

Air pollution leads to increase in electricity usage, study suggests

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High levels of air pollution are forcing people inside to consume more electricity, subsequently causing even greater environmental problems by increasing greenhouse gas emissions.

This is according to a new study from researchers at Cardiff University who have shown that the effects are seen more in lower-income families and those from ethnic minority backgrounds.

The team say the results should encourage decision makers to think about how policy can prevent inequality from widening in terms of both health risks and financial hardships.

The study, which has been published in the journal *Nature Energy*, examined the [energy consumption](#) of over 4,000 [residential buildings](#) and 17,000 commercial buildings in the city of Phoenix, Arizona between 2013 and 2018.

The Phoenix [metropolitan area](#) has the highest air pollution levels in the United States, with pollution being generated from both natural sources, such as dust storms, and human activities such as [energy](#) generation and transport.

The energy consumption data from the buildings in Phoenix was compared to levels of pollution in the area, allowing the researchers to tell whether households with distinct income levels or from various ethnic groups responded to air pollution differently.

The results showed that higher levels of pollution were associated with higher electricity consumption in residential buildings, with increases mainly happening in the daytime.

Higher pollution levels also resulted in higher electricity consumption in commercial buildings in the retail and recreation industries.

"Our results indicate that when air pollution levels are high, people tend to reduce traveling and shift to indoor activities, which lead to more electricity consumption in general, whether it be from heating, cooling

and lighting or the increase use of appliances" said lead author of the study Dr. Pan He from Cardiff University's School of Earth and Ocean Sciences.

"Lower-income or Hispanic consumers experienced a larger increase, possibly because they have low energy efficiency in their homes and are more exposed to air pollution."

The researchers also examined the impact of [high levels of air pollution](#) on energy supplies, specifically solar panels.

It is believed that solar panels can lose their efficiency as air pollution not only absorbs and scatters the sunlight in the air, but also gets deposited on the surface of the panels which hampers their power generation.

Indeed, the results showed that air pollution reduced the power generated by [solar panels](#) in both the residential and [commercial buildings](#), with the latter less affected potentially because the panels are better maintained and cleaned.

"Our findings show the importance of considering the interactions and feedbacks of consumer behavior and solar energy systems to air pollution issues," Dr. He continued.

"A [cost-benefit analysis](#) when accounting for the damages presented in this paper could produce larger welfare gains from pollution control policies. Meanwhile, it is critical to reduce the socio-economic vulnerability in adapting to air [pollution](#), which can be achieved by improving the energy efficiency in the homes of specific income and ethnic groups."

More information: Pan He et al, Increase in domestic electricity

consumption from particulate air pollution, *Nature Energy* (2020). [DOI: 10.1038/s41560-020-00699-0](https://doi.org/10.1038/s41560-020-00699-0)

Provided by Cardiff University

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