Blueprint for Disaster?

The buildings in which we live and work turn out to be the nation's largest source of global warming pollution. Fear not: A renowned architect has a new design.

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It looks as though this interview might end before it has even started. Ed Mazria doesn't want to talk about all the energy-saving features of the home he has designed for himself in the hills overlooking Santa Fe, New Mexico. There will be no discussion of how he warms his spacious house on a near-freezing November day without a heater, no tips about installing solar panels. Mazria, a maverick architect widely respected for his pioneering designs, wants to talk about a much larger issue. He is convinced that the leading cause of global warming has been overlooked by both scientists and environmentalists. Architects like himself, he argues, and the buildings they design and construct are responsible for nearly 50 percent of the world's greenhouse gas emissions.

It's a startling assertion, and my first reaction is that it must be wrong. What about all the SUVs and trucks, the coal-fired power plants, the deregulated industries, all eructing tons of carbon dioxide into the air?

Hunching his 6-foot-6 frame over a laptop, Mazria points to a diagram on the screen, a pie chart he made using Department of Energy statistics that slices energy consumption in the United States into four neat wedges. The chart holds no surprises and in fact contradicts Mazria's claim: There's no slice devoted solely to architecture or buildings. But there's a fat one -- 35 percent of the pie -- for industry, which includes manufacturing, mining, agriculture, forestry, fisheries,

construction, and the operation of industrial buildings. The next largest chunk, transportation, accounts for 27 percent of the total. The residential sector, which comprises energy used at home for heating, air-conditioning, cooking, and electricity, accounts for 21 percent; the commercial sector, which includes energy used in office buildings, hospitals, and government facilities, makes up 17 percent and is the smallest piece. Divvied up this way, the worst offenders are the usual suspects -- industry and transportation. All attempts to rein in greenhouse gases focus on them.

But two years ago, Mazria, who is 64, realized that this way of looking at energy use was fundamentally flawed. His insight came shortly after the younger architects at his firm, Mazria Odems Dzurec, asked him to give a seminar on green design. Mazria has been interested in energy conservation for more than 30 years. In 1979, he wrote *The Passive Solar Energy Book*, a guide to designing homes that harness the sun's energy to heat and cool living spaces; it has sold more than 500,000 copies. But until he began to prepare for his talk, Mazria had never tried to quantify how the actions of architects affect the most serious environmental problem: global warming.

So he reapportioned the Energy Department data, shifting processes that had been lumped under industry -- the manufacture of construction materials, for example -- into a new category that included all buildings: commercial, residential, institutional, and industrial. When he finished adding up the numbers, he was stunned. The built environment eclipsed the transportation and industry sectors.

The evidence that our climate is rapidly changing is overwhelming. It's found in tree rings and in centuries-old air trapped in Greenland's ice: The average global temperature has not been this high for more than a thousand years. Flooded coastal areas, droughts, famine, species extinction, and the spread of tropical disease into temperate zones are among the likely consequences. Existing strategies for halting or reversing this scenario seem doomed to fail, given that the leader of the world's largest emitter of greenhouse gases -- the United States -- questions the reality of global warming. But Mazria believes that our failure to grasp the single most important cause of global warming is also preventing us from finding workable solutions.

Mazria brings up an image of his redesigned energy pie chart on his laptop. Now there are only three slices: industry, transportation, and a new one -- buildings. The industry wedge has shrunk to just 25 percent, and the commercial sector has vanished; he has reassigned the energy needed to operate all kinds of buildings to his building-sector wedge. In Mazria's new pie, the built environment swallows 48 percent of the nation's energy; transportation claims the remaining 27 percent.

"Think of it this way," he says. "Your car is the size of this table here, and you use it, on average, an hour and a half a day. But a house? It's operating 24 hours a day. It's maybe a hundred times the size of a car. It's got a water heater that burns gas or oil on-site. Now this house has a solar hot-water heater and lots of passive energy coming in; it doesn't use that much energy. But if this were a normal house, you'd be heating it right now; you'd be making hot water; the electricity would be going for all the appliances."

