

The Health Benefits of Climate Action

Taking action to address climate change can have significant health benefits that present important opportunities for addressing key public health issues. These health benefits are often referred to as “cobenefits.” “Cobenefits are the public health (or other) benefits associated with GHGE reductions, independent of reductions to global warming.”¹ Cobenefits provide a framework for intersectoral partnerships and increased support for climate mitigation.

5.1 Transportation

Transportation systems determine how people and goods get from place to place, and impact access to jobs, school, and essential services and resources. Today’s transportation system causes injury and illness from air pollution, motor vehicle collisions, sedentary behavior, noise, and stress. Current land use, transportation, and housing patterns have increased our dependence on automobiles. Historical investments in road infrastructure and inadequate investments in public transit and bicycle and pedestrian infrastructure have resulted in a vehicle-centric transportation system that will require investment and behavior change to become a healthy and climate-friendly transportation system.

Key Messages

- Transportation is the largest source of GHGE in the U.S., accounting for 28.5% of emissions.
- Low-income families spend more of their income on transportation, have more exposure to vehicle pollution, and are at higher risk of injury and death due to collisions.
- Car-dependent land use, housing and transportation patterns increase sedentary lifestyles, increasing premature mortality and many chronic disease risks.
- Reduced car use is a priority, yielding significant health and climate benefits, such as increased physical activity and reduced emissions.
- Reduce transportation-related emissions through low and zero emission vehicles, low carbon fuels, and clean freight, also reduces respiratory and cardiovascular disease

Transportation and Climate Change

The transportation sector is now the largest (and fastest growing) source of U.S. GHGs; in 2016, it caused 28.5% of all U.S. GHG emissions.² The majority (82.7%) of U.S. transportation-related GHG emissions are attributable to cars, light-duty trucks, and heavy-duty freight vehicles.³ Other GHGE sources include cement production and roadway impacts on deforestation.⁴

TRANSPORTATION AND DESIGN

Impacts on Climate Change and Health

AUTOMOTIVE TRANSPORTATION



Driving releases harmful pollutants into the environment. People both inside and outside the vehicle are exposed.

- CLIMATE IMPACTS:**
Increases Traffic, Increases Pollution
- HEALTH IMPACTS:**
Decreases physical activity
Increases chronic disease risk
Worsens existing chronic disease

Many people can be transported at once via mass transit, reducing vehicles on roads. This form of transportation also encourages walking between stops and destinations.

- CLIMATE IMPACTS:**
Reduces Traffic, Reduces Pollution
- HEALTH IMPACTS:**
Increases physical activity (slightly)
Increases safety, Decreases stress
Increases social interaction

MASS/PUBLIC TRANSPORTATION



Walking, biking, and rolling to the places we need to go is termed active transportation. People who have options to reach their destinations without driving can have more active lifestyles. Active lifestyles promote healthier lives.

- CLIMATE IMPACTS:**
Reduces Traffic, Reduces Pollution
- HEALTH IMPACTS:**
Increases physical activity, Decreases chronic disease risk, Decreases stress, Increases social interaction

ACTIVE TRANSPORTATION



Communities are designed with health in mind. All modes of transportation, particularly safe forms of active transportation, are weighed. Designs promote green space (including parks or areas with trees and gardens).

- CLIMATE IMPACTS:**
Decreases Distances Traveled, Reduces Pollution
- HEALTH IMPACTS:**
Decreases chronic disease risk
Increases safety

HEALTHY COMMUNITY DESIGN



APHA, American College of Sports Medicine, Climate for Health, ecoAmerica 2017

Transportation and Health

Too little physical activity is associated with heart disease, stroke, diabetes, obesity, osteoporosis, depression and all-cause mortality. As of 2017, only one-third of people in the U.S. regularly achieved recommended moderate physical activity levels.⁵ Exposure to traffic related air pollutants increases the risk for heart disease, asthma and other respiratory disease, cancer, premature death, adverse birth outcomes, diabetes, and affects lung and brain development in children.⁶ Motor vehicles crashes are the top cause of injury, disability, and death in the U.S. for 5–24 year olds.⁷ Long commutes and traffic increase stress and isolation from family and community.⁸ Pavement contributes to urban heat islands (See Section [5.4—Urban Greening](#)).⁹

Transportation and Health Equity

Low-income individuals and people of color are more likely to live near busy roadways and face disproportionate impacts of motor vehicle pollution.^{10,11} Low-income people, people of color and children face greater risk of death and injury due to motor vehicle crashes.^{12,13} Low-income families often have few low-cost transportation options, and almost 30% of their income goes to transportation.¹⁴

Reducing Transport-Related Climate Pollution and Improving Health

One of the best ways to improve our health and reduce climate pollution is to spend less time driving cars and more time using “active transportation”—walking, biking, and using public transit. Modest shifts in travel mode from car travel to active transportation provide big reductions in chronic disease.

- Nearly 28% of all trips in urban areas are less than one mile, easy bicycling distance.¹⁵
- Walking, biking, and public transit must be safe to ensure that expanding active transportation doesn’t lead to more injuries. In 2015, approximately 18% of automobile crash fatalities included pedestrians and bicyclists.¹⁶
- “Complete Streets” make streets friendly for all users; better road and sidewalk design, segregated bike lanes, lighting, shade, and bike parking make biking and walking safer and more pleasant.¹⁷
- Programs such as “Safe Routes to School” allow parents to feel that children can safely use active transportation to get to school.¹⁸

Due to the high cost of driving, low-income people are more frequent users of active transportation. Better service, safety, affordability, and accessibility allows low-income people, youth, seniors and the disabled better access to resources and opportunities. Free or discounted public transit fees for students also increase school attendance and decrease contact with the juvenile justice system.¹⁹

Zero-emission vehicles and hybrid low carbon vehicles reduce air pollution and climate pollution. Zero-emission vehicles (battery electric and hydrogen fuel cell) produce zero tailpipe smog-forming or greenhouse gas emissions. Using today’s average U.S. electricity mix of renewable and non-renewable resources, an electric car will cut harmful carbon pollution by about half compared to the average new vehicle.²⁰

Low carbon fuel standards and automobile fuel efficiency standards reduce air pollution and climate pollution. The EPA’s Low Carbon Fuel Standards Program 2017–2025 model year light-duty vehicles are projected to save approximately 2 billion metric tons of GHGs over the lifetimes of the vehicles; however, in May 2018, the EPA proposed a roll back on these cleaner car standards.^{21,22}



Traffic Jam in NYC
joiseyshowaa, 2011



Active Transportation
Myleen Hollero

What Local Health Departments Can Do

Local health departments can play a critical role in moving toward a healthy, equitable, and climate-friendly transportation system.

