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Phoenix acting to cool 'urban heat island'

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The Arizona Republic

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Maybe the time you noticed it was really, really hot was when you walked outside in bare feet in July and found the pavement scalding.

Of course, it was 10:30 p.m., and it seemed strange that the temperature was still above 100 degrees.

"When we moved here, we were surrounded by gravel roads, which didn't absorb the heat like cement does," said Walter Heater, who moved from Michigan to Tempe 22 years ago. "But I put in a pool with cement, a workshop with cement, a driveway with cement.

"I live in a block house and I can feel the heat radiate from that."

Climate experts say the Valley ranks as the world's foremost "urban heat island," a place where the combination of sun, tile roofs, unshaded streets and lots and lots of asphalt keeps people sweating long into the night.

It stays hotter longer in Phoenix than in most places. Since 1949, the average low temperature at Phoenix Sky Harbor International Airport has risen more than 10 degrees. And over the past 40 years, the number of hours a day over 100 degrees has jumped dramatically.

While the Sahara Desert cools off rapidly at night, dropping as much as 50 degrees between day and night, the Sonoran Desert around Phoenix doesn't. It's partly a matter of soil composition - the sands of the Sahara retain heat at a lower rate than the hardpan-like surface of the Sonoran Desert. More importantly, the Sahara doesn't have parking lots.

Temperature differentials between Phoenix and Tucson prove what a difference the scope of development makes. Last week, when the daytime high in Phoenix averaged 4.5 degrees higher than in Tucson, the nighttime low was more than 10 degrees warmer in the Valley.

Some of that is because of altitude and winds, but a bigger factor is that Tucson has much less heat-absorbing material than the Phoenix area.

In 1949, the average temperature for July in Phoenix was 90.4 degrees. Last year's average temperature for the month? 94.2 degrees.

Despite all that, Phoenix is just taking its first baby steps toward making the island a more livable place, which could include using lighter-colored pavement and roofs that reflect, rather than absorb, energy.

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"It will be adopted into the general plan," said Joy Mee, the city's assistant director of planning.

"We're waiting on the planning board to give us some guidance and set some priorities for us."

But it will take at least a year to study the issue, and then the city will have to apply for grants and figure out how to work solutions into the city's building code.

In the meantime, the extended periods of heat produce more ozone, which generally makes the air more polluted and unpleasant to breathe.

Perhaps more importantly, the more polluted the air, the closer the state is to having its federal highway money pulled because Phoenix's air doesn't meet pollution goals.

But, as Mee points out, Phoenix's desire to do something about the heat island moves planning forward, and the city is working with Arizona State University on long-term climate projects.

But a look at some other cities shows that Phoenix is behind the times when it comes to the heat island:

- Tucson instituted reflective-roof standards for newly built city buildings after a pilot project succeeded beyond city planners' dreams. One of the new administration buildings was built with a reflective roof; the city saved 48 percent in energy costs.
- In Atlanta, the National Park Service paved some of the parking lots along the Chattahoochee River with porous material that absorbs and releases heat more efficiently than standard asphalt.
- Chicago has embarked on a program of putting gardens on rooftops.
- Salt Lake City, which like Phoenix has both a heat island and an air pollution problem, has been testing new rooftop materials since 1995.

And the urban heat island in the Valley can't be blamed on Phoenix alone. The truth is that the higher temperatures caused by heat being retained in dark building materials follow the land-use map very closely.

The heat island is more about urban growth than anything else - where the asphalt goes, the heat island follows. And that's why there are exceptions.

"It's more an archipelago of heat, rather than a heat island," said Tony Brazel, an Arizona State University professor who has been studying the long-term climate of the Valley.

That's why there are pockets of coolness: Satellite imagery of Phoenix shows that at 11 a.m., Phoenix's Arcadia neighborhood, with its preserved orchard trees and its expansive grassy lots, can be up to 10 degrees cooler than the areas south of it. The Fort McDowell Indian Reservation east of Scottsdale, for example, cools more rapidly than Scottsdale, due to its relative dearth of development.

But by and large, heat retention has followed unrestrained development.

With the West Valley's formerly agricultural landscape rapidly being converted to homes, the heat island is floating out there.

"As the city grows and expands outward, the heat island expands with it," said Nancy Selover, the state's assistant climatologist.

No one knows that better than Brent Hedquist, an ASU graduate student who spent a month last fall driving across the East Valley trying to understand the heat island.

"As you drive along the interstate, it's mostly asphalt, lots of cars. In some places, it's almost an urban canyon where all the heat gets trapped and rises up."

Hedquist's route took him from Tempe to Gilbert. As he drove along U.S. 60, it got warmer. A lot warmer. Once, it was 27 degrees warmer from where he started in Tempe. But as he entered the agricultural lands near Gilbert, the temperature went down. Near Williams Gateway Airport, the temperature began to rise again.

Why?

A new housing development. Red-tiled roofs. Stucco outsides. Small yards. A little bit of the heat island in what used to be a farmer's field.

"Out there in the new development, I saw just a bunch of homes very close together," Hedquist said. "A lot of the older neighborhoods I drove through which had larger yards were cooler."

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