

The Invisible Threat: Heat Pollution

The debate surrounding global warming is currently focused on CO₂ emissions and considerable effort is being put into reducing fossil-fuel greenhouse gases by developing renewable energy sources and reducing carbon concentrations in the atmosphere.

However global warming and the climate changes it produces is the result of the heat trapped by these greenhouse gases, and dealing with this heat pollution is generally overlooked in the debate.

Current levels of the heat-trapping gases in the atmosphere, and their longevity, means that even reducing emissions to zero now is unlikely to stop the temperature rising for at least the next 100 years. Only by reducing the amount of heat pollution emitted into the atmosphere can we have sufficient impact to moderate climate change extremes.

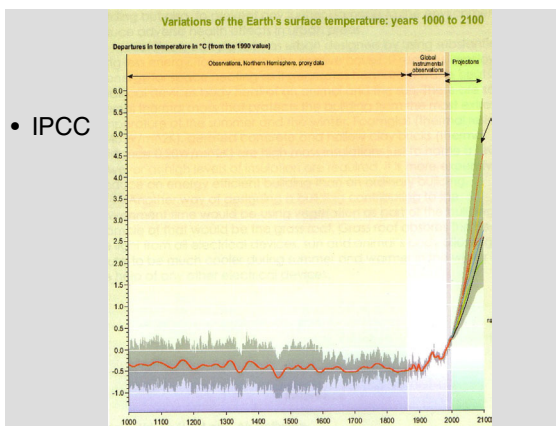
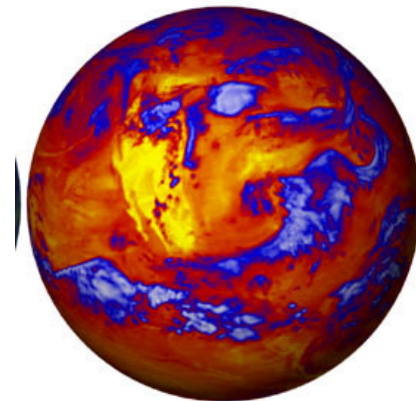
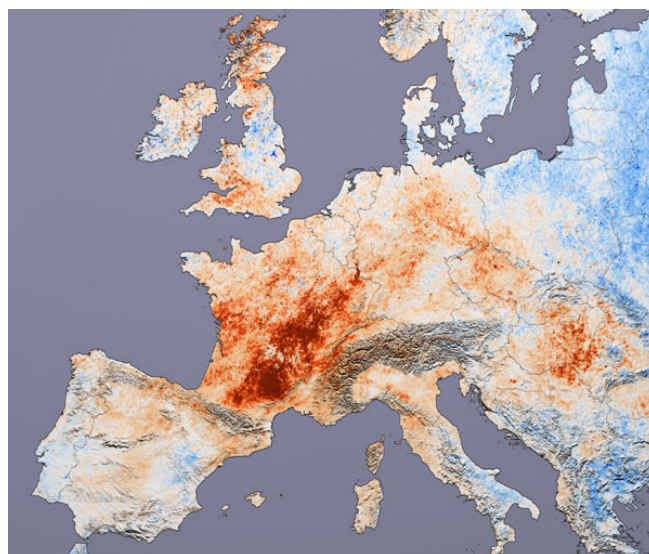


