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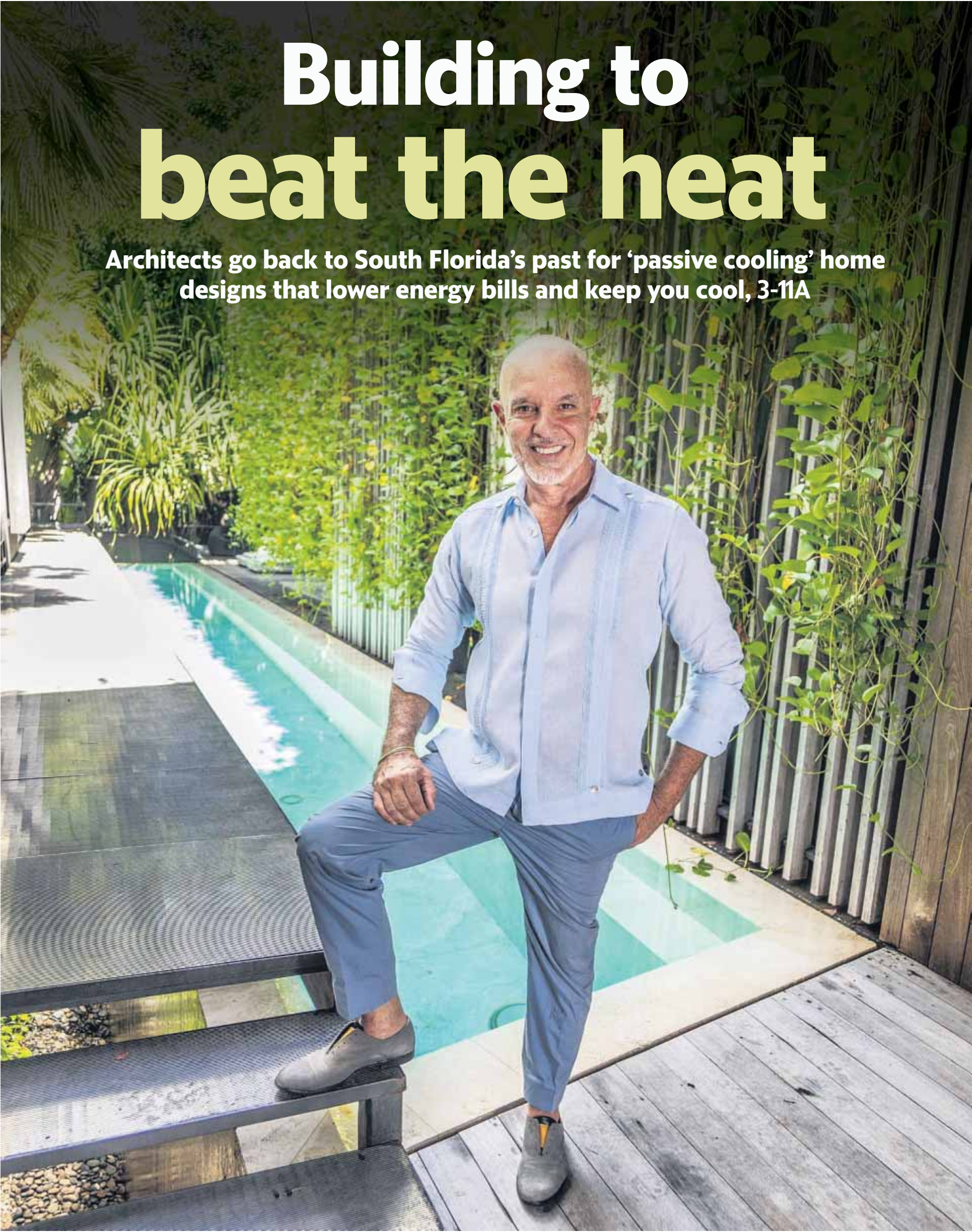


SUNDAY AUGUST 27, 2023

# Miami Herald

Building to  
beat the heat

Architects go back to South Florida's past for 'passive cooling' home designs that lower energy bills and keep you cool, 3-11A



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Archive: Keeping a balance.

Watsco, U.S. air conditioner leader, aims to keep people cool without warming the planet.



VIDEO: Shining example.

A look at a Miami Beach energy efficient home by architect René González.



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Jack Parker examines a tree in his yard that provides shade and helps funnel breezes into his home in this 2003 photo. On top of the roof, there's a solar hot water system.

# Building to beat Florida's heat

## Going back to the past for cooler home designs

Cooler building designs lower energy bills — and carbon emissions — by reducing the amount of energy needed to keep homes comfortable. Cooling alone typically represents about 60% of Floridians' power bills, according to FPL.

