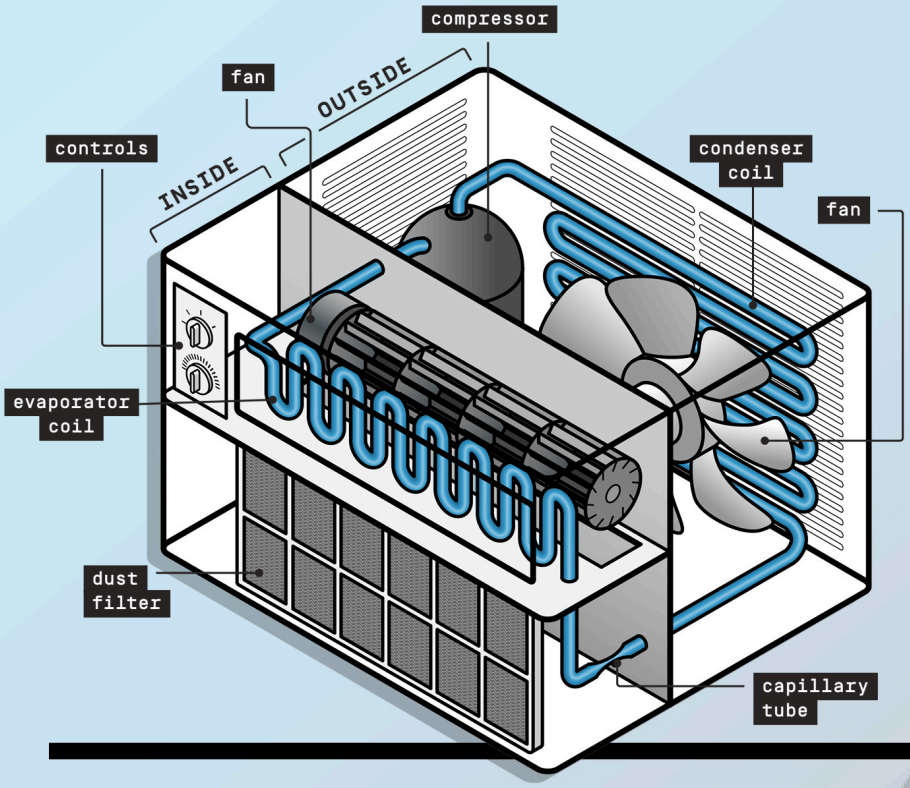
WHAT IF YOUR A/C ISN'T RUNNING PROPERLY?

- Change batteries: A dying battery in your thermostat can impact your HVAC system. You should change batteries in your controller and thermostat yearly, Porzio says. Some older thermostats may not be battery-operated and are hard-wired instead.
- Check circuit breakers and reset buttons: Locate circuit breakers in "off" position on your electrical panel to ensure the issue doesn't lie there. Don't press reset buttons or circuit breakers more than once. If the A/C doesn't work after resetting it once, it's time to call in professional help.
- Unless you know what you're doing, call an expert: Some of the most common items that fail on air conditioning systems, like compressors and capacitors, are not easily replaced by most homeowners, Porzio says. "We have a saying in the field: 'Most compressors don't die, they're murdered.'"





HOW DO AIR CONDITIONERS WORK?

Contrary to popular belief, A/C systems don't make cold air. "You're not adding cooling, you're removing heat," says Craig Bradshaw, executive director of the Air Conditioning and Refrigeration Center at the University of Illinois Urbana-Champaign. All air conditioners pump a refrigerant fluid (which absorbs heat) through a series of coils to move heat from one location to another. One end of the system compresses the refrigerant into a liquid while the other end allows it to expand into a vapor. The aim is to create two zones: the hot zone (where the condenser moves heat outside) and the cold zone (where the evaporator moves cool air inside).

GETTY IMAGES (ILLUSTRATION, THERMOSTAT)

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OPTIMIZE YOUR A/C SETUP

Cooling your house sucks up a lot of energy, and the Department of Energy (DOE) says you can slash about 3 percent off your energy bill for every degree you raise your central air's temperature. Here's how to not go overboard with your A/C in the summer.