Assessment and Surveillance

See Section [7.1—Surveillance](#)

- Implement walkability and bikeability assessments, noting sidewalk width, shared and protected bike lanes, crosswalks and walk signs, aesthetics and shading, and connectivity and accessibility of sidewalks and bike routes.²³ Multiple tools are available to assess streetscape design and walkability, including the [Microscale Audit of Pedestrian Streetscapes-Mini Tool](#).²⁴
- Conduct health assessments to identify health benefits and potential health harms of transportation policies and programs proposed during the development of city and county Climate Action Plans, General and Specific Plans, Regional Transportation Plans, Bike and Pedestrian Master Plans, and others.
 - The Clackamas County Public Health Division in Oregon partnered with the county’s Department of Transportation and Development to conduct a Health Impact Assessment, which prompted the agencies to recommend that the county build more sidewalks, improve lighting along paths, and enhance safety mechanisms at cross-walks.²⁵
- Use available data to show the health impacts of transportation in your community, including the disproportionate impacts on children, low-income communities, and people of color.
- Use the Integrated Transport and Health Impacts Model (ITHIM) to quantify the health benefits and harms of different transportation planning scenarios or mobility goals and vehicle miles traveled reduction targets.²⁶
- Assess the health impacts and benefits of shifts in transportation technology and infrastructure, including shifts from gas and diesel motor vehicles and trucks to low or zero emission vehicles and anti-idling ordinances.²⁷

Intersectoral Collaboration

See Section [7.3—Collaboration](#)

Collaborate with planners, zoning, transportation agencies, and school districts to support:^{28,29}

- Active transportation programs and infrastructure, including Complete Streets, safe routes to school, bike lanes, bike shares, segregated bike lanes, safe pedestrian sidewalks, traffic calming, and signage, lighting and shading on biking and walking paths.
 - In Alexandria, VA, the health department was part of a cross-agency partnership to implement a 58-step action plan to expand Safe Routes to School and eliminate all traffic-related fatalities and serious injuries by 2028.³⁰
 - In Helena, Montana, the local public health department collaborated with parks, public transit, and other community stakeholders to improve access to the trail system, creating a free trolley system for youth to access trails, pools, parks, libraries, and other activities.³¹
- Investments in transit infrastructure, maintenance, and access, including reduced transit fares/passes for students and low-income people.
- School siting in walkable, bikeable, transit-friendly locations.

Work with local planning, housing, transportation, and community development agencies and community-based organizations to support policies that encourage density and mixed land use to allow more people to live closer to jobs, schools, services, and parks, including infill and transit-oriented development.

- Anti-displacement measures and affordable housing are critical to ensure that low-income residents are not displaced through gentrification, as “smart growth” and new amenities may increase property values.³²
- Promote inclusion of trees, parks and green space, and space for community gardens.

Provide health evidence and data to support:

- Lower speed limits.
- Strengthening of low carbon fuel standards and vehicle efficiency standards.
- Strategies to increase the use of electric vehicles such as electrification infrastructure and financial incentives, including mechanisms that allow low-income populations to benefit from electric vehicle ownership, such as enhanced rebates and charging stations in multi-unit housing.³³

Community Engagement and Education

See Sections [7.2—Engagement](#) and [8—Communications](#)

- Educate communities on the health and climate [benefits of active transport](#) and provide resources regarding local bike share programs and bike lanes, walking paths, and public transit.³⁴
- Inform local decision makers about the connections among transportation, climate change, health, and equity.
- Promote pedestrian and bicycle safety

- Provide opportunities for community residents—especially youth and seniors—to conduct walkability assessments.
 - In 2007, the Iowa Department of Public Health developed a tool for local health departments across the state to use in assessing the walkability of their communities. Thirteen communities utilized the tool, and many of these communities went on to engage city officials on improving active transport infrastructure.³⁵
- Support community based organizations that advocate for active transportation

For More Information:

- [Healthy, Equitable Transportation Policy: Recommendations and Research](#)³⁶
- [Getting Involved in Transportation Planning](#)³⁷
- [APHA's at the Intersection of Public Health and Transportation](#)³⁸
- [APHA, American College of Sports Medicine, and ecoAmerica: Changing Climate through Healthy Community Design and Transportation factsheet](#)
- [APHA's Transportation and Health Case Studies](#)³⁹
- [CDC, USDOT, and APHA's Transportation and Health Tool](#)⁴⁰
- [Partnering with Metropolitan Planning Organizations to Advance Healthy Communities](#)⁴¹
- [U.S. Climate and Health Alliance's State Policy Initiative, Transportation Resources](#)⁴²



Coal Transport in Wyoming
Kimon Berl, 2009



Children Learning About Solar Panels, Reno, Nevada
Jessica Reeder/BlackRockSolar (CC BY 2.0)

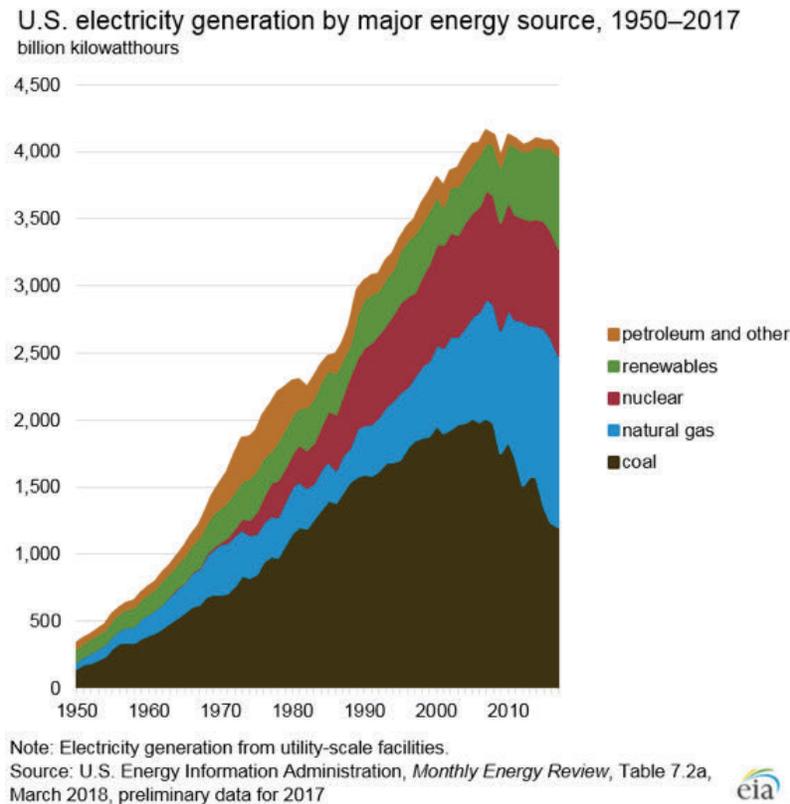
5.2 Energy and Fossil Fuels

Electricity generation is responsible for 28% of U.S. greenhouse gas emissions (GHGE), almost all of which is associated with the burning of dirty fossil fuels (Figure 5.2.1).¹ Fossil fuels—coal, oil, and gas—are fuels that were formed when prehistoric plants and animals died and were gradually buried by layers of rock.² As of 2017, coal provides 30.1% of U.S. electricity, although its use is declining due to the cheap cost of natural gas.³ A significant reduction in our reliance on fossil fuels for transportation, electricity, heating and other uses of energy is vital to make progress in fighting climate change.