BY NICOLÁS RIVERO  
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Jack Parker, a longtime environmental science professor at Florida International University, built his house from the ground up to use as little electricity as possible and take advantage of South Florida's natural cooling forces.

The place was angled to catch prevailing breezes and shaded by strategically planted trees. Plentiful windows allowed air flow and vented hot air. It used about one-sixth the power of surrounding homes, saving money and also the family's sanity after Hurricane Andrew struck in the muggy depths of August 1992 and knocked out power for 11 days.

"We were the only ones in our whole neighborhood that could sleep at night because we could open the windows," Parker said. "Everybody else was in their homes really sweating and suffering from the heat."

Parker built that Kendall home way back in 1984, but its "passive cooling" approach never really caught on as South Florida continued to boom. At least until now. As climate change drives temperatures and cooling costs higher, some architects and homebuyers are beginning to employ designs developed long before air conditioning — all the way back to the deep porches of cracker cottages and the elevated chickee huts of South Florida's first inhabitants.

"There have been more designers willing to reinstate passive design strategies in their projects," said Sonia Chao, the associate dean of research at the University of Miami School of Architecture. "I suspect that as climate stressors ... continue to impact our communities more consistently, a greater number of clients will demand that their designers incorporate such features, if for no other



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Aerial view of a house in Miami Beach designed by Miami architect René Gonzalez. Called the 'Prairie House,' it has many cooling features including a roof covered in plants, shade trees, large windows and sliding glass panels that open to let in a breeze on cool days.

reason than to reduce their own utility costs."

Cool building designs can keep people more comfortable during record-breaking summer heatwaves. But they also promise to reduce the amount of electricity homes use for air conditioning while also reducing the carbon emissions that are raising global temperatures.

"If you do this properly, you're going to end up saving money ... and you're reducing the carbon pollution that goes with that," Parker said.

**THE COOLING HOUSE ON THE PRAIRIE**

Lately, architects designing high-end houses for wealthy, climate-conscious buyers have started working cooling techniques that were once common into their con-

temporary designs.

Take, for instance, the \$15.2 million "Prairie House" on Miami Beach, a three-bedroom 3,200-square-foot luxury home designed by the Miami architect René Gonzalez.

SEE HEAT, 4A



BATTLE VAUGHAN Miami Herald file photo

Miami architect Alfred Browning Parker designed and built his home in Coconut Grove in 1954, above, which maximized shade and airflow and aimed to work with nature to stay cool. He was one of the premier architects of the era.





ALLISON DIAZ Miami Herald file

The Barnacle in Coconut Grove, which was built in the 1890s and is the oldest home in Miami that exists on its original site, features deep-shaded porches that help cool the building while letting breezes pass through.

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## HEAT

The building is designed to be “porous,” full of courtyards, breezeways and open spaces that allow breezes to flow through. The entire structure is elevated 14 feet above the ground, which not only allows the building to dodge floods, but also allows cool air to circulate under the floor.

A single courtyard can lower a building’s energy bill by about 7% on average, according to a 2021 study from Spanish researchers at the universities of Cadiz and Seville.

In addition to the Prairie Residence’s courtyards and breezeways, plants grow on the roof and glass walls retract on cool days and nights to let in the breeze. Gonzalez dotted the property with shade trees and water features to cool off the air as it flows through.

“The effect is not only physical but it’s also psychological,” Gonzalez said. “The idea that you have air flowing around you and you see spaces and you see a water element or a pool also psychologically makes you feel cooler.”

Architects have other cooling tricks up their sleeves. In a house she built for a family in Punta Gorda, Miami architect Suzanne Martinson extended the roof 10 feet beyond the windows and sliding glass doors to shade the interior. The house is only one room wide, with big windows that can be thrown open to let air flow easily across the building.

“We’re unusual because we’re in a tropical environment where the humidity is high,” Martinson said. “In a humid climate, the way to stay cool is to have air moving across your body and your skin, so you’ve got to have moving air.”

