Efficiency of buildings key to meeting climate goals

By Stephanie Pincetl

In energy, we are learning how to make the invisible visible.

We now know that cities are responsible for 70 percent of the globe's green house gas emissions (GHG). We know that 60 percent of those urban GHG emissions comes from cars, trucks, and other forms of transportation, with the remaining 40 percent coming from building energy use – electricity and natural gas to heat and cool.

But we don't know many of the particulars about energy use in buildings. How much do different types of buildings, or different aged buildings, or various other social and demographic factors contribute to energy use? How much does each building, and how much do different parts of the building, use energy? Even with modeling to give us some data, we don't know energy use down to the meter-by-meter, building-by-building level. While we know that car emissions reporting has been fraudulent, we at least have a sense of emissions by make and by year. That's not so for buildings, and that leaves a gaping hole in what we know; it's like not knowing the difference between the emissions of a diesel truck compared to a hybrid car.

The county of Los Angeles and UCLA's California Center for Sustainable Communities Institute of the Environment and Sustainability, which I direct, are determined to fill this void. We need to understand building energy use so we can make the right investments to reduce building energy use, and the emissions. After four years of technical, scientific, and legal efforts, and after participating in California Public Utility Commission proceedings to enable greater data access,

UCLA obtained address-level data under a non-disclosure agreement with the PUC. UCLA and the county have developed an interactive web energy atlas as a result .

It’s the first such interactive atlas in the country. (New York City built a map prototype at the ZIP code level in 2012.) Our atlas provides an innovative platform to build and share knowledge of the actual energy use of buildings by neighborhood, city, building type, use, age, size, and demographics of residents.

Such an atlas was overdue. About $13 billion in investments in energy conservation and efficiency have been made in California since 2002, paid for by private utility ratepayers through their bills. Taxpayers, utilities, and the government need to know what efforts have been effective in changing the amount of energy used in buildings, and what has not worked; local governments also needed a way to account for Green House Gas emissions in a precise manner – which buildings are the most significant in energy use? The website has a contact address where users can send in their own discoveries in investigating the website – patterns across the landscape, some unexpected correlations or other insights.

In assembling, analyzing and aggregating all the data, we came up with a number of surprising findings.

For example: Malibu residents use 10 times more energy per capita than residents of Bell, in southeast LA County. But the buildings in Bell are far less energy-efficient, using more energy per square foot than those in Malibu. And Compton actually has the highest median per square foot consumption in the region. The atlas also shows energy use by building-age categories. The highest energy-using buildings were uniformly built before 1950, and the lowest from 1990 onward, perhaps proof that our building standards are working.

Those findings have major implications for interventions at a

building and neighborhood level that could generate big and rapid energy efficiency gains. Knowing the specifics of buildings makes it possible to target investments where and when they will make the most impact. The atlas also points out that existing efforts to improve efficiency – like smart meters with time-of-use pricing that changes depending on the time and season – might be useless if your building has massive structural inefficiencies.

But the implications are still broader. Why, for instance, should we force individuals to decide between turning off their refrigerator or their air conditioner when their buildings themselves are energy hogs?

Buildings are becoming more important in reaching climate targets, and should be included in December's Paris climate change talks. And Gov. Jerry Brown has just signed, a new law that requires California to reduce greenhouse gas emissions 40 percent below 1990 levels by 2030. The only way we'll get to that goal is by looking more closely at individual buildings. It will also greatly improve the wellbeing of people who live, work, learn, and play in them.

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