

Comments on "Potential Relief from Extreme Urban Air Pollution"

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The paper by Ewing (1972) may stimulate the interest of many like myself who live in arctic cities where surface inversions occur on about 70% of the total winter days. Unfortunately, Ewing's estimate for population density is one order of magnitude too small due to an error in his conversion of units. The value of S for surface inversion avoidance, which is $0.16 \text{ cal cm}^{-2} \text{ min}^{-1}$, should be 112 W m^{-2} and not 11.2 W m^{-2} , which makes the required population density about one-third a million per square mile or the power requirement ten times that given by Ewing. This error completely invalidates his subsequent inference that cities already have this population density or the power output. Furthermore, the chances of achieving this density and output in the future are extremely unlikely.

In Fairbanks the total heat dissipated in winter by power plants is about 10^{12} cal per day (50×10^6 BTU per capita per year); this is approximately 50% of the total energy consumed in Fairbanks. Almost all this heat is dissipated through latent heat of evaporation in cooling ponds; it leads to formation of ice fog at temperatures below approximately -30°C . We have considered other ways of dissipating this energy as a means of preventing ice fog and have come to the conclusion that if all the heat output can be concentrated into one area and if technology can be developed to

dissipate heat by only radiation from the surface, then we would be able to avoid radiative cooling in an area of 2 km^2 . For Fairbanks in the winter, the energy required for avoidance of surface inversion is only about 25 W m^{-2} (Wendler and Jayaweera, 1972) compared to Ewing's estimate of 112 W m^{-2} for a warmer city.

I would also like to mention in passing there are other more practical and relatively inexpensive methods proposed for reducing or avoiding radiative cooling. Artificial cloud formation by Dry Ice seeding (Jayaweera and Ohtake, 1972) is applicable for large areas if suitable conditions occur. Also the spraying of water droplets coated with certain chemicals (Mihara, 1966) may be applicable for a small area such as a farm lot where frost may endanger the crops.

REFERENCES

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