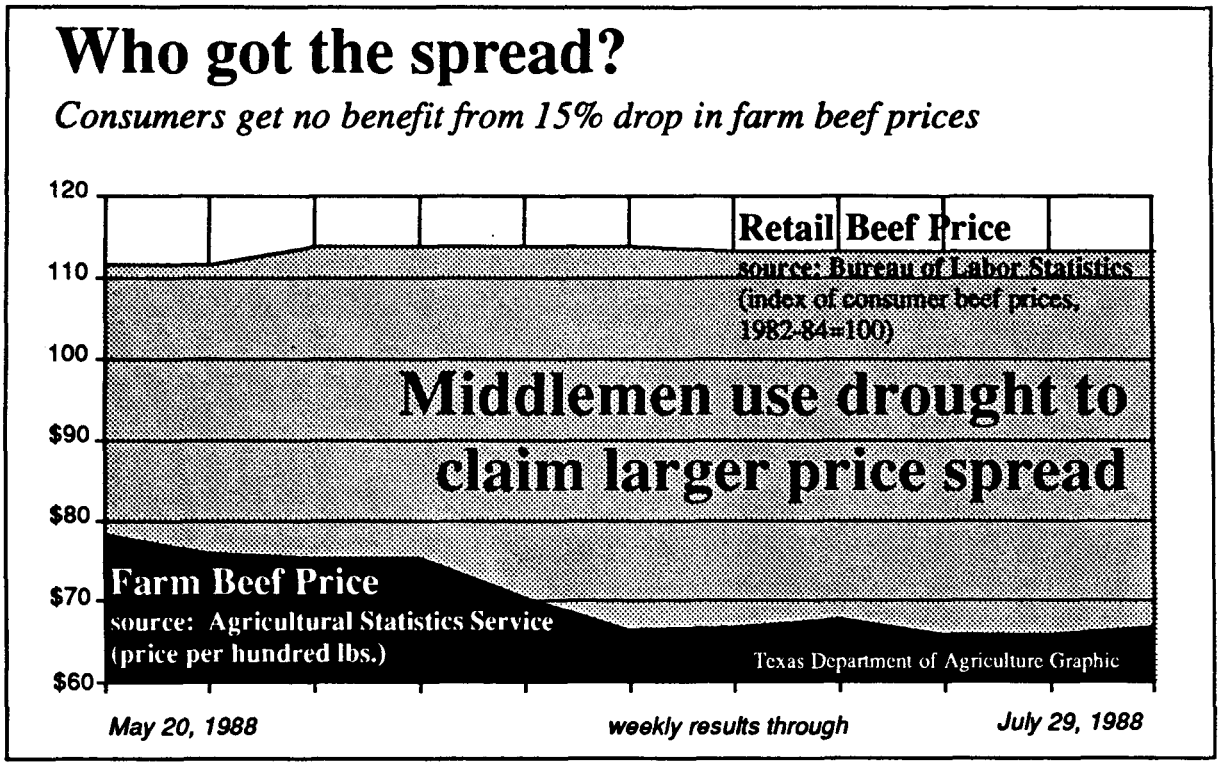

Keeping Cities Cool

Jonathan Marshall

As cities grow, so does the average gap between their summertime temperature and that of surrounding rural areas. A metropolis of five million people will show an average heat difference of four degrees in summer, and often much higher.

"The largest reported temperature difference that I've seen was 15 degrees Celsius (27 degree Fahrenheit) at Fairbanks, Alaska," says Thomas Karl, a research meteorologist at the National Climatic Data Center in North Carolina. "New York City has heat islands as high as 10 degrees Celsius (18 degrees Fahrenheit)."

The reasons for this hot-box effect aren't mysterious. Cities "are heated by exhaust from air-conditioning plants, furnaces, engines and the built-up heat in asphalt and concrete surfaces," notes Kenneth Watt, a professor of environmental studies at the University of California at Davis.

