

Small City Climate Action Plans.

The Problem to Solve.

Greenhouse gases are the primary cause of climate change. The reduction of these gases, carbon dioxide and methane primarily, is the challenge. Small cities have powers to make improvements in their practices and those of their citizens and businesses; witness the Iowa City Climate Action Plan presented below.

Energy User Groups.

The generators of greenhouse gases are found in five user groups [source: EIA]. Four of the five groups consume energy as noted.

Transportation (27% of greenhouse gas emissions; 28% of energy consumption) – The transportation sector generates the largest share of greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes. Over 90% of the fuel used for transportation is petroleum based, which includes primarily gasoline and diesel.²

Electricity production (25% of greenhouse gas emissions) – Electricity production generates the second largest share of greenhouse gas emissions. Approximately 60% of our electricity comes from burning fossil fuels, mostly coal and natural gas.³

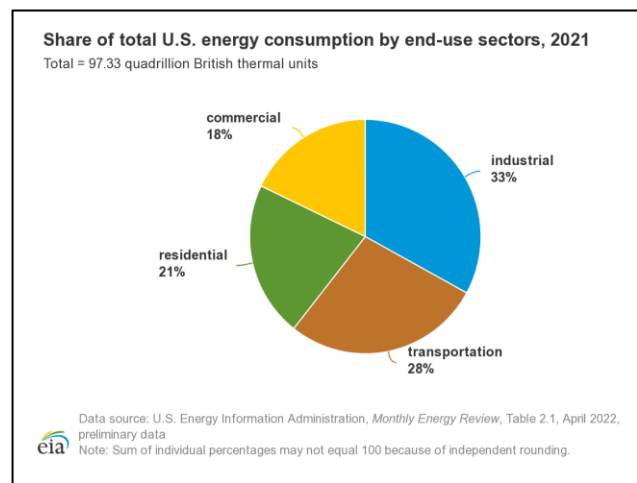
Industry (24% of greenhouse gas emissions; 33% of energy consumption) – Greenhouse gas emissions from industry primarily come from burning fossil fuels for energy, as well as greenhouse gas emissions from certain chemical reactions necessary to produce goods from raw materials.

Commercial and Residential (13% of greenhouse gas emissions; 39% of energy consumption) – Greenhouse gas emissions from businesses and homes arise primarily from fossil fuels burned for heat, the use of certain products that contain greenhouse gases, especially construction materials, the handling of waste and the saving of existing buildings.

Saving existing buildings has a twofold energy savings: the first is saving the energy embodied in the structure itself. The second is the energy saving from not having to reproduce the structure with its materials plus the energy required for the equipment, materials, financing and disposal of waste. Buildings not be saved can be recycled.

Agriculture (11% of greenhouse gas emissions) – Greenhouse gas emissions from agriculture come from livestock such as cows, agricultural soils, and rice production.

Land Use and Forestry (13% of greenhouse gas emissions) forms a unique sixth group – Land areas can act as sinks (absorbing CO₂ from the atmosphere) or a source of greenhouse gas emissions. In the United States, since 1990, managed forests and other lands are net sinks.



A Role for Small Cities.

One can easily assume that climate change and actions to mitigate its impacts seem to fall to national and state governments and large corporations. Not so fast... Small cities can strike a vision of a carbon-free city and prepare strategies and actions to meet their vision.

The two main arenas of local action are transportation and construction. Converting existing vehicle fleets to alternative fuels is a great start. Revising building codes to enforce conservation practices is also within the purview of small cities and towns. Other actions, such as promoting “plant-rich” diets are also useful.

“The Iowa City Climate Action Plan [see the Summary Chart below] identifies 18 action items critical to meeting the city’s emission reduction goals.” *Planning, The Magazine of the American Planning Association*, April 2019, article describes the Iowa City program. The link is www.icgov.org/climateaction.

The summary chart focuses on actions for home, work and government. Each action is rated by cost [low, medium, high] and impact on local greenhouse gases [low, moderate and high]. Actions range from low cost/low impact to high cost/high impact. The magic of the approach is that the high cost – low impact actions can be avoided while the low cost – high impact actions, i.e., the “low hanging fruit”, quickly become apparent and achievable.

Selected actions from the Summary Chart:

Low cost - high impact

- Increase energy efficiency in new buildings.
- Increase employee commuter options.
- Encourage a “plant rich” diet.

Low cost – moderate impact

- Increase bicycle and pedestrian transportation.

