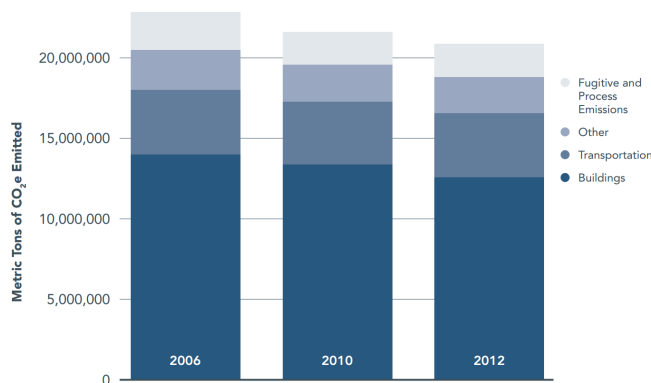


80 BY 50 ANALYSIS SUMMARY

Leading cities around the country – and world – are making aggressive commitments to reduce greenhouse gas emissions 80 percent by 2050. As the City of Philadelphia prepares to set a new carbon reduction goal in 2016, the Mayor's Office of Sustainability partnered with Drexel University to better understand the feasibility of this goal in the Philadelphia context. Drexel completed an analysis of how the city might meet the 80 by 50 target; those findings are available on Drexel's website, and are summarized below.

Citywide Emissions, 2006 - 12



WHY 80 BY 50?

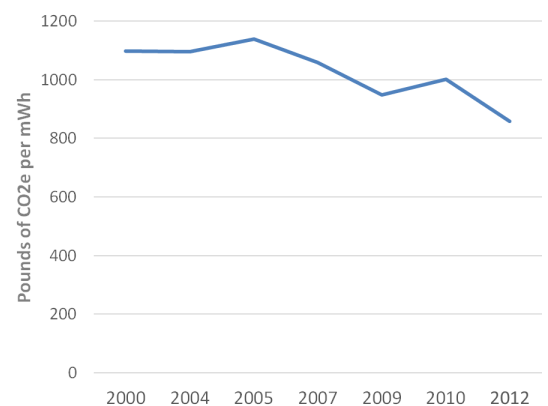
As part of *Greenworks*, Philadelphia's comprehensive sustainability plan, the city set a goal to reduce greenhouse gas emissions 20 percent from 1990 and 2006 baselines by 2015. While emissions have declined (see sidebar), Philadelphia has not reached the *Greenworks* goals. To meet our local, national, and global climate goals, more aggressive action is necessary. The 80 by 50 commitment is an emerging international standard for deep carbon reductions at the local level.

SOURCES OF GREENHOUSE GAS EMISSIONS

To achieve this goal, Drexel researchers evaluated the potential for reduced carbon emissions across three sectors:

- **Energy usage in buildings:** Philadelphia's buildings account for 60 percent of the city's greenhouse gas emissions, making this sector the single-great opportunity for meeting the 80x50 goal. One way to reduce those emissions is by improving the energy efficiency of Philadelphia's building stock. Drexel built on ASHRAE analysis of building retrofits to evaluate the potential for deep retrofits across each of Philadelphia's building sectors.
- **Transportation emissions:** Transportation is the second-biggest source of carbon emissions in Philadelphia. Drexel analyzed two key pathways for transportation emissions reductions: greater adoption of emissions-free mode choices (e.g. walking, biking, and transit) and the conversion of many or all of Philadelphia's vehicles to plug-in electric cars.
- **Regional electricity grid:** Emissions from buildings (and increasing from electric vehicles) can also be reduced by investing in a cleaner electricity grid. Philadelphia's regional grid is already cleaner than it was 15 years ago (see sidebar), and this process will accelerate through the EPA Clean Power Plan.

Carbon Intensity of Electricity Grid



Between 2000 and 2012 (the most recent data available), the pounds of carbon dioxide-equivalent emitted through the generation of a megawatt of electricity declined 28 percent; this trend will accelerate through the implementation of EPA's Clean Power Plan, though more aggressive action will be required to meet the 80 by 50 target.

FRAMEWORK FOR DEEP CARBON REDUCTIONS

Through the analyses above, Drexel identified numerous possible scenarios for deep emissions reductions. By focusing first on those scenarios where reductions were cost-neutral or revenue-generating, Drexel recommended the following strategies* for meeting the 80 by 50 target:



CLEAN ELECTRIC GRID

There are several pathways available to decarbonize the electricity grid. The most-effective method based on current projects is on-shore wind generation, where widespread deployment could reduce emissions 11 percent. Increased investment in off-shore wind, hydroelectricity, and solar power could result in a 97 percent reduction in emissions from the electricity grid by 2050.

A cleaner grid will lower emissions associated with the electricity used to power buildings and electric vehicles, helping achieve Drexel's second two recommendations:



ENERGY EFFICIENCY RETROFITS

Energy usage reductions of between 30 and 50 percent are possible across a number of building sectors. Reductions in hospitals, schools, grocery and retail establishments can be funded through the cost savings from efficiency gains, while deeper reductions in commercial office buildings may require additional investment.



PLUG-IN ELECTRIC VEHICLES

Given current technology and pricing, Drexel's analysis found the cost of widespread uptake in plug-in electric vehicles (EVs) to exceed the benefits, even with the social cost of carbon factored in. Nonetheless, at least a modest increase in EV adoption will be necessary to meet the 80 by 50 goal. Given the current high cost of EVs, Drexel recommends focusing first on grid efficiency and building retrofits while the market for plug-in vehicles develops.

NEXT STEPS

The current *Greenworks* emissions targets conclude in 2015. As the Mayor's Office of Sustainability prepares to establish new short- and long-term greenhouse gas emissions goals as part of a new sustainability plan, Drexel's analysis helps the City to contextualize the feasibility of aggressive reductions and understand what policies would need to be undertaken to realize those goals.

The work completed by Drexel University provides a broad framework, but further analysis is necessary to develop a robust plan of action for achieving deep emissions reductions in Philadelphia. The City will continue to evaluate opportunities for further research to better understand specific programs and policies that will best achieve long-term emissions reductions.

* This is a summary of Drexel's analysis, which provides more in-depth and nuanced recommendations in the Comparison of Options section of the report (beginning on page 55).

Drexel Report on 80 by 50 Analysis

Options for Achieving Deep Reductions in Carbon Emissions in Philadelphia by 2050

Prepared by Drexel University for
The Philadelphia Mayor's Office of Sustainability
November 2015



Drexel University
The Institute for Energy
and the Environment

Drexel's complete analysis of pathways toward an 80 by 50 goal can be read online at <http://drexel.edu/txe/news/events/>.

SCOPE OF EMISSIONS CONSIDERED

Emissions are categorized by their scope, which varies based on their source. Scope 1 emissions are directly emitted from sources that are owned or controlled by the entity, typically through burning fossil fuels on site and through entity-owned or entity-leased vehicle use. Scope 2 emissions are indirect emissions resulting from electricity, heating and cooling, or steam generated off site but purchased by the entity. Scope 3 emissions include indirect emissions from sources that are not owned or controlled by the entity but are related to the entity's activities.

Drexel's analysis was primarily focused on the first two emission types and based on accepted international standards for carbon accounting. However, Scope 3 emissions (e.g. air travel taken by Philadelphia residents or emissions required to produce goods consumed in Philadelphia) should be considered in future inventories as standards and data availability allow.

CONTACT

For more information about the Mayor's Office of Sustainability and *Greenworks Philadelphia*, visit www.phila.gov/green, email our office at mos@phila.gov, or call 215-686-3495.