Key Messages

- Switching from coal combustion and other fossil fuels to clean, safe, renewable energy—like wind, solar and hydroelectric—is essential for our health and for the climate.
- Energy efficiency and clean renewable energy have substantial benefits for health, including reductions in asthma and other respiratory disease, cardiovascular disease and premature deaths.
- Energy production is the largest source of climate pollution in the U.S., responsible for nearly 1/3 of greenhouse gas emissions.
- Coal-fired power plants release 3.5 million tons of CO₂ per year, the most significant climate pollutant.
- Energy production is a major source of air, water, and soil pollution, and harms our health.
- Air pollution from burning coal causes over 13,000 deaths and 20,000 heart attacks in the U.S. each year.
- Increased energy efficiency (in homes, offices, and industry) allows us to meet our energy needs at lower cost and with less climate and air pollution.

Figure 5.2.1: Types of fuels used in electricity production



Energy and Climate Change

Coal

Coal combustion is a major source of GHGE and of toxic air pollutants.⁴ Coal produces more carbon dioxide per unit of energy than any other energy source, producing nearly 68% of CO₂ from U.S. electricity production but only 30% of electricity.^{5,6} Coal mining releases methane—a potent short-lived climate pollutant with a global warming potential far higher than that of CO₂—and contaminates land, water, and soil in nearby communities.⁷

Oil

Oil well exploration, offshore oil platform, and oil well production operations and refinery processes result in significant CO₂ and methane emissions.^{8,9,10} Transporting oil by truck, rail, or marine vessels also results in significant CO₂ emissions.¹¹

Natural Gas

Natural gas has been proposed as a “bridge fuel,” producing significantly lower CO₂ emissions than coal.¹² But recent findings suggest that the methane released during the lifecycle of natural gas use may have a climate impact even greater than that of coal. Methane is a potent short-lived climate pollutant with a global warming potential far higher than that of CO₂.^{13,14} In 2011, leaks from high pressure natural gas pipelines resulted in emissions equivalent to 33.3 million metric tons of CO₂ (or the CO₂ emissions from 6-7 millions cars).¹⁵

The Aliso Canyon Gas Leak

In October 2015, the largest methane leak in U.S. history occurred at the Aliso Canyon natural gas storage facility in Los Angeles County, California, releasing over 100,000 metric tons of methane. Thousands of families were evacuated from their homes, and many nearby residents suffered from symptoms such as nausea and headaches that the Los Angeles County Department of Public Health (LADPH) linked to exposure to high levels of mercaptans—odorants used in natural gas.

Researchers at the University of Southern California School of Medicine have raised concern about exposures to contaminants and byproducts such as hydrogen sulfide, benzene, and other volatile organic compounds.

Renewable Energy

Across their life cycles, renewable energy sources produce significantly less greenhouse gases than fossil fuels. A study of new renewable energy resources implemented across the U.S. in 2013 found that these additions resulted in emissions reduced by 59 million metric tons of CO₂ equivalent and \$0.7 billion to \$6.3 billion in benefits for that year.¹⁷

Other Considerations

Globally, oil, gas, and mineral extraction account for an estimated 7% of deforestation in the subtropics, which releases stored CO₂ and removes an important global carbon sink.^{18,19}

Use of fossil fuel reserves must be limited to stay within 2°C warming

In order to have at least a 50% chance of staying within 2°C of global warming above pre-industrial levels, cumulative carbon emissions between 2011 and 2050 need to be limited to 1,100 gigatonnes of carbon dioxide (Gt CO₂). The emissions embedded in available fossil fuel reserves are around three times that amount. A recent study demonstrates that, “globally, a third of oil reserves, half of gas reserves and over 80% of current coal reserves should remain unused from 2010 to 2050 in order to meet a target of 2°C.”

Energy and Health

A switch from dirty fossil fuels to renewable energy will result in significant reductions in illness and deaths.²¹ The U.S. Department of Energy’s National Renewable Energy Laboratory found that states that reduced fossil fuel energy production through new renewable energy systems saw health benefits and savings.²² The full life cycles of these fuels includes extraction, processing, storage, transportation and use, each with significant climate, health, and equity impacts.

Coal

- Coal mining can cause significant water contamination and mudslides.^{23,24}
- Coal miners suffer from debilitating occupational hazards, such as black lung disease, injuries and fatalities.^{25,26}
- Coal is generally uncovered when stored or transported, resulting in significant increases in the concentrations of fine airborne particulates within 25 miles of the storage site or transportation line. Processing coal for export or use also creates coal dust.²⁷
- Coal air pollution is also associated with heart disease, asthma, and chronic lung disease, with the greatest impacts on children, the elderly, low-income communities, people of color, and communities downwind of power plants.^{28,29,30,31}
- Burning coal to produce electricity releases tons of toxic chemicals into the air, including nitrogen oxides, sulfur oxides and particulate matter (PM).³² Coal power plants are the largest single source of mercury that pollutes waterways and contaminates the fish we eat. It is a potent neurotoxin that can cause developmental problems and learning disabilities, particularly in fetuses and young children.³³
- The cumulative health costs of coal-based electricity in the U.S. have been estimated to fall between \$62 billion and \$523 billion annually.³⁴

Hydraulic fracturing—“Fracking”

As reservoirs of oil and gas continue to deplete, producers have turned to “unconventional” extraction methods such as hydraulic fracturing to tap reserves trapped in deep shale rock formations. Fracking releases significantly more methane than conventional extraction. The process requires huge quantities of water, which may enter surface and groundwater. Improper disposal of fracking water and inadequate treatment of wastewater can contaminate water used for drinking and crop irrigation. Workers at these sites are potentially exposed to chemicals in fracking fluids and high levels of crystalline silica in frack sand. Unconventional extraction processes can destabilize geologic formations causing sinkholes and earthquakes. Sites are often constructed in previously unexploited environments, introducing air quality, toxics, and noise concerns for surrounding communities from industrial activity, construction, and diesel transport emissions.

Drilling and fracking involves over 900 products containing over 600 chemicals, few of which have been fully characterized from a toxicological perspective. Physicians for Social Responsibility and Concerned Health Professionals of New York released a Compendium that summarizes hundreds of studies on the health impacts of unconventional oil and gas extraction, ranging from air and water quality issues to worker health, noise, earthquakes, and radioactive releases.



Fracking Wells, Pipelines, and Roads Deteriorating the Landscape
Simon Frasier University, 2006

Other Energy Sources

- Natural gas extraction, storage, and transport emit methane, large concentrations of which may displace oxygen, causing dizziness, weakness, nausea, and vomiting.³⁵
 - In the past 30 years there have been approximately 9,000 ‘significant’ pipeline-related incidents across the U.S. with resultant 548 deaths, 2,576 injuries, and approximately \$8.5 billion in financial damages³⁶
 - Underground storage of natural gas presents risks of explosions, fires, routine toxic air-pollutant emissions, and leaks.³⁷
 - Gas extraction, storage, and combustion may also release benzene, which has been associated with leukemia, and other volatile organic compounds, which contribute to the formation ground-level ozone (smog).^{38,39}
- Oil production processes release cancer-causing and smog-forming chemicals and particulate matter including diesel exhaust and silica dust.⁴⁵
 - People living in fence-line communities near oil and gas drilling sites have higher risks for cancer, increased asthma attacks and other respiratory problems, and emerging evidence of increased risks of adverse reproductive and neurodevelopmental outcomes.^{46,47}
 - In 2010, oil refineries reported approximately 22,000 tons of hazardous air pollution to the Environmental Protection Agency.⁴⁸
- The use of nuclear power poses a very small risk of accidental releases of radiation, though accidental releases could be catastrophic.⁴⁹ Nuclear workers face risks from chronic low-level radiation exposure, with attendant cancer risks, and uranium miners have a high risk of lung cancer.⁵⁰

Energy and Health Equity

The greatest impacts of energy-related air pollution affect children, the elderly, low-income communities, people of color and communities downwind of power plants.

