

ARE THERE URBAN POLICY SOLUTIONS FOR CLIMATE CHANGE?

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More than half the world's population is urban. We in cities are responsible for three quarters of global energy consumption and 80 percent of greenhouse gas emissions. As much as climate change is a global problem, it is disproportionately an urban problem with solutions rooted in urban public policies. As with the rest of the fully industrialized world, many of the problems and opportunities rest not only with national and state governments, but also with municipal governments.

From the local perspective, fighting climate change means enacting policies of both mitigation and adaptation. The purpose of this essay is to identify cities on the leading representing prominent cases of climate change mitigation and adaptation and to critique their policy approaches. For inspiration, it is instructive to examine leading European cities. Europe resembles the US several important ways--climate, population and economic development, and standard of living--and faces the same environmental problems. At one time, the US was the global leader in responding to environmental problems. In the current century, Europe has overtaken the US in developing innovative responses to the imminent challenge of climate change.

ADAPTATION

The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as "the process of adjustment to actual or expected climate and its effects" (IPCC, 2014). For communities, this means doing what we can to live with and minimize the destruction and suffering that comes from climate change. Every region must contend with its own set of environmental impacts resulting from anthropomorphic climate change, including sea level rise and increased wildfire risk. However, some of the effects of climate change are universal, and certain municipalities have been leaders in addressing these challenges.

Extreme Heat. Barcelona is a compact city with a population of 3.2 million, half in the central city and half in the greater metro region. Another 9 million tourists visit annually. In summer months, the central city can be 8 degrees hotter than the surrounding areas because of the urban heat island effect. It is estimated the average daily temperature will increase 2 degrees by 2050 if no action is taken (City of Barcelona, 2018).

One way Barcelona is adapting to extreme heat is by building upon its iconic street grid and assembling neighborhood Superblocks. Each of the nine superblocks excludes automobile traffic, except around the perimeter, and interior streets are reserved for bicycles, buses, and pedestrian malls. This allows much of the street to be converted to playgrounds and green space. Even though the plans were initially opposed by car owners and some business groups, the number of retail business increased by 30 percent after the first three superblocks were completed. Hundreds of other potential superblocks are being studied.

Climate justice is another priority for Barcelona. An estimated 11 percent of residents suffer from energy poverty, meaning they cannot afford to cool their homes to 25 degrees (c) summer or heat their homes in winter. Heat waves can turn deadly, with elderly residents dying at a 36 percent higher rate than the overall population. In 2018, the city approved a Climate Plan with a goal of eliminating energy poverty by 2030. A city-owned company was established to supply electricity to 20,000 homes, and new transportation services for vulnerable residents are being funded (City of Barcelona, 2018).

Extreme Precipitation. With its plan to become carbon-neutral by 2025, Copenhagen was known as an early leader among cities for climate change mitigation. Shortly after the ambitious CPH Climate Plan was proposed, a devastating rainfall event underscored the need for aggressive climate adaptation. One summer day in 2011, the city experienced 6 inches of rain in two hours, causing over \$1 billion in damage.

When the city approved its Climate Adaptation Plan later that year, meteorological models were forecast a 50 percent increase in rain in the winter months and a 40 percent decrease in summer, although intense events like the 2011 cloudburst were predicted to occur with greater frequency. The Climate Adaptation Plan identifies three levels of preparation: For high-risk weather events, taking measures to prevent damage, such as expanding sewer capacity and separating sewers from stormwater systems. Where damage from extreme precipitation is inevitable, it means taking measures to minimize the impact and reduce overall vulnerability (City of Copenhagen, 2017).

To implement the adaptation plan, a water tax was levied to fund over 300 projects around the city. Green spaces and recreation areas were transformed into dual-use facilities, where they could serve as flood basins. Residents were invited to participate in the planning process and identify additional spaces that could provide water detention during heavy rain. The tax was expected to be offset by lower insurance premiums (City of Copenhagen, 2017).

MITIGATION

Mitigation policies are those which address the root cause of the problem, rather than dealing with its effects. With regard to climate change, mitigation is defined as “human intervention to reduce the sources or enhance the sinks of greenhouse gases” (IPCC, 2014). If adaptation means bailing water from a leaking boat to avoid sinking, mitigation is plugging the leak and repairing the boat.

Renewable Energy Targets. Worldwide, hundreds of cities have set minimum standards for renewable sources in their energy portfolios. The most ambitious have pledged to eliminate fossil fuels entirely and committed to timetables and deadlines. However, they have embraced various targets and strategies for fulfilling their promises. Cities have been able to choose renewable sources through Power Purchasing Agreements (which have also become common in the US) but many cities have leveraged these arrangements to decarbonize their municipal operations and impose green procurement requirements.