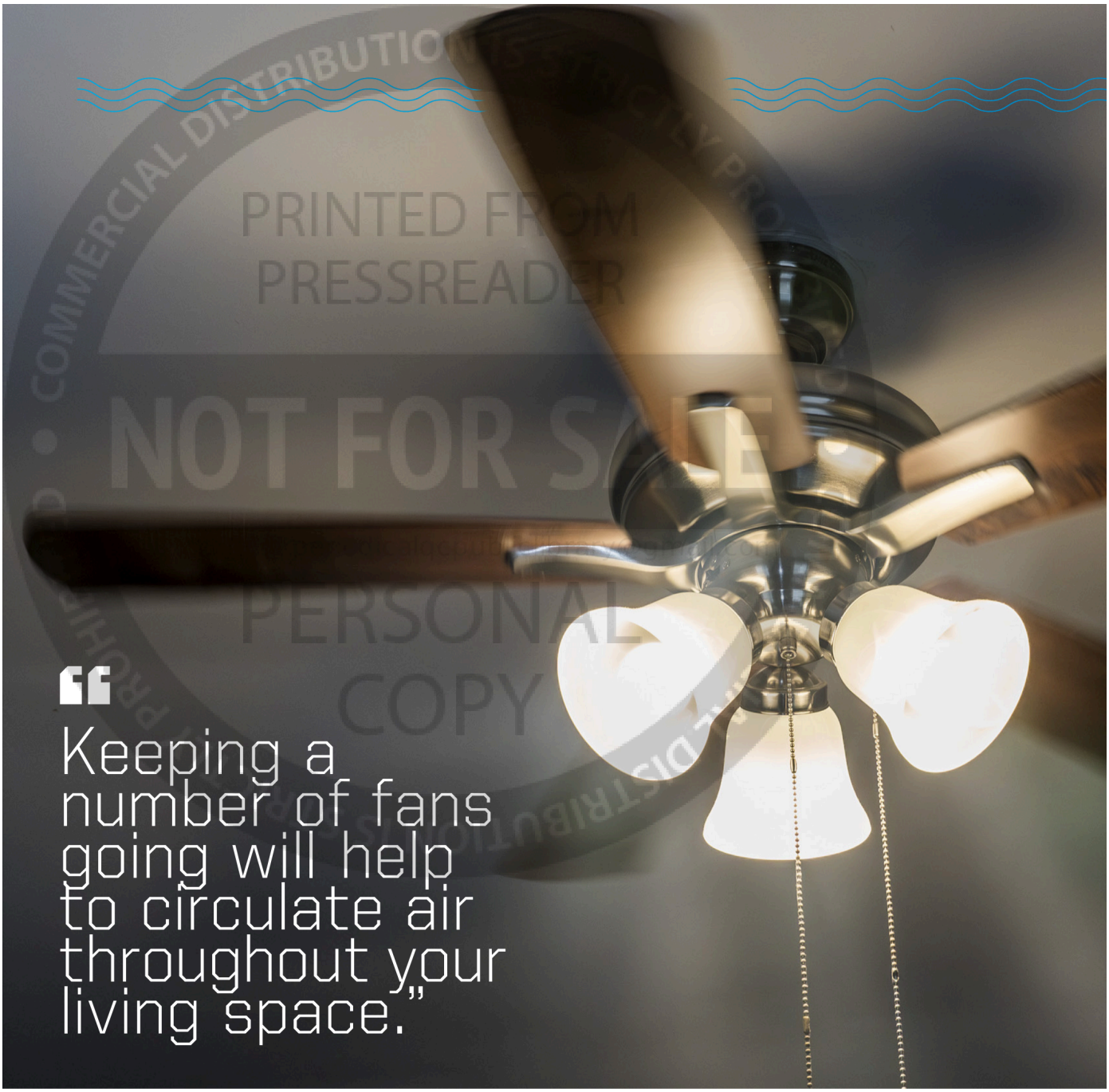
SET THE TEMPERATURE RIGHT → Consumer Reports via Energy Star, a joint program from DOE and the Environmental Protection Agency (EPA), recommends the following settings:

- 78°F when you're home
- 85°F when you're at work or away
- 82°F when you're sleeping

Economically and environmentally, an 82-degree bedroom checks out. From a comfort standpoint? Not so much. For the best A/C temperature for sleeping, the National Sleep Foundation says your bedroom should be somewhere between 60 and 67 degrees for optimal snoozing, as that range helps your body cool down and fall asleep faster.

KEEP IT CONSISTENT → A/C units perform two cooling operations: sensible, which helps lower the temperature, and latent, which removes humidity from the air. Despite its name, the latent load can account for much of the energy a unit consumes to condense water vapor from the air when it's humid, and it will work extra hard before you even feel any temperature difference.