Moderate cost – high impact

- Embrace electric vehicles, alternative fuel vehicles and other emerging technologies.

Increase energy efficiency in new buildings.

Most towns are revising zoning and building codes to improve the energy efficiency of homes and offices. Many homebuilders are offering optional energy efficiency upgrades that are migrating into the standard feature category.

Their studies show that solar on the roof is not all that effective and that the real energy savings come from increased insulation and window treatments. Codes with this focus for home, apartments, offices and other buildings can be accomplished straight away.

Increase employee commuter options.

Multi-modal transportation systems have been the objective of local and regional transportation plans forever. Congestion management plans reduce idling time on roadways. Carpooling, bike/ped facilities and ride-share programs work when taken seriously.

Bus service is the key. More glamorous transit options are expensive and ultimately rely on bus route linkages. Monies devoted to transit best focus on better coaches, better headways and better routes. Without this critical piece of the commuter trip, monies will continue to be spent on less effective pieces of the system.

Encourage “plant rich” diets.

This one sounds pretty esoteric; however, several reasonable programs can be enacted to move our diets away from beef.

The City of Winter Garden, FL [population 45,000] is taking diet, sustainable food hubs and farm to table seriously. The City bought the Tucker Ranch and is devoting land to farming that will meet their sustainability and environmental objectives:

Tucker Ranch, Winter Garden FL.

A 16-acre state-of-the-art working farm will be [is being] developed, complete with a community and teaching farm, modern greenhouse, retail store, commercial kitchen, and cold storage. The farm will be a showcase for cutting edge farming technology utilizing permaculture practices along with the establishment of a sustainable food hub to serve the region. All the food grown at Tucker Ranch will be sold to local food outlets and schools, and produce will be sold at the Winter Garden Farmers Market. The city is currently working on developing the farm and restoring native vegetation.

http://wintergardenexperience.com/news_detail/tucker-ranch

Farmers’ markets, teaching farms and participating restaurants can establish a culture sensitivity to “plant rich” diets. Implementing these programs in school lunches, hospital diets, prison meals and other institutional meal programs expands the program’s reach. Progress can be made.

Increase bicycle and pedestrian transportation.

Every city and town is working to expand its bike/ped system. The trick is to consider it a commuting mode of travel rather than strictly recreational. A commuter bike/ped system requires different connections with job centers and facilities for showers, storage and safety.

Embrace electric vehicles, alternative fuel vehicles and other emerging technologies.

Along with improved new building energy efficiency, electric vehicles have got to be considered the most important action any city can take to reduce greenhouse gas emissions. Autonomous vehicles are interesting, but they are not “game changers.” Electric vehicles change everything.

Common sense and the US EPA reflect that transportation is the biggest generator of greenhouse gas emissions. EPA studies show 29% of all emissions come from transportation. Small cities and towns can take action by:

- Converting city and large employer vehicle fleets, over time, to alternative fuels.
- Electric charging stations can become ubiquitous.
- Local property tax credits for installation of home charging equipment and home energy efficiencies can be enacted.
- State and federal tax credit programs can be advertised to residents and businesses. Electric vehicles will make a difference.

Conclusions.

Small cities can do what they do best:

- **Increase energy efficiency in new buildings, especially civic buildings.**
 - Improve building codes to increase the energy efficiency of homes and offices.
 - Find practical ways to reduce and/or recycle construction waste.
 - Go small with micro power grids, low impact drainage systems and small wastewater disposal systems.
 - Use solar and wind energy sources.
 - Demonstrate new approaches using civic buildings.
- **Embrace electric and alternative fuel vehicles;** provide infrastructure.
- **Encourage “plant rich” diets;** start with meals at school and other institutions.
- **Increase employee commuter options.**
 - Commuters are the prize; support regional commuter bus service.
 - Increase bicycle and pedestrian transportation for home-to-work, wellness and recreation trips.
- **Plant Trees** to reduce the Heat Island Effect. A city goal of 40% tree canopy is attainable.


Institute local programs and support regional transit, energy, nutrition and building code efforts. Small city and town actions can be powerful.


The City of Iowa City's "Climate Action Plan" has taken climate change seriously. The City has devised a simple yet effective system for evaluating actions to improve conditions; the system provides a balance of effectiveness and cost. As the chart below from *Planning Magazine*, April 2019 indicates, some low cost actions have high climate improvement impacts. Some high cost options are not that effective.