- Coal power plants are disproportionately located in low-income communities and communities of color; nearly six million African Americans live within three miles of a coal-fired power plant.^{65,66}
- Over 1 million African Americans live in counties that face a cancer risk above EPA’s level of concern from toxins emitted by natural gas facilities.⁶⁷
- For many low-income families, “fuel poverty” due to high energy costs means choosing between paying for energy to cook, heat, or cool homes, versus other essential necessities such as food.⁶⁸
- Fuel poverty is associated with increased risk for cold-related illness, and use of unsafe heat sources that can cause carbon monoxide poisoning or fires.⁶⁹ Globally, lack of access to energy leads to 3.8 million premature deaths associated with household air pollution from burning solid fuels and kerosene for cooking.⁷⁰
- Concerns about high-energy costs may reduce the use of air conditioning during heat waves, increasing the risk of heat illness and deaths among low-income families. 18% of households below the poverty line do not have air conditioning).⁷¹

Health and Emerging Electricity Technologies

A transition to clean energy brings significant climate and health benefits because greenhouse gas emissions across the life cycle of renewables are far less than those from fossil fuels.^{52,53}

However, the potential health risks of emerging electricity technologies should not be ignored.

- **Solar Photovoltaics**

- Exposures to toxic dust and chemicals during material extraction and manufacturing stages, much of which occurs outside of the U.S.⁵⁴
- Disposal of solar photovoltaics (also likely to be offshored) may pose toxics exposure risks; research into safe and sustainable recycling and disposal is needed.⁵⁵

- **Wind**

- Current data does not support a causal relationship between wind turbine noise, infrasound, and vibration—symptoms common to reports of “wind turbine syndrome.”
- Wind turbine noise exposure has been associated with sleep disruption and annoyance.

- **Biomass**

- Long-distance transport of biomass feedstocks entails diesel emissions related to goods movement that may be avoided with small, distributed systems.⁵⁷
- Alternative fates of feedstock—e.g. wildfire, open burning, or landfills—may be associated with health risks such as smoke exposure and displacement.⁵⁸
- Emissions from the energy conversion process pose health risks that have been inadequately characterized.⁵⁹

- **Geothermal**

- Occupational exposures to hydrogen sulfide are of concern.⁶⁰
- Leaks from liquid and solid waste streams may cause water contamination.⁶¹

- **Storage Technologies**

- Electrochemical battery storage systems require use of rare and potentially hazardous materials that pose both chemical and fire risks throughout their life cycle.⁶²

Emerging electricity generating and storage systems employ a myriad of workers across technology life cycles; more work is needed to ensure that these jobs are healthy and safe, provide career development, and pay living wages.⁶³

Utility scale facilities may offer community economic development opportunities, but these should not detract from efforts to reduce related air pollutant emissions, particularly in communities already burdened with poor air quality.⁶⁴

Just Transition

In order to equitably transition to decrease the country's reliance on fossil fuels, there must be policies for a "just transition" for workers currently employed in the fossil fuel industry.

"A just transition brings together workers, communities, employers and government in social dialogue to drive the concrete plans, policies and investments needed for a fast and fair transformation. It focuses on jobs, livelihoods and ensuring that no one is left behind as we race to reduce emissions, protect the climate and advance social and economic justice."⁷²

Strategies include investments to retain and create good jobs, modernizing industry, apprenticeship, education, training programs for renewable energy jobs, and providing assistance for any workers and families who may be adversely affected.⁷³ Chicago IBEW Local 134 is building a renewable energy training facility for IBEW electricians across the U.S. to train for jobs in the new green economy. The site will have wind, photovoltaic, building automation, and smart metering facilities and training programs.⁷⁴

Reducing Reliance on Fossil Fuel Energy

Switching from fossil fuels to clean, renewable energy is a critical path to the reduction of greenhouse gas emissions. Electricity generated from renewables releases about 1/20th the GHGE of coal over the full life cycle.⁷⁵ Advances in renewable energy technology have made renewable energy ever more cost-competitive and increased market shares.⁷⁶

- In 2016, renewable electricity accounted for 67% of U.S. electricity capacity additions, growing from 64% in 2015, and coal-fired plants accounts for 80% of facility closures.⁷⁷
 - U.S. wind energy increased by more than 11%, and U.S. solar energy increased by 52% in 2016.⁷⁸

Energy efficiency and energy conservation are important for tackling climate change. They reduce the need for energy production and thus reduce GHGEs and air pollution, helping to reduce the health and climate impacts mentioned above.^{79,80,81}

- Energy efficiency also reduces energy costs and saves money, a benefit especially for those on fixed or low incomes.^{82,83}
- Programs are available to ensure that energy efficiency upgrades are available to those who need them the most: [Low Income Home Energy Efficiency Plan \(LIHEAP\)](#) and the [Weatherization Assistance Program \(WAP\)](#).^{84,85}
- Key strategies for energy efficiency include zero net energy homes and commercial buildings; industry adoption of energy efficiency; deployment of energy-efficient appliances and light bulbs; strengthened energy efficiency standards for buildings and appliances.
 - Energy efficiency measures that tighten the building envelope need to ensure adequate ventilation to maintain healthy indoor air quality.

What Local Health Departments Can Do

Assessment and Surveillance

See Section [7.1—Surveillance](#)

Provide data, mapping, and analysis that layers health and social vulnerability information with information about current or projected air and water pollution related to fossil fuel use and production.

Conduct health impact assessments of proposals for new or expanded fossil fuel extraction, processing, storage, and transportation in your jurisdiction.

- The New York Department of Health conducted a review of high volume hydraulic fracturing that bolstered the Governor’s decision to ban fracking throughout the state.⁸⁶
- Green River District Health Department in Kentucky completed an HIA on three proposed coal gasification plants to inform the community and policy makers on how job creation benefits compared to potential health impacts, including on low-income communities and other vulnerable populations.^{87,88}

Assess the health and safety risks of oil and gas extraction, processing, storage and transportation in your jurisdiction.

- Assess potential impacts of “beneficial reuse” of oil field produced water for the irrigation of food crops, watering livestock and recharging aquifers.⁸⁹

Analyze the health benefits of local and regional proposals to increase energy efficiency and shift to renewable energy, for example in city or county Climate Action Plans.