According to Mazria, one of the reasons that the role of the built environment in global warming has been largely ignored is that few people understand what architects really do. To illustrate his point, he describes the work his firm did in designing a community center in Santa Fe. It produced two 400-page documents specifying thousands of construction materials -- concrete, steel, floor tile, lighting fixtures, switches, paint, insulation. Although Mazria didn't purchase all those materials himself, he instructed the city to buy them -- and it did. "Architects are the largest consuming block in the country," he says. "With the stroke of a pen, we can specify anything we want for a building. We could specify parts -- recycled brick, stone, or steel, for example -- that don't use much fossil fuel to manufacture."

Projections of construction growth are staggering. "Over the next 20 years, we'll add 22 million homes and other buildings in this country," says Mazria. Each will have a boiler that burns oil or gas to heat water, and each will be an individual source of greenhouse gases separate from power plant emissions. More than half of the households in the United States -- nearly 62 million -- use natural gas in furnaces, water heaters, stoves, and clothes dryers, and that gas is burned *in the home*. Close to 10 percent use oil. "When did you ever hear someone say, 'Hey, we're going to put in 22 million little power plants in this country in the next 20 years'?" he asks. "I've never heard anyone talk about this."

Even the most drastic improvements in automobile emissions or the widespread adoption of wind and solar energy won't curb global warming without better building design. Of course, that's not to say such efforts shouldn't be made, Mazria says, but our priorities are off.

The irony is that a solution is at hand -- and has been for more than two decades. In the early 1980s, the Department of Energy commissioned a dozen or so pilot projects to study energy-efficient building design. The goal was to reduce sharply the energy use of commercial and institutional buildings solely by making smarter design choices, without solar panels or other new technologies.

Mazria's firm got one of the contracts, for a library in Mount Airy, North Carolina. By using natural light instead of electric lights and carefully placing windows and furniture to maximize natural heating and cooling, the finished library requires 80 percent less energy than other buildings of its size in the state.

Twenty years later, the results of that study have yet to be widely implemented, but Mazria aims to change that. He now devotes most of his own energy to promoting two policy initiatives: updating both architectural training and building codes. If Mazria has his way, architecture schools will require students to design buildings that use little or no fossil fuel, and building codes will be revised to force architects and contractors to limit energy use to half of the regional average for a given structure, be it a school, an office complex, or an apartment block. Under Mazria's plan, the energy conservation requirement would increase by 10 percent every five years.

His ideas are getting some attention: Mazria just returned from Canada, where he gave the keynote address at the Royal Architectural Institute of Canada's annual convention. In the audience were influential members of the National Council of Architectural Registration Boards, the organization that regulates the entire architectural profession in the United States: Mazria was immediately invited to deliver the keynote address at its annual meeting this summer.

Each year, new buildings constructed in this country total about five billion square feet -- and an equal amount of space is renovated. Once a project has been completed, its daily energy consumption is fixed until it is either renovated or torn down; typically that means it stays the same for 50 to 100 years. The Energy Department project demonstrated decades ago that design alone can reduce energy use by at least 50 percent. "So this is a no-brainer," Mazria says.

Shortly after I visited Mazria's home, Christian Dagg, a professor at Auburn University's College of Architecture, Design, and Construction, in Auburn, Alabama, invited him to give a talk to the students there. When Mazria arrived on campus, he and Dagg met at a coffee shop, which turned out to be a perfect prelude to his talk that evening.

"We sat in this huge, heated space," says Dagg. "You could hear the fans running. The lights were on, there were neon signs over the counter. We just looked around at all the power required to heat the space, and we were the only people there."

Now Dagg is among the converted. "Once you get people to grasp all the elements of the problem," says Mazria, "the answers become clear."