Sweden's third-largest city, Malmo, pledged to become carbon-neutral by 2030, with renewables supplying 100 percent of its energy city-wide. Malmo had already been a showcase for renewable energy for several years before making its commitment to carbon neutrality. Building codes mandated solar power be included in new construction, and a municipal waste incinerator provided the baseline of power needed to phase out coal from the city's energy portfolio by 2009. Located just across the Oresund Straits from Copenhagen, the city also had access to ample power from offshore wind turbines, including the Middlegrunden Offshore Wind Farm, which was the largest in the world when it opened in 2000. In 2020, a milestone was passed when it became the first European city to power municipal operations entirely with renewable sources. Malmo was one of several cities which showed leadership by decarbonizing their municipal operations first – before extending its renewable energy target city-wide.

The first national capital to commit to carbon neutrality was Oslo, which announced its plan to decarbonize in phases. In 2016, the City Council adopted a plan to reduce carbon emissions by 50 percent below 1990 levels, and 95 percent by 2030. They were able to accomplish this because of an innovative program of "climate budgets." The first climate budget for 2017, set reduction targets for three areas: transportation, buildings, and resources—which consists of landfills, waste and wastewater—and each subsequent budget has required lower emissions targets (C40, 2018). The city took the lead by adopting a green procurement policy and requiring all construction projects to be free of fossil fuels in 2017 (Klima Oslo, 2019). Other cities have developed climate mitigation strategies based on decarbonizing the three main sectors which use the most energy: The power grid, transportation, and the heating and cooling sector.

Heating and Cooling. Cities in high latitudes or extremely hot regions may consume up to half their energy for heating and cooling. This presents an opportunity to phase out fossil fuels by replacing existing systems with electric heat pumps, which can be powered with renewable energy.

Barcelona was the first city to mandate solar thermal heating systems. An ordinance in 2000 required 60 percent of energy used to heat water in new and renovated buildings, without specifying the technology to be used. The initiative was aided by Spain's national program of feed-in-tariffs, which guaranteed developers a return on their investments. Because the heating and cooling sector accounts for a particularly large portion of the city's energy use, the widespread adoption of solar thermal technology represented a significant stride toward carbon neutrality. Barcelona subsequently determined it would shift this sector to 100 percent renewable energy, a goal now within reach (City of Barcelona, 2018).

Transportation. Perhaps the most difficult sector to decarbonize is transportation. Urban road transport is responsible for 37 percent of all carbon emissions from transportation sources, and for many cities, road vehicle traffic is the main source of air pollution. For megacities such as Mexico City, Sao Paolo and Delhi, road transportation uses more energy than the city's power grid. One path to a more sustainable transportation network is to replace diesel and petroleum powered buses, but there has been little interest in this outside of China. More than 95 percent of the electric buses procured worldwide are operating in Chinese cities (REC 2019).

No city has managed to fully decarbonize its transportation sector, but London and Brighton have committed to 100 percent carbon-free transportation by 2030. Brighton's approach was to power its bus fleet with biodiesel. In London, all city buses were hybrid or electric in 2020, and beginning in 2025, all new buses procured are to be electric or hydrogen powered. London already made significant strides by reducing automobile traffic through a mixture of congestion pricing and vehicle bans during certain hours. The Mayor's Plan for London is for 80 percent of all trips to be on public transit, bicycle, or foot, by 2041 (Mayor of London, 2018).

Electric Power. For most big cities, the largest source of energy demand is its electric grid. Long before the Paris Agreement, Copenhagen enacted and implemented a plan to achieve carbon neutrality by 2025. This included a target of a 20 percent reduction in carbon emissions from 2005 by 2015, which was met and exceeded. By 2018, annual carbon emissions had been reduced by 38 percent compared to 2005, despite a growth in population of 16 percent (C40, 2018). The savings were achieved by conservation measures, such as replacing incandescent lights with LED devices, as well as increased reliance on wind, solar and biomass. Wind, both onshore and offshore, is the source of more than half of Copenhagen's power, and the city plans to add 100 more wind turbines by 2025.

CONCLUSION

There are abundant examples of innovative local climate policies in the US, but even the most progressive communities lag behind the accomplishments described here. A recent report on the US Sustainability Development Goals rated the 100 largest metropolitan areas in the country according to 16 indicators. For each of the criteria, cities were rated poor, moderate, or good with a lone exception: For the indicator, "Climate Action," all 100 cities were rated "poor" (Espey, et al. 2018). Certainly, a coordinated national and regional policy is essential for the US to effectively mitigate and adapt to climate change, but the European cases show how much can be accomplished when ambitious measures are taken where most people live and work.

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