

# Resurfacing urban areas to offset 150 billion tons of carbon dioxide

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Sun rays appear through the clouds. Scientists sketched a vision on Friday of converting the world's cities into giant sunlight reflectors to help fight global warming but met with scepticism from fellow academics.

Imagine a world where the rooftops and pavements of every urban area are resurfaced to increase the reflection of the Sun's light rays. Well, this is exactly what a group of Canadian researchers have done in an attempt to measure the potential effects against global warming.

In a study published today, 13 April, in IOP Publishing's journal *Environmental Research Letters*, researchers from Concordia University created this scenario to see what effect a global increase in surface reflectance would have on [global temperature](#) and our own [carbon dioxide](#) (CO<sub>2</sub>) [emissions](#).

They estimate that increasing the reflectance – commonly known as albedo – of every urban area by 0.1 will give a CO<sub>2</sub> offset between 130 and 150 billion tonnes. This is equivalent to taking every car in the world off the road for 50 years, assuming a single car gives off around 4 tonnes of carbon dioxide a year.

This could also provide huge financial gains: CO<sub>2</sub> is currently traded at \$25 a tonne meaning savings could be in the range of \$3300 and \$3800 billion dollars. Albedo is measured on a scale ranging from 0 for a non-reflecting, perfectly black surface to 1 for a perfectly white surface. The albedo of all roofs can be increased, on average, by 0.25 and all paved surfaces can be increased by about 0.15. The researchers believe this will increase a city's overall albedo by about 0.10.

Researchers have long proposed that changing the albedo of a surface could be an effective way of reducing CO<sub>2</sub> emissions. A change could effectively cool buildings that would usually retain heat and therefore reduce the use of air-conditioning systems; it could also improve outdoor air quality and offset the warming that the world is currently experiencing.

In this new study, the researchers showed that increasing the albedo of a 1m<sup>2</sup> surface by 0.01 would have the same effect on global temperature, over the next 80 years, as decreasing emissions by around 7kg of CO<sub>2</sub>.

The researchers used a dataset of all global urban areas, called the Global Rural and Urban Mapping Project (GRUMP), to give a realistic estimate of the effects of a global albedo change. In addition to the very large carbon dioxide offset, the researchers calculated a potential decrease in temperature of about 0.07°C

Completely changing the surfaces of all the world's roofs and pavements seems like a mammoth task; however, the researchers believe that it is

possible if promoted in the right ways.

"Typically roofs are resurfaced (or changed) about every 20-30 years; paved surfaces are resurfaced about every ten years. When roofs or paved surfaces are installed, they can be changed to materials with high solar reflectance, typically at no incremental cost," the researchers write.

Lead author Professor Hashem Akbari said: "It is all based on planning, codes and policies. If we really put the nuts and bolts in place, we can get close to 100 per cent of urban areas increasing the albedo of surfaces."

Fast facts:

- Over 50% of the world's population currently lives in urban areas. This is expected to increase to 70% by 2040.
- [Pavements](#) and roofs comprise over 60% of urban surfaces (25% roof and 35% pavement).
- According to the GRUMP model, the combined size of global [urban areas](#) is around 2 million km<sup>2</sup>.

**More information:** The long-term effect of increasing the albedo of urban areas, Hashem Akbari et al. 2012 *Environ. Res. Lett.* 7 024004. [iopscience.iop.org/1748-9326/7/2/024004/article](http://iopscience.iop.org/1748-9326/7/2/024004/article)

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