- A collaborative HIA by the Massachusetts Department of Public Health and Pioneer Valley Planning Commission assessed health impacts of implementing energy efficiency in municipal buildings.⁹⁰

Interagency Collaboration

See Section [7.3—Collaboration](#)

Provide relevant health data to inform communities and policymakers about the health impacts of local policies and standards that:

- Encourage increased energy efficiency and shift to clean renewable energy
 - Local community choice energy initiatives allow cities and counties the to aggregate energy demand, negotiate with suppliers, purchase more green power, reduce the cost of electricity, and provide power from local sources.⁹¹
- Reduce climate and air pollutants from electricity production, including methane leakage from natural gas.
- Limit expansion of fossil fuel based energy production.
- Increase access to information about the chemicals used in fracking or the transport of oil and coal.
- Establish a health and safety buffer zone between oil and gas facilities and sensitive “receptors” such as homes, childcare, clinics.

Encourage schools, health care systems, and local governments to purchase or install renewable energy, and connect them with resources on energy efficiency and renewables.^{92,93,94,95}

- Health care systems can join Health Care Without Harm’s [Health Care Climate Challenge](#).⁹⁶

Partner with housing, code enforcement, and home visiting agencies to improve access to measures that reduce climate vulnerability and increase energy efficiency, such as weatherization and energy assistance.

Work with emergency management agencies and local utilities to ensure no electricity shutoffs during heat waves.

Collaborate with local planners and community-based organizations to expand low-income energy retrofitting and weatherization programs, and to integrate healthy home components into those programs.

- King County, WA increased ventilation, moisture and mold control, carpet replacement, and plumbing repairs in homes visited by community health workers after adding a weatherization component to training.⁹⁷

Partner with schools, community college districts, unions, and local trade organizations and green industries to develop green job apprenticeship and pipeline programs.

- The Oakland, CA Green Jobs Corps provides green jobs training for young adults facing barriers to employment.⁹⁸

Collaborate with OSHA to address occupational health risks across the fossil fuel life cycle.

Community Engagement and Education

See Section [7.2—Engagement](#)

Share information about the health harms of dirty fossil fuel energy from coal, oil, and natural gas and the health benefits of clean energy with colleagues, clients, policymakers, and community.

Support community based organizations seeking a just transition to a low carbon economy, including engagement through HIAs on fossil fuel facilities and projects.

Provide referrals to services for energy efficiency and/or assistance (LIHEAP) and weatherization services and information on funding sources during home visits.

Implement community warning systems if there is a risk of release of toxic substances from oil and gas facilities, such as in Contra Costa County, CA.⁹⁹

For More Information:

- [Energy and Human Health](#)¹⁰⁰
- [The National Renewable Energy Laboratory’s Retrospective Analysis of Renewable Energy Benefits in the U.S.](#)¹⁰¹
- [U.S. Department of Energy’s Energy Efficiency Resources](#)¹⁰²
- U.S. Climate and Health Alliance’s State Policy Initiative, [Renewable Energy](#) and [Energy Efficiency](#)^{103,104}

5.3 Agriculture and Food Systems

Food and agriculture systems have significant impacts on climate change, the environment, and our health. Our food and agriculture systems account for approximately one-third of all U.S. GHG emissions and are driving increased consumption of foods associated with chronic illness.^{1,2,3}

Key Messages

Shifting to healthy diets and local, sustainable food and agriculture systems offer significant health, climate, and environmental benefits.⁴

- Local food systems increase access to healthy fruits and vegetables.⁵
- Eating less red and processed meat reduces the risk of heart disease and cancer⁶ and reduces methane emissions from livestock production.
- Sustainable agricultural practices conserve water, reduce pesticide and fertilizer use, protect topsoil, and sequester (store) carbon.⁷
- Reducing food waste and food waste diversion can reduce food insecurity and climate pollution at the same time.⁸
- Poor nutrition - especially overconsumption of calorie-dense foods and meat - is a leading cause of illness in the U.S., associated with diabetes, obesity, and cardiovascular disease.^{9,10}
- Agriculture is a significant source of methane and nitrous oxide, extremely potent climate-warming gases. It is responsible for 8.6% of U.S. greenhouse gas emissions (GHGE) and about a third of global GHGE.¹¹
- Industrial agricultural practices are also associated with antibiotic resistance, water contamination, pesticide illness, and topsoil loss.^{12,13,14}
- Climate change will reduce worldwide food production through adverse impacts on crop yields and fisheries.¹⁵ This will increase food insecurity and associated risks of chronic illness and under-nutrition.

Agriculture and Climate Change

In 2016, agriculture was responsible for 8.6% of U.S. total GHG emissions, including 36% of the country's methane emissions.¹⁶

- Factoring in fertilizer use, food refrigeration, food transport, and agriculture-related deforestation and soil depletion, food and agriculture systems account for about one-third of all U.S. GHG emissions.¹⁷
- Food production and processing account for 17% of U.S. fossil fuel use.¹⁸ In the food industry, food production accounts for 83% of carbon emissions.¹⁹
- Nitrogen fertilizer accounts for ~80% of U.S. nitrous oxide emissions.²⁰



Cows feeding in large cowshed
Official / Shutterstock.com



Urban Farming in San Francisco
VitusKonter, 2010

- 40% of food (valued at \$165 billion) is wasted annually, and the 30 million tons of food that goes to landfills releases 23% of U.S. methane emissions.²¹
- Destroying rainforests for cattle feed is eliminating carbon reservoirs and watersheds.²²
- 1 kg beef equates to roughly the same GHGE emissions as 160 highway miles in a mid-size car.^{23,24}

Climate change is adversely impacting agriculture and food production (See Section [4.8—Food Security](#)).

- Extreme heat, drought, and precipitation and higher ozone levels decrease crop yields.^{25,26,27}
- Higher temperatures and drought reduce milk and egg production.²⁸
- Warmer temperatures increase the risk of food contamination.²⁹
- Increased atmospheric CO₂ reduces the protein and micronutrient content of key crops.³⁰
- Extreme weather events can disrupt food transportation and supply chains.³¹
- Global food production will decrease by an estimated 2% per decade due to climate change, while global food demand increases by 14% per decade.³²
 - Climate change has increased the number of malnourished children by 7–20% globally.³³

Agriculture and Health

Poor diet and nutrition are leading causes of illness and death, increasing diabetes, obesity, cardiovascular disease, and cancer.³⁴

- Only 1 in 10 U.S. adults eat the recommended amount of fruit and vegetables per day^{35,36}
- Access to healthy affordable food is limited for low-income households and communities, exacerbating health inequities.^{37,38}
- U.S. consumption of meat, high-fat, high-salt foods, and sugar has radically increased over several decades, driven by corn and soy subsidies.^{39,40}

- Industrial agricultural practices are associated with antibiotic resistance, water contamination, and pesticide-related impacts.^{41,42,43}
 - Nitrogen fertilizers and animal waste contaminate groundwater with nitrates, which is associated with “blue baby” syndrome.^{44,45,46}
 - Pesticides cause acute illness in farmworkers and their children, increasing cancer, reproductive defects, and neurological and cognitive deficits.⁴⁷
- Environmental and crop degradation from climate change and industrial agriculture increases risk for food insecurity, chronic illness and under-nutrition.⁴⁸

Climate Change, Meat Consumption, and Health

Meat consumption in the U.S. has doubled over the last century. Diets heavy in red and processed meat have been linked to higher rates of heart disease, stroke, Type 2 diabetes, obesity, certain cancers, and earlier death.⁴⁹

