Earth Institute researchers develop interactive map of NYC's energy use

April 2 2012, by David Funkhouser

Midtown Manhattan is red hot; Greenpoint a cool yellow and beige. It's all a matter of energy: A new interactive, color-coded map created by a team at Columbia's engineering school allows viewers to pinpoint and compare estimated energy usage, building lot by building lot, throughout New York City.

The researchers, working under Professor Vijay Modi of the Earth Engineering Center, a center of the Earth Institute, hope the new map will encourage city planners and building owners to seek more efficient ways to produce and use energy by using cogeneration, conservation and alternative energy systems. The map was created by the Modi Research Group.

"The simplest thing we learned [from the map] was that there are possibilities for doing lots of things which are hard to see when you don't look at the big picture," Modi said. For instance, neighboring buildings with large energy demands could team up to install cogeneration systems, which use heat generated from electricity to heat the buildings, cutting energy use.

To use the above map: Zoom in and out using the +/- buttons; click and drag to find a neighborhood; zoom in further to pinpoint a building lot. As you cursor touches the lot, a box will appear for that address showing estimated energy use (based on ZIP code-wide data), and a breakdown of how it's used.

Large institutions such as NYU, with an advantage of both size and varied patterns of energy use, already have started to use cogeneration, which can save them substantially on energy costs. New York State has committed $20 million for combined heat and power generation projects at hospitals, apartment complexes and businesses. The new map reveals some the potential for individual private building owners to join forces to the same end, Modi said.

To build the map, the researchers used data gathered by the Mayor's Office of Long-Term Planning and Sustainability for electricity, natural gas, steam and fuel oil usage. The data is based on average energy use by ZIP code — actual consumption data for individual buildings is not public information.

The researchers then estimated individual property energy use based on floor area and function, said Bianca Howard, a PhD engineering student from Omaha, Neb., who was the principal investigator on the study. The map breaks down energy use into space heating, space cooling, hot water and base electricity – that is, lighting and appliances such as refrigerators, televisions, computers and business machines.

Users can zoom into the map and click on individual blocks or tax lots to see their building's estimated energy use. Dark red areas denote high energy use; yellow and orange, lower consumption. A box pops up to show the ratio of energy used to heat a building or run its lighting and appliances.

The numbers are just an estimated average for buildings in a particular zip code. But map users can pull out their own utility bills and see how actual usage compares to that average. And, perhaps, they can see the potential for cutting those bills through conservation and other means.

Modi said one of the challenges has been regulatory. "Everybody

recognizes the opportunity … but the challenge has been that the cost of doing things in New York is a lot more than the hardware costs. … Technically there may not be a big hurdle, but in New York, it has become a big hurdle for various reasons, and maybe the city can look at ways to reduce the hurdles."

Howard explained the two main goals of the study: "We wanted to get some understanding of the basis of how energy is distributed around the city, so we can find out how we can locate sources of energy generation by the need," she said. That includes looking at more localized sources of power, be it combined heat and power generation, or locations where solar-generated electricity, solar hot water systems or wind power might work well.

And, the study also could help give planners a sense of how much greenhouse gas emissions reductions could be achieved by using these systems.

The next step: upgrading the map to allow individual building owners to enter their actual energy use information online and use it to compare how they're doing. Adding the real data would make the map more accurate, and allow researchers to improve the model they use to estimate energy use in other buildings.

Howard's research is funded by the National Science Foundation through the Integrated Graduate Education and Research Traineeship, a program designed to help students learn how to solve problems using skills in a variety of scientific and engineering disciplines.

Provided by Columbia University

Citation: Earth Institute researchers develop interactive map of NYC's energy use (2012, April 2)

retrieved 7 May 2024 from