Image 1: temperature rising inexorably



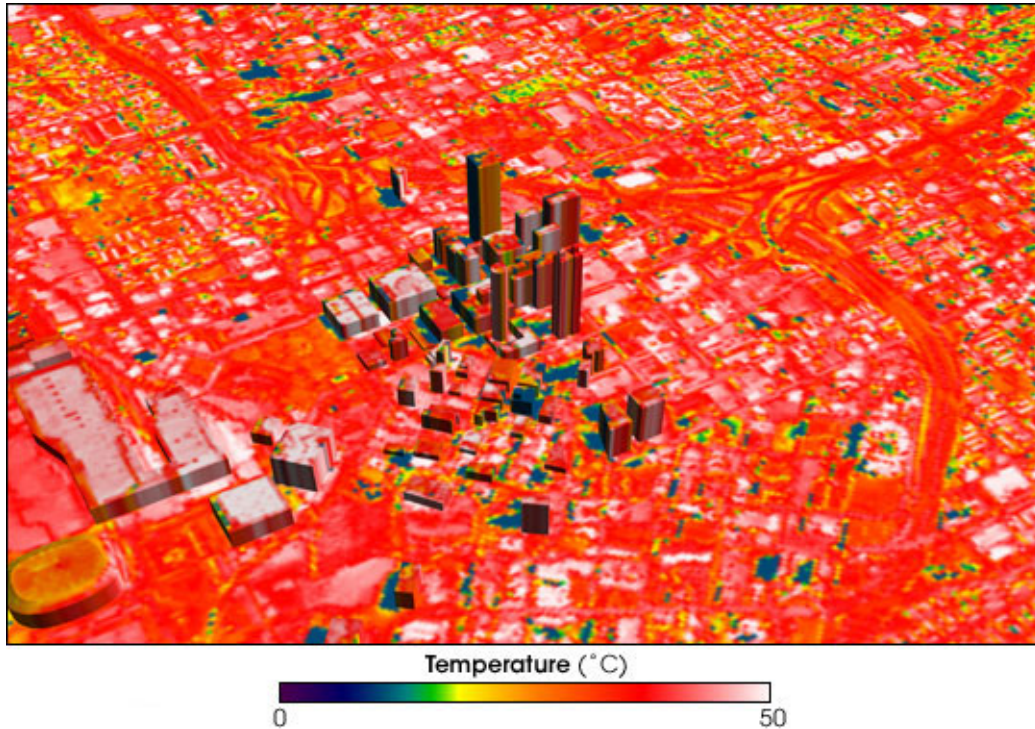
Emitted Longwave Radiation
2: heat emitted by warm US landmass



3: 10C/18F temperatures differences July 2001 and 2003 during heatwave in France: 35,000 excess deaths

Many human activities are heat producing, from industrial processes to household activities and urban lifestyles in general including all forms of transportation, and of course any use of energy irrespective of its source which deposits waste heat in the environment.

One of the key thermal sources is the **urban heat island phenomenon** which traps heat in thermal mass like concrete and black roads which absorb, store and then re-emit this heat to the urban air at night.



4: urban heat Island of Atlanta USA

This hot city phenomenon has far-reaching environmental sustainability and human livability implications, ranging from the aggravation of health problems such as heat stress, increasing the intensity of urban air pollution, and contributing to extreme weather events - in addition to the ever-increasing use of air-conditioners, with flow-on impacts for energy supply, brownouts and greenhouse gas emissions. Because most people on earth live in cities, and each city is also substantially hotter than its natural surroundings, urban contributions to global warming are significant.

Proposed solutions to cool cities include urban greening and low-emission surfaces and cool colors on buildings, rooftops and roads. However, these have had minimal apparent affect to date, and given the rapidly developing and urbanizing nations worldwide, addressing the urban heat island phenomenon is of increasing importance. Urban greening is not a simple affair: it involves major infrastructural, management, maintenance and watering complexities.