Meat production, processing, distribution and retailing accounts for 9% of U.S. and 15% of global GHG.⁵⁰ Animal agriculture accounts for 42% of agricultural emissions in the U.S.; worldwide, livestock accounts for between 14.5 percent and 18 percent of human-induced GHGE.⁵¹ A recent study found that there is an 8-fold difference in GHGE associated with vegetarian and meat-based individual diets, 72% of which is due to increased beef intake.⁵²

Industrial animal farming practices have devastating environmental impacts. Communities surrounding concentrated animal feeding operations (CAFOs)—frequently low-income communities and communities of color—often have poor air quality with high levels of hydrogen sulfide and ammonia and increased rates of asthma, respiratory illness, depression, and anxiety.⁵³ These operations are also associated with local water contamination from excessive nutrient runoff, antibiotics, and microbial pathogens.⁵⁴ CAFO antibiotic use accounts for 70% of U.S. antibiotic use and is a key contributor to increasing antibiotic resistance.^{55,56,57} A third of global arable land is used to grow animal feed, accounting for nearly 70% of the world’s deforestation⁵⁸ In the U.S., crops such as corn and soybeans receive tens of billions of dollars in subsidies. The vast majority of these crops are used for feed in livestock operations.⁵⁹

Reducing meat consumption and eating a more plant-based diet could:⁶⁰

- Reduce global mortality from chronic disease by 6–10%.
- Reduce food-related greenhouse gas emissions by 29–70%.
- Save \$1–31 trillion overall by improving diets.

Agriculture and Health Equity

Climate impacts will exacerbate lack of access to and affordability of safe water and fresh produce for many low-income families and communities of color.⁶¹

- Food insecurity increases as food prices rise; pushing low-income households to choose cheaper, low-nutrient, processed foods associated with higher risks for diabetes, hypertension and obesity.^{62,63}
- Food insecurity is more common in people of color. In 2016, 12.3% of U.S. households were food insecure: 22.5% of Black households and 18.5% of Hispanic households versus 9.3% of White households.⁶⁴

Agricultural workers are at high risk for climate-related health impacts, such as heat illness and vector borne disease.⁶⁵

Declines in food production result in significant job and economic losses in farming communities.

- 80% of U.S. farmworkers identify as Hispanic and just over half are documented, leaving many members of this community especially vulnerable to economic and health impacts of climate change.⁶⁶

Indigenous communities that practice traditional hunting, subsistence farming and fishing are vulnerable to climate change impacts on game, farming and aquatic habitats, particularly in coastal communities where rising sea level threatens fishing habitats.⁶⁷

Reducing Food-Related Climate Pollution and Improving Health

Improvements in food production and distribution, reduced food waste and eating less meat will reduce climate and environmental pollution and improve health.

- The use of available sustainable agricultural practices (e.g. better crop management, reduced fertilizer use, soil and degraded land restoration, improved manure management, increased water efficiency) could reduce agricultural GHGE by 5–14%, while increasing soil productivity and carbon storage and reducing soil erosion and water contamination.^{68,69,70,71,72}
- Eating less meat and more fruits and vegetables would decrease greenhouse gas emissions and yield substantial health benefits.^{73,74,75,76,77}
- Reductions in the use of pesticides and antibiotics would reduce pesticide related illness and water contamination, improve worker safety, and decrease antibiotic resistance.⁷⁸
- Sustainable local food systems can reduce the use of fossil fuels in food transport, processing, packaging, and storage, increase access to healthy fruits and vegetables; build social capital, and improve mental health.⁷⁹ (See Figure 5.3.1)

Figure 5.3.1: Los Angeles Food Policy Council’s Good Food for All Agenda⁸⁰



What Local Health Departments Can Do

Public health has a critical role in building healthy, equitable, sustainable, and climate resilient communities.

Assessment and Surveillance

See Section [7.1—Surveillance](#)

Assess and map food insecurity and local/regional food system assets in your community. See: [CX3](#)⁸¹, [Map the Meal Gap](#)⁸², [Local Food System Asset Mapping](#)⁸³, and [Healthier Food Retail: Beginning the Assessment Process in Your State or Community](#).⁸⁴

- Boulder, Larimer, and Weld Counties (CO) collaborated to assess local food systems in their rural regions, including marketing of agricultural products, shopping habits, food distribution, access to food, and nutrition assistance programs, and community gardens.⁸⁵

Intersectoral Collaboration

See Section [7.3—Collaboration](#)

Collaborate with Environmental Health, Planning, agricultural agencies, school districts, businesses, institutions such as hospitals, and community-based organizations to support local and sustainable food systems, including:

- Expansion of community and school gardens, urban and peri-urban agriculture, farmer’s markets, mobile fruit and vegetable vending, “farm-to-fork” programs, food hubs, and conservation of regional agricultural lands.
 - Prince George Public Health in Maryland started a farmer’s market, collaborating with local parks, businesses, and media outlets to procure space and grants to cover vendors’ liability insurance and WIC certification.⁸⁶
- Removal of legal and zoning barriers and promotion of incentives for businesses and organizations growing and selling healthy foods.⁸⁷
- Preservation of agricultural land and natural habitats.
- Sustainable agricultural practices such as water conservation, better management of livestock production, and practices that reduce soil degradation and the use of fossil fuel based inputs such as pesticides and synthetic fertilizers (e.g. a fee on nitrogen fertilizers).^{88,89,90,91}
- Reduction of federal subsidies for commodity crops (e.g. corn and soy) and increase in subsidies for production of healthy and sustainably grown foods.

Collaborate across departments and with other agencies and community organizations to increase access to affordable healthy foods.

- Expand the use of SNAP EBT and financial incentives at farmer’s market coupons or mobile fruit and vegetable vendors.⁹²
 - In Kent County, Michigan, the health department supported the local YMCA in creating a “Veggie Van” to provide urban neighborhoods in Grand Rapids year-round, daily access to fruits and vegetables from local farmers, sold at reduced prices. The Veggie Van accepts EBT, SNAP, WIC, and Senior Project Fresh/Market FRESH benefits.⁹³

Encourage local health care providers and pharmacies to establish healthy food prescription programs that refer people to community resources to support healthy eating.⁹⁴

Encourage procurement of healthy and local foods by institutions such as hospitals, schools, businesses, and government agencies.⁹⁵ The Kentucky Department of Public Health created the “Better Bites” programs at three state department cafeterias to offer healthy, local meal options and smaller portion sizes, along with related trainings and educational resource.⁹⁶

Reduce food waste and food insecurity by promoting surplus food diversion and gleaning programs in collaboration with community groups.⁹⁷

- Increase donations of healthy and usable food from hospitals, restaurants, and groceries to food banks and pantries.⁹⁸
- Train Environmental Health Specialists on climate change, food waste, and food insecurity. Adapt and disseminate the Safe Surplus Food Donation Best Management Practices and the Safe Surplus Food Donation Toolkit for food facilities during normal routine inspections

Collaborate with Agricultural Extension and local agricultural organizations to educate growers and agricultural operations about agriculture-climate change-health connections.

Community Engagement and Education

See Section [7.2—Engagement](#)

Inform the public and local decision-makers about the connections among food systems, food waste, climate change, health, and equity.