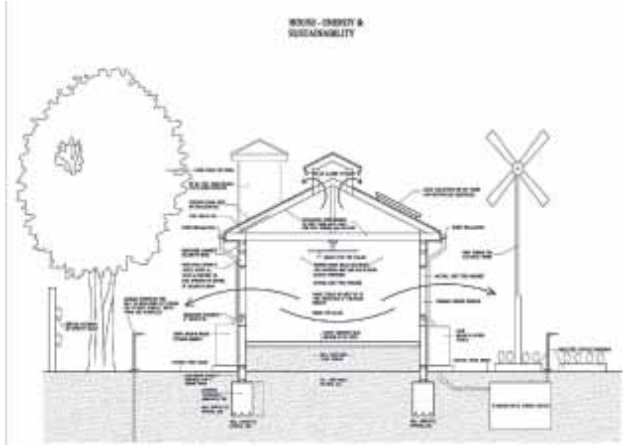
Martinson also raised the ceilings up 10 feet and placed ceiling fans in each room to help hot air rise above the heads of the people inside.

Finally, shaded porches — a staple of southern architecture — can be a



PETER ANDREW BOSCH Miami Herald file

Architect Alfred Browning Parker, pictured at his Coconut Grove home in 1993, was an exception to the trend away from passive cooling designs in the air-conditioning era. His home featured deep porches, overhangs and shade trees to stay cool.



Courtesy of Sonia Chao

Windows placed for cross-ventilation, shade trees and a roof that lets hot indoor air rise up and escape figure prominently in this drawing by architect Derrick Smith, which proposes a sustainable design for a house in Haiti as part of University of Miami Architecture project.

great way to keep a building cool, according to Chao. In addition to giving people a place to sit in the breeze and cool off, deep porches also shade exterior walls, especially south- or west-facing walls that otherwise bake in the

afternoon sun. “When you have porches on the right side of the building ... the sun’s rays never reach the wall that’s protecting the interior room,” Chao said. “That wall is not gaining any heat, which means you

build like this in South Florida. Gonzalez, for instance, takes design inspiration from the region’s earliest inhabitants.

“It’s about building in the same way that the natives have built,” he said. “If you look at chicken huts and early Native American structures, you’ll see that they’re elevated off the ground, they’re very [open] and they’re generally oriented so they allow the southeast breezes we have here in South Florida to flow in and out the other side.”

In Florida’s frontier days, many settlers built their houses using the same ideas. Often, that meant “narrow buildings, preferably oriented along an east/west axis, with deep porches on the southern side of the building or the strategic placement of trees, and finally, tall operable windows lined up across from each other,” Chao said.

“Interior spaces were usually taller and often ceilings were pitched and some had an opening towards the top to let the hot air rise and exit the structure,” she said, adding that many buildings also had crawl spaces that allowed air to circulate beneath the floorboards and louvered shutters that let air flow through while blocking light.

The Barnacle — a historic house built in 1891 in Coconut Grove by Ralph Monroe, a yacht designer who became commodore of the area’s first yacht club — used many of these techniques to keep his place cool before air conditioning.

The building’s facade is shaded by two stories of deep porches and balconies under a wide roof overhang and covered in large operable windows that face the southeasterly breezes blowing in from Biscayne Bay. The entire structure — the oldest home in Miami-Dade still in its original site and now part of a state park — is surrounded by dense shade trees that open up on the southeast to funnel in the wind.

Cooling techniques be-



University of Miami

Sonia Chao, the associate dean of research at the University of Miami School of Architecture.

need less electricity to cool that space.”

Porches don’t just work for single-family homes. They can also be worked into much larger buildings, like the Perez Art Museum Miami, which has an east wall shaded by a massive porch overlooking Biscayne Bay.

### SOUTH FLORIDA’S COOL ARCHITECTURAL HISTORY

It used to be common to

SEE HEAT, 6A



STEVEN BROOKE Courtesy of Steven Brooke

The windows that line the walls of this house in Punta Gorda, designed by Suzanne Martinson, can be thrown open to let in a breeze on cool winter days or nights.





Roof overhangs and a deep porch help cool the Pérez Art Museum Miami.

CORTESÍA Daniel Azoulay



ANDREA SACHS The Washington Post

Guests at the 55,000-acre Big Cypress Seminole Reservation can stay in chickees, traditional wooden huts with thatched roofs. The huts are built elevated above the ground, allowing air to circulate.



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Miami architect René Gonzalez stands in the open living room behind the pool of a house he designed in Miami Beach known as the 'Prairie House'. The house features many passive cooling features, including a roof covered in plants, shade trees, large windows and sliding glass doors that open to let in breezes on cool days.

FROM PAGE 4A

# HEAT

came iconic parts of the region’s architectural landscape. Many of the Art Deco buildings that line Miami Beach, for instance, have deep “eyebrow” ledges over their windows that shade the interior in addition to lending the facade an aesthetic flourish.

The modernist architect Alfred Browning Parker became famous for the houses he designed around Miami after World War II, which maximized shade and airflow and aimed to work with nature to stay cool. The Coconut Grove home Parker built for his own family in 1954 was featured in the Pace Setter House Program, which highlighted post-war modernist homes that embraced their region’s vernacular design.