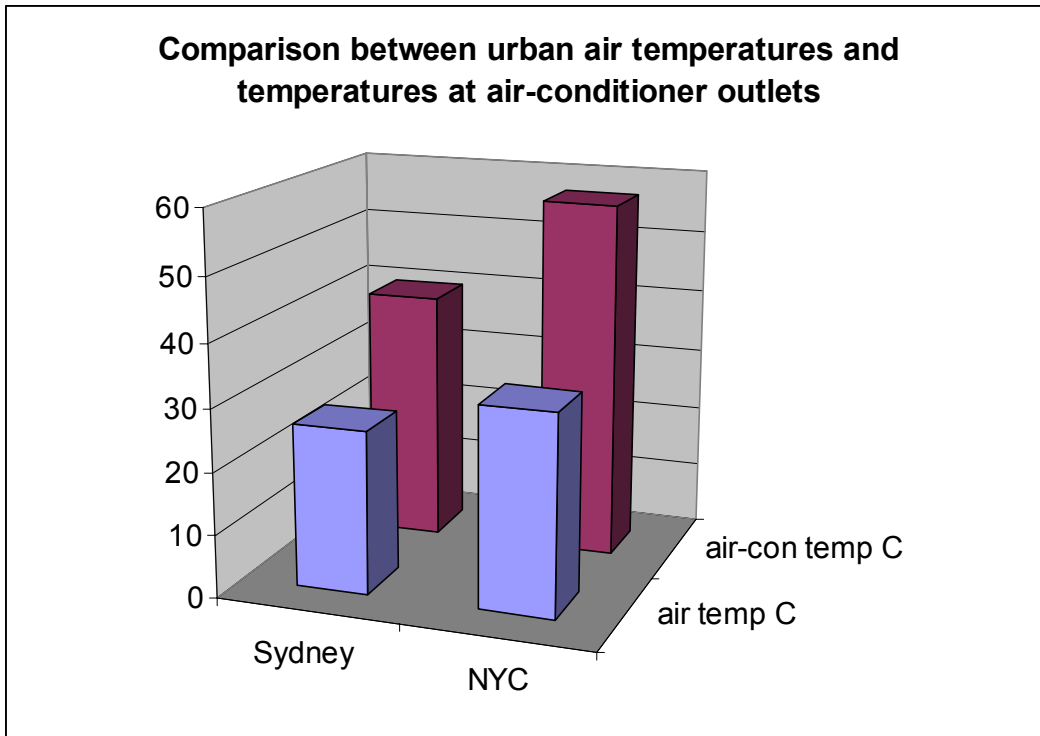


5: waste heat emitted from air-conditioners

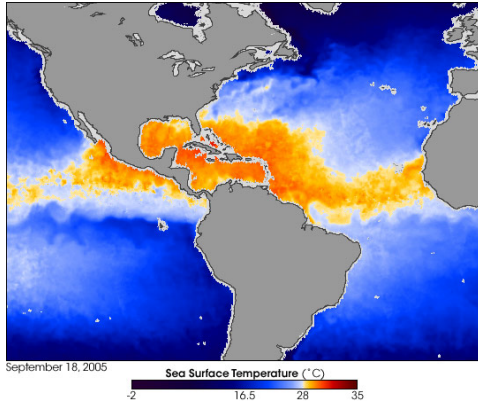


6: waste heat emitted in NYC streets

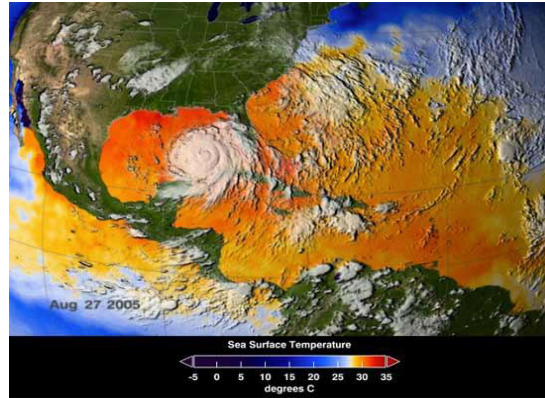
It is essential to develop strategies to capture waste heat before it is emitted into the atmosphere where it contributes to the urban and global warming effect. One strategy is to target the heat emitted at air-conditioning outlets, which essentially concentrate heat from the building, human occupants, machinery, lights, etc, and shift it outside the building - where it adds to the urban heat load.



The global climate is rapidly deteriorating - ice shelves are melting, sea-levels rising, and the Gulf Stream conveyor belt threatened while waves of hurricanes brew over hot oceans, and devastating weather extremes of all natures are more and more prevalent in every corner of the globe.



7: hurricane alley



8: hurricane Katrina



9: Kilimanjaro meltdown: 1993 to 2000

International efforts to mitigate global warming now rely on Kyoto targets which are however so low and unenforceable as to be of little utility except to salve political conscience in the short term, besides earning greening corporations energy dollars from selling carbon credits. However, if capturing and sequestering heat was similarly recognized and rewarded, a rapid amelioration in urban and global climates could result.

An urgent paradigm shift is necessary, recognizing that energy-emissions *and* heat-emissions are both forms of pollution, which work *in unison* to bring about climate change - at global and urban scales. Unless the amount of heat pollution emitted into the atmosphere is reduced, it will continue to silently and invisibly change the climate, beneath the consciousness of the world energy and environmental community.

Image References

- 1: <http://www.ipcc.ch/>
- 2, 3, 4, 7 & 9: NASA Earth Observatory
- 8: www.NewScientist.com
- 5 & 6: Urban-Climature & Energy Inc