Conduct campaigns and programs with schools, businesses, agencies, and communities to reduce consumption of meat, processed foods, and sugar-sweetened beverages— for example “[Meatless Mondays](#)” and “[Rethink Your Drink](#)”—and to reduce food waste.^{99,100}

Work with community groups and stakeholders to implement and support a Food Policy Council.¹⁰¹

- The Cleveland Department of Public Health worked collaboratively with diverse stakeholders to create the Cleveland-Cuyahoga County Food Policy Coalition to build a just, equitable, healthy and sustainable food system through policy change and capacity building.¹⁰²

Train youth and community members to collect neighborhood level data on food quality, availability and affordability in low-income communities, using a tool such as CX3.¹⁰³

- Support use of data to inform policy makers and institutions about opportunities to improve local food system and healthy food access.
- Look for opportunities to integrate climate change into nutrition education, information on food insecurity, and materials that address meat consumption and food waste reduction.
 - San Luis Obispo, CA integrated climate change education into its OutsideIn SLO nutrition materials.¹⁰⁴

For More Information:

- [Climate Impacts on Food Systems](#)¹⁰⁵
- [Sustainable Agriculture and Healthy Food Systems: A Resource Guide for Planners](#)¹⁰⁶
- [Los Angeles Food Council’s Good Food for All Report](#)¹⁰⁷

5.4 Urban Greening and Green Infrastructure

Urban heat islands are areas in cities with many buildings, lots of dark surfaces such as pavement and asphalt, and fewer trees, parks, and green space.¹ In these “urban heat islands,” daytime temperatures are on average 1-6°F higher than in surrounding more suburban and rural areas. Nighttime temperatures can be as much as 22°F higher as the heat is gradually released from buildings and pavement.² Climate change is projected to increase average summer temperatures and cause more frequent, more severe, and longer heat waves, worsening the effects of urban heat islands and increasing the risks of heat illness and deaths.³

Urban greening refers to strategies that increase trees, parks, gardens, agriculture, forests, and other green and natural space in urban areas, and green infrastructure uses vegetation, soils, and natural processes to manage and create healthier urban environments. Urban greening and green infrastructure can increase resilience to extreme heat and natural disasters while reducing other impacts of climate change, such as flooding, storm surges, and sea level rise.⁴

Key Messages

- The health risks of heat, air pollution and flooding are increasing as climate change brings warmer temperatures, more extreme weather events and sea level rise.
- These risks are greatest in “urban heat islands” and in places with aging infrastructure or where natural protections have been weakened.
- Urban greening reduces the risk of heat illness and flooding, lowers energy costs and improves health.
- Green spaces provide places to be physically active and improve our overall well-being.
- Trees sequester carbon dioxide, improve air quality, capture rainwater and replenish groundwater.

Green Infrastructure and Gray Infrastructure

Gray Infrastructure

Gray infrastructure refers to man-made structures such as storm sewers, levees, seawalls and detention ponds designed to move water or protect developed areas from flooding.⁵ These structures—often made of concrete—may increase water runoff, as surface water is unable to be filtered through soil.⁶ Increased runoff contributes to flooding during extreme rain events, and can increase the concentration of pollutants in runoff.⁷ Gray infrastructure retains heat from the air, contributing to the urban heat island effect and increasing nighttime air temperatures (Figure 5.4.1).⁸

Green Infrastructure

Green infrastructure includes: tree planting, rain barrels and rain gardens, green street design with permeable pavements and bioswales (sections or sidewalks or curbs with vegetation that allow natural treatment of runoff water), ecosystem restoration and green roofs.^{9,10,11} Green infrastructure:

- Provide more green and cool space, and reduce the risk of flooding.
- Increase resilience to extreme heat and natural disasters while reducing other impacts of climate change, such as flooding, storm surges, and sea level rise
- Reduce sewer overflows during storms, recharge groundwater aquifers water by allowing rainwater to soak into the ground, and reduce the energy needed to treat and move wastewater.^{12,13,14}

Figure 5.4.1: Green Infrastructure Rain Garden¹⁵ (left) and Grey Infrastructure¹⁶ (right)



Urban Greening, Green Infrastructure, and Climate Change

Urban greening reduces urban heat islands and decreases the risk of heat illness by lowering surface and air temperatures.^{17,18,19}

- Shaded surfaces, from trees and other plants, may be 20–45°F cooler than unshaded surfaces;²⁰ A vegetated “green roof” surface can be cooler than the surrounding air, whereas conventional rooftop surfaces can exceed ambient air temperatures by up to 90°F.²¹
- Warm weather increases in energy demand for air conditioning, increasing the chance of electricity brown-outs.²² Shade cools buildings and can decrease air conditionings costs by 20%.^{23,24,25}
- Plants and vegetative growth can protect fragile coastal areas, mitigate sea level rise, and improve water quality and aquatic habitats.²⁶
- Trees sequester carbon dioxide (sequestering an estimated 95.5 million metric tons of carbon dioxide in 2006).²⁷



Urban Garden in Detroit
Kate Gardiner, 2012



Farmers Market
John Tornow, 2010

Urban Greening, Green Infrastructure, and Health

People living in urban heat islands are at greater risk of heat-related illness.²⁸ Green infrastructure could reduce temperatures by 0.5–0.7°C.²⁹ A 0.5°C reduction in the maximum and minimum temperatures results in a 50% reduction in heat-related mortality.³⁰

- Urban areas experience greater air pollution and more negative health impacts during hot summer months.³¹ Higher temperatures lead to higher levels of ozone, with increased risks for asthma and heart attacks.³²
- Trees clean the air by removing harmful pollutants associated with asthma and cardiovascular disease, such as ozone, nitrogen dioxide, and particulate matter.³³
- Parks provide places for physical activity and social connection, and community gardens increase access to healthy foods (See Section [4.8—Food Security](#)).^{34,35}
- Access to green space lowers stress, and even speeds up recovery times in hospitalized patients.^{37,38}
- Trees and greenery have been associated with reduction in crime and increases in property value.³⁹

Urban Greening, Green Infrastructure, and Health Equity

People of color and low-income families are more likely to live in areas with fewer trees, parks and green spaces and are thus more likely to be exposed to the heat risks of urban heat islands.⁴⁰

- People living in poverty are less able to afford the costs of air conditioning, making other heat adaptation strategies such as greening even more important.
- Accessible parks have been associated with greater physical activity, relaxation, social interaction, and improved quality of life in communities, especially in low-income communities and communities of color.^{41,42,43}
- Without intentional strategies to ensure equitable access to greening and green space for all, neighborhood greening may contribute to gentrification and displacement of lower-income residents.⁴⁴

What Can Local Health Departments Do

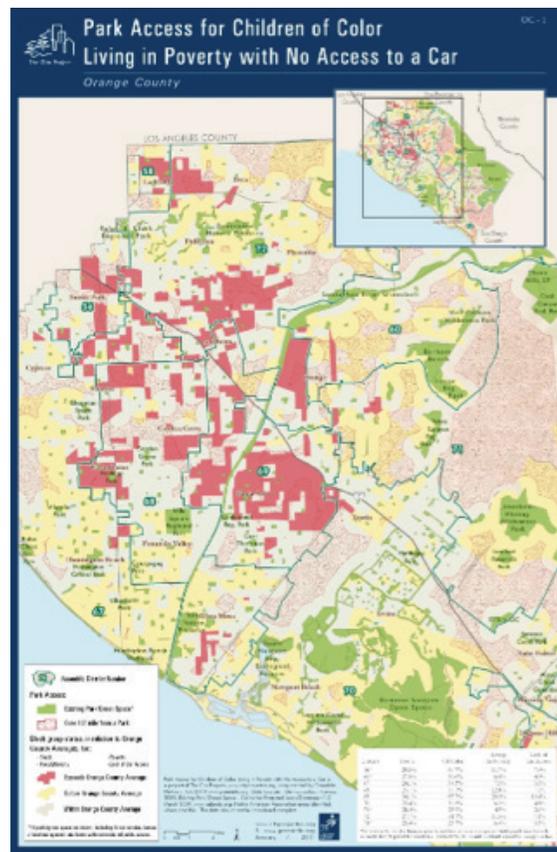
Public health professionals and health agencies have a critical role in building healthy, equitable, sustainable, and climate resilient communities.