Dark roofs and streets soak up heat and shimmer in the sun. As much as 40 percent of the entire city of Los Angeles, for instance, is paved for cars, a vast expanse that absorbs heat during midday and radiates it back as the sun goes down.

Tall buildings block the wind and trap heat that would otherwise escape skyward.

When trees and grass give way to concrete and asphalt, water runs off in storm drains rather than carrying away heat through evaporation.

Crowded cars, industry and even human bodies raise temperatures as well.

The result, Karl explains, is "a heat island that can grow and even escape outside the city. A nice park can be caught up because the warmth overtakes the whole area."

The good news is that nothing so formidable or expensive as global climate change may be needed to cool things off for the sweltering masses. In fact, the answers are as cheap and low-tech as they come.

A team of scientists at Lawrence Livermore Berkeley Laboratory, led by physicist Art Rosenfeld, argue that planting urban trees and switching to light-colored surfaces on roofs, streets and parking lots would "effectively reduce building cooling loads and peak power" requirements and "are the cheapest way we know of saving energy and money, and reducing carbon dioxide emissions."

In a recent paper, they cite studies indicating that properly located trees, and shrubs reduce the daily air-conditioning electricity use by as much as 50 percent.

The plants shade buildings from the sun and use up heat to evaporate water. A survey of neighborhoods in

Sacramento, California found that those with plenty of trees enjoyed average temperatures as much as nine degrees lower than in unshaded parts of town.

Building materials and paint also have an enormous impact on how much sun a city absorbs. Whitewashed Greek villages stay far cooler than cities built of red brick. A house with reflective paint in a light-colored neighborhood of Sacramento uses over 60 percent less energy annually than its darker counterparts. And less air-conditioning in turn means less heat turned loose into the atmosphere.

Reflective rooftops and fine white sand rolled into asphalt streets and parking lots can also dramatically reduce heat islands and air conditioning bills. This prescription may cost next to nothing if implemented gradually, as roofs are repaired and streets repaved. City governments could require new office buildings to have highly reflective roofs and could encourage residents to think cool when repainting their homes. If enough surfaces are designed to reflect heat, the entire city will enjoy cooler days and evenings.

The LBL scientists calculate that such simple strategies are an exceptionally effective means of saving energy, a mere tenth as expensive as newly generated electricity.

And by reducing power demands, such policies will limit the need to burn fossil fuels that contribute to the global greenhouse effect. Planting 100 million urban shade trees would have the same effect on greenhouse gases as planting 15 times as many forest trees.

It can be done. The city of Los Angeles planted a million trees as part of a breautification campaign before the 1984 Olympics, at a cost of less than a million dollars.

"We think these measures will not only mitigate the heat island but create an oasis in the cities so they are even cooler than rural areas," says Hashem Akbari, a member of the LBL team.

Before Americans panic about long, hot summers to come or wait for global solutions, they should turn to natural air-conditioning for relief. More urban trees and lighter colors could made for a painless -- and pretty -- cure.

One Day in the Lives of American Children

16,200 women get pregnant
2,753 of them are teenagers

1,099 teenagers have abortions
367 teenagers miscarry
1,287 teenagers give birth

666 babies are born to women who have had inadequate prenatal care
695 babies are born at low birthweight (less than 5 lbs., 9 oz.)
44 babies are born at very low birthweight (less than 3 lbs., 5 oz.)
72 babies die before one month of life
110 babies die before their first birthday

27 children die because of poverty
9 children die from guns
5 teens commit suicide

849 teens become sexually active
609 teenagers get syphilis or gonorrhea

1,868 teenagers drop out of high school

988 children are abused
3,288 children run away from home
1,736 children are in adult jails

2,269 children are born out of wedlock
2,989 children see their parents divorced

36,057 people lose jobs

--Children's Defense Fund

The Other Danger of Star Wars

Dietrich Fischer

Critics of Star Wars have long argued that the system would not offer reliable protection against a nuclear attack. That is what happened to the *Stark*, which was hit by an Iraqi Exocet missile, although it possessed the most modern automated air defense system.

