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Could renewable 'power-by-wire' help fix China's air pollution problems?

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Bringing renewable power 'by wire' from western China to its power-hungry Eastern cities could have benefits for both local air quality and global climate change, new research has found.

The study, **published today** in the journal Environmental Research Letters, examined if ongoing power transmission capacity investment in China – driven largely by concerns over air pollution – could also reduce local adverse health impacts from air pollution, and greenhouse gas emissions.

China is the world's top carbon emitter, and suffers from severe air pollution. It recently committed to improve air quality and to peak its CO₂ emissions by 2030. The research team carried out a quantitative evaluation of the potential air quality, health and climate implications of long-distance energy by wire strategies.

Lead author Dr Wei Peng, from Harvard University, said: "We examined one possibility that could potentially address both problems: using long-distance electricity transmission to bring renewable power to the polluted eastern provinces."

"Using cutting edge atmospheric modelling and recent epidemiological data, we found that transmitting a hybrid of 60 per cent renewable power and 40 per cent coal – known as hybrid-by-wire – reduces 20 per cent more national air-pollution-associated deaths, and decreases three times more carbon emissions, than transmitting only coal-based electricity."

The study also found that, although transmitting coal power was slightly more effective at reducing air pollution impacts than simply replacing old coal power plants with newer, cleaner ones in the east, both coal scenarios had approximately the same carbon emissions.

Co-author Professor Denise Mauzerall, from Princeton University, said: "Our findings have several policy implications. First, it's critical that transmission planning is coordinated with renewable energy use to maximise the combined air quality and climate benefits from energy-by-wire plans. This sort of coordination can better exploit renewable resources in remote areas, and maximize climate, air quality and health co-benefits.

"As many countries also need to expand transmission to support greater use of renewable energy, grid planners should consider the air quality implications of investment in transmission capacity in order to increase the co-benefits for health and carbon mitigation."

The researchers also noted that long-distance transmission could lead to other local environmental impacts from power plants in the electricity exporting regions.

Professor Mauzerall said: "For example, relocating coal power generation to arid western regions could exacerbate water scarcity. Alternatively, extensive development of hydropower may have major impacts on local ecosystems. It is extremely important, therefore, that grid planners consider the overall impact of long-distance electricity transmission on the environment at regional, national and global scales."