But, with some exceptions, South Florida’s classic cooling designs slowly began to fade after World War II, when air conditioning gradually became cheaper and more pervasive, according to Chao. “As that started to happen,” she said, “developers started to say, ‘Aha! I no longer need [passive cooling] elements because people can live in the building without the porch, without operable windows, without shutters because the air conditioning is going to make the space comfortable.’”

“By the 1970s, unfortunately, most buildings were put together in completely different way,” she said.

Many newer houses were built with windows that didn’t open, without porches, overhangs or

shade trees on the lot. With A/C ducts snaking from room to room, buildings weren’t designed for cross-ventilation. Despite the increasing temperatures, that remains the dominant design. Just consider the trendy modern “sugar cube” mansions going up across South Florida.

“Today, it is common for us to find the same cookie-cutter design in South Florida as in Alaska,” Chao said. “Unfortunately, South Florida homes are no longer built with climate zone considerations and we have mechanical air conditioning to thank for that.”

## HOTTER DAYS, HIGHER STAKES

Cooler building designs have dual benefits. They offer a way to lower energy bills — and carbon emissions — by reducing the amount of energy people need to use to keep their homes and businesses comfortable throughout the year. Cooling alone typically represents about 60% of Floridians’ power bills, according to FPL. Of course, that doesn’t

mean people need to live without air conditioning on the hottest days of summer.

“It’s not a matter of suggesting that you’re going to always live here with your doors open,” Gonzalez said. “The heat here, as is getting to be the case everywhere in the world, is extreme during the summer months. But during the winter months, we have very nice weather and we have many days on which you have the ability to open up.”

But you can only “open up” to the breeze if your home has windows that open and a layout that allows air to flow through. Some modern houses are now built with fixed windows that can’t open, according to Martinson. “Developers and clients are doing that because an operable window costs more and it’s a savings, but it’s a shame that they can’t open them to enjoy the breeze when there is one or the nice weather in the winter,” she said.

The other challenge, Martinson said, is South

Florida’s cool winter days are becoming a rarity. “It has gotten so much hotter,” she said. “I’ve been here since the ‘50s when my family moved here and you could be outside in the summer. There was more of a canopy in Miami and you could be in the shade and be totally comfortable. But that isn’t the case now.”

Recent studies verify that. In the 1960s, daily temperatures hit 90 degrees for about a quarter of the year. Now, 90-degree days account for a third of the year. By 2050, scientists expect South Floridians to sweat through 90-degree days for more than half the year.

In the meantime, Miami’s rapid development has replaced trees and plants with concrete and asphalt, contributing to the “urban heat island effect.” Miami has become one of the hottest concrete jungles in the country, according to a recent report from the nonprofit research group Climate Central.

Miami’s warming trend makes it all the more urgent to start designing buildings to be more resilient to extreme heat, according to Chao — particularly for the less-affluent.

“In particular we should be thoughtful about how poorer community members are impacted by extreme heat, because they may not be able to afford to run that air conditioning system 24/7,” she said. “That’s why it’s particularly important to start to build immediately in this more thoughtful, planet-savvy manner when we’re doing so for affordable or workforce housing.”

“We’re talking not only about how much energy they consume, but we’re actually talking about their health and safety and welfare,” Chao said.

## THE COST OF COOLING

Designing cooler buildings doesn’t have to break the bank. Gonzalez knows most people could never afford to live in a home as luxe as his Prairie House. “This is not a cheap house,” he said. “But some of the strategies we used here are inexpensive and easy to apply.”

Planting shade trees on the property, using breezeways or courtyards to let air flow through a building and installing windows that can open to let in a breeze are all relatively affordable design techniques — even if the Prairie House’s rooftop jacuzzi and 10-foot elevation are not.

“Passive design is not a matter of style nor is it complicated nor more expensive necessarily in the hands of an expert,” Chao said.

A prime early example: Parker and his wife Janat, an FIU psychology professor, were both on academic salaries when they built their energy efficient home almost 40 years ago.

The two-story house in The Crossings has 37 windows with ceilings designed to capture hot air as it rises indoors and vent it through a set of windows high in the second floor walls. Parker even oriented the house at a slight angle from the street so that it would face South Florida’s prevailing southeasterly breezes.

For the dog days of summer, when mere breezes wouldn’t cut it, Parker bought the most efficient air conditioner he could find and mainly just cooled the bedrooms on the second floor. Then he strategically planted 50 trees on his quarter-acre lot to offer maximum shade to the A/C condenser in his yard and the south-facing wall and windows.

