Hixon Center for
Urban Sustainability

FACT SHEET

Energy Efficiency for Better Air Quality

Healthy City | **Built Environment**

Climate Issue: Energy Use and Greenhouse Gas (GHG) Emissions

- Global energy use is expected to increase by 27% by 2040
- Fossil fuel combustion for energy production causes GHG emissions and other air pollutants
- These pollutants have dangerous long-term health impacts, causing thousands of premature deaths per year in the U.S.
- Nationwide, buildings account for 40% of all energy use
- Investing in building energy efficiency provides a pathway toward reducing emissions, improving air quality and saving lives.

How to Increase Energy Efficiency

There are three critical ways to increase building energy efficiency:

- Improve appliance efficiency
- Use windows that reduce heat transfer
- Ensure building air tightness to reduce heat transfer, as well as inflow of outside air pollution

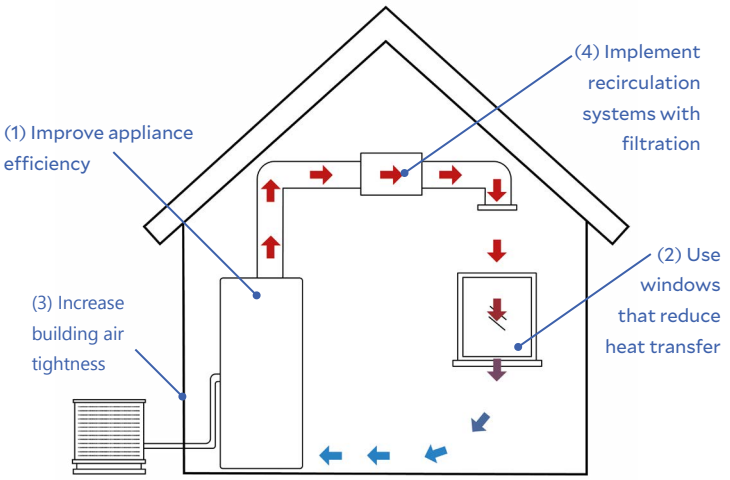
These improvements decrease energy use, thereby reducing fossil fuel combustion. This limits the release of GHGs and other air pollutants, avoiding harmful health impacts.

Resulting benefits for outdoor air quality can decrease annual premature mortality by 3,600 cases in the U.S. Health benefits are pronounced in the Midwest and Middle Atlantic regions.

Without Planning, Energy Efficiency Can Worsen Indoor Air Quality

- Ensuring building air tightness is critical for improving energy efficiency, but it can also trap appliance emissions indoors
- Forced-air recirculation systems spread these trapped emissions throughout buildings, worsening indoor air quality
- Installing recirculation systems with filtration can clean the air, mitigating negative health impacts
- Applied widely, these improvements to indoor air quality can save an additional 1,500 lives annually in the U.S.

Interventions for Outdoor & Indoor Air Quality



IN A NUTSHELL

- Fossil fuel combustion for energy production causes pollution that worsens air quality and kills thousands
- Decreasing energy needs through appliance efficiency, high-performance windows, and building air tightness reduces pollution. This improves air quality and saves lives
- Ensuring building air tightness can worsen indoor air quality by trapping emissions inside. Health impacts can be avoided by installing recirculation systems with filtration.

WHAT CAN YOUR CITY DO?

SET ambitious local standards for appliance energy efficiency

UPDATE construction practices to ensure building air tightness

PROVIDE guidelines for indoor air quality

OFFER strategic retrofitting incentives for recirculation systems with filtration.

To find out more information on this case study, contact **Kenneth Gillingham** at **kenneth.gillingham@yale.edu**. Case study based off K. T. Gillingham, P. Huang, C. Buehler, J. Peccia, D. R. Gentner (2021) "The Climate and Health Benefits from Intensive Building Energy Efficiency Improvements," Science Advances, 7 (34), doi: 10.1126/sciadv.abg0947.