Experts recommend keeping your A/C running even when you're not at home because the system will have to work extra hard once you return. However, you can lower it by a few degrees when



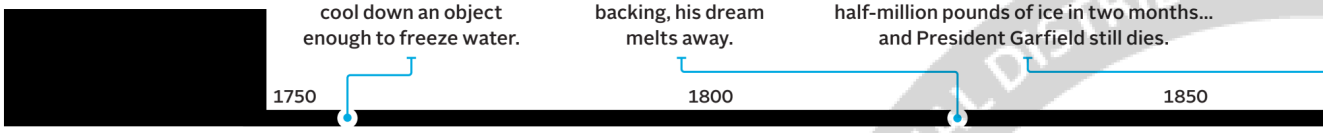
> “Keeping a number of fans going will help to circulate air throughout your living space.”

HIGH-LIGHTS FROM A/C HISTORY

1758
Benjamin Franklin and professor John Hadley of Cambridge University discover that evaporation of alcohol and other volatile liquids, which evaporate faster than water, can cool down an object enough to freeze water.

1830s
At the Florida hospital where he works, Dr. John Gorrie builds an ice-making machine that uses compression to make buckets of ice and then blows air over them. He patents the idea in 1851, but without any financial backing, his dream melts away.

1881
After an assassin shoots President James Garfield on July 2, naval engineers build a boxy makeshift cooling unit to keep him comfortable. The device is filled with water-soaked cloth, and a fan blows hot air overhead and keeps cool air closer to the ground. While this device can lower room temperature by up to 20°F, it uses a half-million pounds of ice in two months... and President Garfield still dies.



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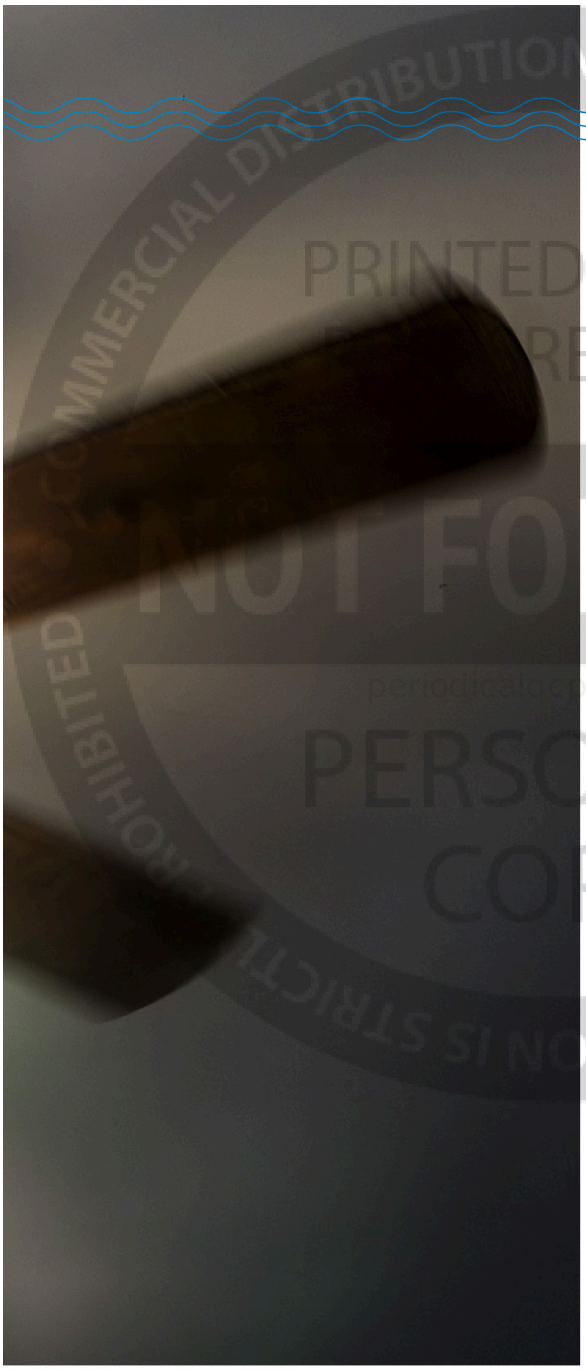

you're away. Porzio recommends avoiding wild temperature swings and sticking to perhaps a 3- to 4-degree increase. "By the time the house gets 4, 5, 6, 7 degrees higher, now you've got a ton of humidity," he says.