LINK: <https://www.icgov.org/project/climate-action>


TAKING ACTION: IOWA CITY'S CAP


The Iowa City Climate Action Plan identifies 35 action items crucial to meeting the city's emissions reduction goals. The table below summarizes the action categories and lists the actions designated as high priority. In addition to the plan, the city created a Climate Action Toolkit that is meant to inspire the community to take an active role in reducing the city's greenhouse gas emissions. The toolkit is available online at icgov.org/climateaction.
































BUILDINGS


TRANSPORTATION


WASTE


ADAPTATION


SUSTAINABLE LIFESTYLE

ACTION	SECTOR(S) HOME/WORK/GOV'T	COST	LOCAL GREENHOUSE GAS IMPACT
BUILDINGS			
Increase energy efficiency in residences		\$-\$\$\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Increase energy efficiency in businesses	 	\$-\$\$\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Increase energy efficiency in new buildings	  	\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Increase on-site renewable energy systems and electrification	  	\$\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Continue to increase energy efficiency in city-owned buildings		\$-\$\$\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
TRANSPORTATION			
Increase use of public transit systems	  	\$-\$\$\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Embrace electric vehicles, alternative fuel vehicles, and other emerging technologies	  	\$\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Increase bicycle and pedestrian transportation	  	\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Increase compact and contiguous development		\$\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Increase employee commuter options		\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
WASTE			
Reduce waste at the source	 	\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Take action on a study to efficiently capture and use methane from wastewater operations		\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Take action on a feasibility study on energy generation from landfill methane		\$\$\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
ADAPTATION			
Develop communications and outreach plan for vulnerable populations		\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Coordinate extreme weather preparedness planning with local agencies		\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
SUSTAINABLE LIFESTYLE			
Encourage a plant-rich diet*		\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Create funding mechanisms to support community-wide climate action		\$\$\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>
Incorporate this Climate Plan into the city's sustainability communications		\$	<div style="width: 100%; height: 10px; background-color: #c8e6c9;"></div>

* While the immediate impact on emissions in Iowa City may be relatively small, the global impacts related to eating more plants and less meat result in a very high impact.

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Department of Energy

How Microgrids Work

JUNE 17, 2014

LINK: <https://www.energy.gov/articles/how-microgrids-work>

From CT.org... This article is some eight years old, still, the idea of creating manageable systems, controllable by a single entity has its attraction, and specific application. Small systems for electricity, wastewater treatment, nuclear reactors and other facilities is worth a look.

WHAT IS A MICROGRID?

A microgrid is a local energy grid with control capability, which means it can disconnect from the traditional grid and operate autonomously.

HOW DOES A MICROGRID WORK?

To understand how a microgrid works, you first have to understand how the grid works.

The grid connects homes, businesses and other buildings to central power sources, which allow us to use appliances, heating/cooling systems and electronics. But this interconnectedness means that when part of the grid needs to be repaired, everyone is affected.

This is where a microgrid can help. A microgrid generally operates while connected to the grid, but importantly, it can break off and operate on its own using local energy generation in times of crisis like storms or power outages, or for other reasons.

A microgrid can be powered by distributed generators, batteries, and/or renewable resources like solar panels. Depending on how it's fueled and how its requirements are managed, a microgrid might run indefinitely.



Microgrid equipment at the National Wind Technology Center in Colorado. | Photo courtesy of the National Renewable Energy Lab.

HOW DOES A MICROGRID CONNECT TO THE GRID?

A microgrid connects to the grid at a point of common coupling that maintains voltage at the same level as the main grid unless there is some sort of problem on the grid or other reason to disconnect. A switch can separate the microgrid from the main grid automatically or manually, and it then functions as an island.

WHY WOULD A COMMUNITY CHOOSE TO CONNECT TO MICROGRIDS?

A microgrid not only provides backup for the grid in case of emergencies, but can also be used to cut costs, or connect to a local resource that is too small or unreliable for traditional grid use. A microgrid allows communities to be more energy independent and, in some cases, more environmentally friendly.

HOW MUCH CAN A MICROGRID POWER?

A microgrid comes in a variety of designs and sizes. A microgrid can power a single facility like the [Santa Rita Jail](#) microgrid in Dublin, California. Or a microgrid can power a larger area. For example, in [Fort Collins, Colorado](#), a microgrid is part of a larger goal to create an entire district that produces the same amount of energy it consumes.

Other examples of microgrids around the world are available on Berkeley Lab's [example page](#).

WHAT OTHER RESOURCES ARE THERE?

To learn more about what the Energy Department is doing to research microgrids, you can visit the Office of Electricity's [microgrid activities page](#).