Assessment and Surveillance

See Section [7.1—Surveillance](#)

Collaborate with parks and public works agencies and community-based organizations to map park access and to use tools such as [i-Tree](#) to assess tree canopy and the benefits of planting more trees. (See Figure 5.4.2)^{45,46}

Figure 5.4.2: Map of Park Access for Children of Color Living in Poverty in Orange County⁴⁷



Conduct an assessment of the relationship between access to parks and health.

- The Los Angeles County Department of Public Health assessed park access per capita in relation to premature mortality from various health outcomes. Areas with less park space had higher rates of premature mortality from cardiovascular disease, diabetes, higher prevalence of childhood obesity, and greater economic hardship compared to communities with more park space per capita. African Americans and Latinos were also more likely than Asians and Whites to live in communities with less park access.⁴⁸ See the [CDC's Parks and Trails Health Impact Assessment Toolkit](#).⁴⁹

Intersectoral Collaboration

See Section [7.3—Collaboration](#)

Collaborate with planning, parks, transportation, public works agencies and school districts to promote local policies that:

- Increase parks and tree canopy especially in tree-poor and park-poor low-income communities. Consider tree fire resistance, pollen production, and drought resistance.
- Use trees to provide shade for school yards, parking lots, parks, and walking and bike paths
- Restore and surface urban streams and rivers.⁵⁰

Collaborate with parks, school districts, police, and community partners to improve programming in parks—especially those located in neighborhoods with high levels of violence or social isolation.⁵¹

- The Los Angeles County Department of Public Health documented significant benefits following implementation of the Parks After Dark program, including increased physical activity, improved social cohesion, and decreased violent crime.⁵²

Work with public works to promote and develop “green streets”, particularly in tandem with development of Complete Streets that promote walking and biking.⁵³

- The Miami-Dade Health Department collaborated with the local Parks, Recreation and Open Spaces Department to create an Open Space Master Plan that builds a connected and equitable system of open spaces that encourage exercise, such as parks, natural areas, and cultural amenities linked by greenways, blueways, bike paths, and trails.⁵⁴

Collaborate with local health care providers and parks agencies to start a “Parks Prescription” program.^{55,56}

The D.C. Department of Health and the D.C. Parks and Recreation Department provided neighborhood-specific resources on park access to primary care physicians for distribution to patients.⁵⁷

Encourage community colleges and job training agencies to create apprenticeship programs that teach skills used to restore and create urban green spaces in low-income communities.⁵⁸

Community Engagement and Education

See Section [7.2—Engagement](#)

- Educate communities on the health and climate benefits of local parks and green space and provide clients with resources regarding local parks and related activities and events.
- Engage residents in mapping park access and tree canopy, and support community initiatives to expand access to trees, parks, and green space.
- Survey community members to assess their experience of local parks to understand their needs and how local park use could be improved.⁵⁹
- Inform the public and local decision makers about the connections among green space, climate change, health, and equity.

For More Information

- [Reducing Urban Heat Islands: Compendium of Strategies, Trees and Vegetation](#)⁶⁰
- [Quantifying the Greenhouse Gas Benefits of Urban Parks](#)⁶¹
- [The Value of Green Infrastructure for Urban Climate Adaptation](#)⁶²
- [CDC's Parks, Trails, and Health Workbook: A Tool for Planners, Parks and Recreational Professionals, and Health Practitioners](#)⁶³
- [ChangeLab Solution's Community Gardens for Public Health](#)⁶⁴

5.5 Unintended Harms of Climate Action

Some climate mitigation and adaptation strategies have potentially adverse consequences on health and/or health equity. For example:

- Market mechanisms such as cap and trade or carbon taxes can, if poorly designed, lead to adverse impacts on low-income communities and communities of color, such as perpetuation of exposure of fence-line communities to stationary air pollution sources.^{1,2}
- Large scale production of first-generation biofuels (e.g. corn ethanol) led to increases in the price of corn went up and in land use for commodity crops versus subsistence farming and other agriculture.³
- Groundwater withdrawal may increase significantly in response to drought, with consequences that may further limit water options in a prolonged drought, including:
 - increased concentration of drinking water contaminants.⁴
 - saline intrusion into coastal aquifers, increasing treatment costs and limiting usable water reserves.⁵
 - land subsidence, associated with significant damage in parts of California, Texas and Florida in recent decades.⁶
- Gentrification: as neighborhood amenities such as trees, parks, and bike-pedestrian infrastructure are enhanced, home values and rental prices increase, leading to the displacement of people of color and low-income families who may have been in the neighborhood for years.⁷
- Encouraging walking and biking without concomitant enforcement of traffic safety laws and street design protections, can inadvertently place pedestrians and cyclists at greater risk of injury and death.⁸
- Prioritization of clean car strategies to the exclusion of efforts to reduce vehicle miles traveled fails to optimize health and climate benefits.⁹ Clean cars provide critically important reductions in GHGE and air pollution, but do little to address the adverse impacts of motor vehicle use on physical activity, injuries, and unsustainable land use.
- Air conditioning is energy and cost intensive, increases street level heat, and with widespread use can cause brownouts.¹⁰

What Local Health Departments Can Do

Assessment and Surveillance

See Section [7.1—Surveillance](#)

Assess the health and equity impacts of proposed climate policies and programs, and their implementation.^{11,12}

Intersectoral Collaboration

See Section [7.3—Collaboration](#)

Collaborate with housing, planning, economic development agencies and CBOs to ensure that anti-displacement measures and affordable housing are integrated into planning for “smart growth” and transit-oriented development where amenities may increase property values, such as bike/pedestrian infrastructure and greening.¹³

Collaborate with local planning and office of sustainability to integrate health and equity into the development of climate action plans to optimize benefits.

Community Engagement and Education

See Section [7.2—Engagement](#)

Support community based organizations to build capacity and ensure strong community voice and participation in the development of climate policies and programs.

- In Richmond, CA, Urban Habitat, a local organization, partnered with other groups to raise awareness of the city’s Climate Action Plan, creating climate justice curriculums and trainings for community members and improving mechanisms for their input to be included in the plan and future environmental and sustainability measures.¹⁴