Study suggests reducing energy demand in the future may be centered on developing cities

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Credit: Wikipedia.

(Phys.org)—A small team of researchers with members from institutions in the U.S. and Germany has found that the greatest opportunity for reducing predicted energy demands over the next half-century lies with

cities that are still in the development stage. In their paper published in *Proceedings of National Academy of Sciences*, the group describes their study, what they found, and offer suggestions as to how new kinds of city planning could lead to reductions in the predicted amount of carbon released into the atmosphere in the future.

Scientists around the world are very seriously concerned about the amount of carbon we humans are pumping into the atmosphere, leading to global warming and likely other as yet to be discovered problems. Some are also conducting research to look into ways to at least reduce our overall carbon footprint, if not eliminate it altogether. In this new effort, the researchers began by trying to figure out where the biggest contributors will be. They found that it will, quite naturally, be centered around urban areas—cities need more energy than small towns or other rural areas. But what impact will which cities have over the next fifty years or so?

To answer that question, the researchers analyzed data for 274 cities around the world, then sorted them into eight groups based on size, climate, and other factors. In so doing, they found that the best chance of reducing energy use in the future appears to lie with cities that are still small and growing. Larger cities, the group found, are too entrenched to offer much hope of reducing energy use, thus if cities that are still relatively small can be caused to grow in ways that are different from older cities with their huge energy demands, it might be possible to alter forecasts of a tripling of energy use by cities by 2050. They note that most such cities are in developing countries in Africa, Asia and the Middle East.

Still growing cities represent an opportunity, the researchers claim, because the infrastructure is still not in place. Better planning could prevent urban sprawl, for example, eliminating the need for workers to travel long distances to get to their jobs. The team acknowledges that

while the idea is sound, it is not clear if a mechanism exists that could cause such planning to come about in parts of the world where cities often grow as demand dictates rather than as a result of forethought.

More information: Global typology of urban energy use and potentials for an urbanization mitigation wedge, Felix Creutzig, *PNAS*, DOI: 10.1073/pnas.1315545112

Abstract

The aggregate potential for urban mitigation of global climate change is insufficiently understood. Our analysis, using a dataset of 274 cities representing all city sizes and regions worldwide, demonstrates that economic activity, transport costs, geographic factors, and urban form explain 37% of urban direct energy use and 88% of urban transport energy use. If current trends in urban expansion continue, urban energy use will increase more than threefold, from 240 EJ in 2005 to 730 EJ in 2050. Our model shows that urban planning and transport policies can limit the future increase in urban energy use to 540 EJ in 2050 and contribute to mitigating climate change. However, effective policies for reducing urban greenhouse gas emissions differ with city type. The results show that, for affluent and mature cities, higher gasoline prices combined with compact urban form can result in savings in both residential and transport energy use. In contrast, for developing-country cities with emerging or nascent infrastructures, compact urban form, and transport planning can encourage higher population densities and subsequently avoid lock-in of high carbon emission patterns for travel. The results underscore a significant potential urbanization wedge for reducing energy use in rapidly urbanizing Asia, Africa, and the Middle East.