But there is also another danger which has hardly been mentioned so far: Star Wars weapons *could* work, even when they are not supposed to. The shooting down of Iran Air's Flight 655 with the Vincennes' Aegis weapons system has made this painfully clear.

Aegis includes the most modern and sophisticated radar detection system. It was not supposed to confuse a military jet with a passenger aircraft. That turned out to be an empty promise, like the unsinkable *Titanic*, or safe nuclear power. Will we blindly accept such assurances about Star Wars?

Star Wars weapons will have to react to radar warnings within seconds, precluding human intervention. They could react to a false warning and set in motion a series of events that could trigger an accidental nuclear war.

A piece of debris hitting a space platform could be misinterpreted as a deliberate attack and could activate automated procedures, countermeasures and counter-countermeasures. Politicians would watch helplessly, like a sorcerer's apprentice, unable to stop the forces they had conjured up.

An accidental attack with Star Wars components would not necessarily remain limited to space. It could easily be mistaken as preparation for a nuclear attack, especially in a climate of great international tensions. Each side might feel under enormous pressure to seek to destroy the opponent's nuclear weapons before the opponent could do so.

Could the superpowers agree to a rapid cease-fire? It has taken then over forty years to negotiate the first modest reduction of nuclear weapons. How could anyone be certain that they could agree to a nuclear cease-fire within minutes, given that rational thinking is one of the first casualties in war?

From January 1979 to June 1980, there were 3,804 radar warnings of a possible Soviet nuclear attack on the United States. All of them, of course, were found to be false on human inspection. After that, the Pentagon stopped publishing those statistics, so as not to frighten the public. To turn over the decision to initiate combat to such a failure-prone automated system would be folly.

The computerized battle management system controlling Star Wars would be more complex than anything ever attempted before. Experts estimate that it would take more than a thousand individual programmers to write the approximately 100 million computer instructions required. To believe that such a program could be free of errors, especially given that it could never be tested in reality, is fantasy. It is perhaps equally likely that a monkey hammering randomly on a typewriter would produce a work of Shakespeare.

Michael Dukakis opposes the deployment of weapons in space for good reasons. Why does George Bush press so hard for a system that could endanger our own security? Obviously, it would channel billions of dollars to the defense industry for years to come.

Recently, the Reagan Administration awarded a $1 billion contract to Martin Marietta to study the feasibility and desirability of Star Wars. But Martin Marietta is not a disinterested party. It hopes to build Star Wars components and would hardly jeopardize its future profits by arguing against the system. Asking Martin Marietta to evaluate Star Wars is as if Edwin Meese had been asked to investigate his own possible role in the WedTech scandal.

Improving our security is primarily a political problem and cannot be solved by a technological fix alone. During the big debate in 1969 over whether or not the United States should build an anti-ballistic missile system, it was argued that it was not yet technically feasible to build a "dense" ABM system against Soviet missiles. But that was not considered so important, because the Soviet leadership was seen as relatively reasonable and reliable. The great danger, it was said, came from the Chinese. They were so fanatic and unpredictable. All the United States really needed, it was argued, was a "thin" ABM system to keep out Chinese nuclear missiles.

Today, hardly anyone in the United States is afraid of a Chinese nuclar attack, but not because of a thin ABM system. It is because of better relations. With over 20,000 Chinese students in the United States and a quarter million Americans visiting China each year, neither side fears a nuclear attack from the other. It is time to treat the Soviet Union like China.

Our Forgetful Editorialists

Extra!, the excellent newsletter of Fairness & Accuracy in Reporting notes that when the Soviets shot down KAL 007, the New York Times editorialized: "There is no conceivable excuse for any nation shooting down a harmless airliner." When the Americans shot down an Iranian jetliner this year, the same paper editorialized, "The onus for avoiding such accidents in the future rests on civilian aircraft: avoid combat zones, fly high, acknowledge warnings."