RUN A FAN WITH YOUR A/C → Keeping a number of fans going will help to circulate air throughout your living space. "This will help distribute air from areas with higher load to lower load around the house," says Bradshaw. Ceiling fans are great here, as they move plenty of air while staying relatively quiet, but even a basic box fan will do the trick.

SCHEDULE ANNUAL PROFESSIONAL MAINTENANCE → The latest equipment is so technologically advanced to meet the energy standards, you really should have a professional ensure that everything runs smoothly at least once a year, Porzio says.

UPGRADE FOR EFFICIENCY → Federal laws require A/C units to be more efficient these days, so if your system is older, ask yourself whether you might save money (and the environment) in the long term by upgrading. We measure the A/C efficiency by the ratio of the cooling capacity (in British Thermal Units per hour) to the power input (in watts), which equals the Energy Efficiency Ratio (EER). The higher the EER, the more efficient the air conditioner. Check the DOE website, as the federal government has historically offered tax credits and rebates for energy-efficient air conditioners.

Once you commit to upgrading, unless you have a trusted contractor, go the three-estimate route, Porzio says. "Make sure the person who is selling you a new A/C unit can justify the size they're selling you."

1902

Willis Carrier invents the first modern A/C for the Sackett-Wilhelms Lithographing and Publishing Co. in Brooklyn, N.Y. The machine blows air over cold coils to control room temperature and humidity, keeping paper from wrinkling and ink aligned. Finding that other factories want to get in on the cooling action, Carrier establishes the Carrier Air Conditioning Company of America.

1906

Stuart Cramer, a textile mill engineer in North Carolina, creates a ventilating device that adds water vapor to the air of textile plants. The humidity makes yarn easier to spin and less likely to break. He's the first to call this process "air conditioning."

1914

Air conditioning comes home for the first time. The unit in the Minneapolis mansion of millionaire Charles Gates is approximately 7 feet high, 6 feet wide, and 20 feet long. Gates died before he could try it out.

1900 1950



ADDITIONAL WAYS TO COOL DOWN A ROOM—WITHOUT BLASTING YOUR A/C

WINDOW LOGIC → This may seem obvious, but the very best way to cool down a room is to block the sun's solar heat before it enters your home. Here's how: In the morning, shut all the windows that face east and south; be sure to draw the curtains and lower the blinds, too. Then, open all the windows on the west and north sides of the house. That will help block out the sun, yet still allow fresh, cooler morning air to enter rooms.

In the late afternoon—when the outside temperature drops below the temperature inside your home—reverse the morning routine. Open the windows on the east and south sides of the house, and close the windows on the north and west sides. This is important because once the outside temperature drops, all the solar heat your home absorbed during the day will be released back outside.

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OVERHEAD INSULATION → A properly insulated house is critical to maintaining comfortable indoor temperatures all year long. The most important place to install insulation is your attic floor.

According to the Insulation Institute, if you live in the South, you should have about 14 inches of insulation in your attic floor, and about 18 inches of insulation if you live in the North. The reason attic insulation is so important in the summer is that it prevents hot attic air from warming the rooms below, which can keep the whole house cooler and more comfortable.

The easiest DIY way to increase the depth of attic insulation is to simply lay unfaced batts of fiberglass or mineral wool insulation right on top of—but perpendicular to—the existing attic insulation.

CEILING FANS → Ceiling fans are surprisingly effective in keeping rooms cool, and they use only about a tenth of the electricity of a typical air conditioner. A breeze of just one mile per hour will make you feel three to four degrees cooler. Here's why: Unlike air conditioners, fans cool people, not the air. Just check to be sure the fan is blowing air downward; some models have a "winter" setting that reverses the blade rotation to blow upward.

If you don't have ceiling fans, try using portable box fans, which can make rooms feel more comfortable even through the hottest stretches of sultry weather. The most effective use of portable fans is to wait until the early evening, and then place one or two fans in east- or south-facing windows; be sure the fans are blowing air into the house. Then, place a couple of fans in windows facing west or north so that they're blowing outward. That setup will quickly cool things down by exhausting hot, stale air out of the house.

DITCH YOUR OVEN → On the hottest summer days, cook meals outdoors on the grill or use a microwave, a crockpot, or even a toaster oven, which all produce less heat—and use less electricity—than a full-size oven. If you must use the oven, wait until the late evening or very early morning, when the house is coolest. PM

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