All that cost him roughly \$367,000 in today’s dollars. Before building his house, Parker had toured other ultra-efficient model homes designed to use little energy. “But they were all super expensive, basically for millionaires, so I didn’t want that,” Parker said. “I wanted to have one that was going to be reasonably cost-effective.”

Parker finally left his beloved home in 2019 to move to a retirement community in Asheville, North Carolina. There, he can’t control the landscaping or install ultra-efficient appliances. But he has been circulating newsletters to his neighbors to urge them to use less electricity by raising thermostats, using fans to circulate air and making sure doors and windows are snugly sealed when the air conditioner is running.

“Every house has to contribute to the solution to this,” he said, “so anything that each one of us can do, I think that’s important.”

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‘Eyebrow’ ledges shade the windows of the Bougainvillea Apartments on Collins Avenue in Surfside.



photo by ©Tina Paul 2013





PHOTO BY MICHAEL STAVARIDIS Courtesy of Rene Gonzalez Architects



Herald file

Replacing an aging air conditioner can save money on cooling.

thermal treatments, whether or not you fill the space between window panes with insulating gasses and so on.

All these factors, plus the size and style of the window, mean you might pay anywhere from \$280 to \$1,500 each for a double-pane, insulated window, according to Architectural Digest. But there are federal tax credits that can help bring down the cost: Homeowners who install windows rated “most efficient” by Energy Star can get a tax credit for 30% of the cost up to \$600 under the Inflation Reduction Act.

One way to bring down the temperature is with low-emissivity (low-e) coatings, which reflect the invisible infrared light that carries much of the sun’s heat while allowing visible light to pass through normally. Low-e windows typically cost 10 to 15 percent more than regular windows, according to the Energy Department, but reduce the amount of heat that passes through a window by 30 to 50 percent.

Low-e windows can be so effective at reflecting heat, however, that they’ve been known to melt nearby plastic yard furniture or neighbors’ vinyl house siding on summer days.

COOL PAVEMENTS

Cool pavements — asphalt and concrete made with reflective material or coatings, for instance — can lower the temperature in paved areas outside of a building, which may make

a difference in how comfortable it feels to stand outside on a hot after-

noon. Much like roofs, pavements can heat up to 150

degrees Fahrenheit on sunny summer days, according to the EPA. They then radiate that heat back into the air, warming cities as part of the “urban heat island” effect. Miami has one of the worst urban heat island effects of all major U.S. cities, according to a recent report from the non-profit research group Climate Central.

MIT researchers tested cool pavements in Boston and Phoenix and wrote in a 2021 study that they could lower air temperatures by 3 degrees in Boston and 3.7 degrees in Phoenix if they were used throughout the city.

In a similar 2021 pilot program, the city of Phoenix found that cool pavements were 10.5 to 12 degrees cooler than traditional pavements in the afternoon.

However, cool pavements reflected some of that heat back onto pedestrians, meaning that the

“human experience” of someone walking across cool pavement in the afternoon was “similar to walking on a typical concrete sidewalk,” according to the city.

HIGH-EFFICIENCY A/C

Finally, a more efficient air conditioner can directly lower the amount of electricity and money a building spends on cooling.

A/C manufacturers have been steadily improving their machines’ efficiency since the 1990s to keep up with federal regulations. If you’ve replaced an air conditioner in recent years, you’ve probably upgraded its efficiency and lowered your energy bill.

Replacing a decade-old air conditioner at the minimum efficiency level with a new system at today’s minimum would lower your electricity spending on air conditioning by about 13%, or roughly \$150 a year for a 2,000 square foot house, according to utility FPL.

Plants cover the roof of the ‘Prairie House’ in South Beach, shading the roof from sunlight and cooling the house below.



ALLISON DIAZ Miami Herald file

Double insulated and laminated windows help block solar heat and provide hurricane protection in a Miami Beach home pursuing a LEED certification.

THE URGENCY OF ENERGY EFFICIENCY

Efficiency improvements can make a big difference for the future occupants of the building, according to Sonia Chao, associate dean of research at the University of Miami School of Architecture. “You can think of building materials almost like clothing,” she said. “If you’re standing in the sun dressed in a white, light cotton shirt versus a dark wool, how quickly would you feel uncomfortable in dark wool?”

And, as scientists expect global temperatures to continue to rise, the need to cool down buildings is becoming all the more urgent.

“We’re not taking seriously the changes we need to make as a building profession and a design profession,” said Samenski. “The targets out there for decarbonization are really dramatic and business as usual is not going to get us there.”

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