Charleston County Climate Action Plan

Co-Benefits Analysis

February 2024

Co-Benefits

In many cases, actions that reduce GHG emissions correspond or directly overlap with actions that create vibrant communities, improve public health outcomes, reduce municipal and state operating and capital costs, and support innovation—these are no-regrets policies.[1] Actions that reduce GHGs are synergistic with a wide range of other public goods, and these actions can be justified from the perspective of any of a number of public goods. One review of more than a dozen studies on GHG mitigation policies found that the co-benefits of reduced air pollution—a single co-benefit—often equaled or exceeded the benefit of the GHG reduction itself.[2]

[1] Lamia Kamal-Chaoui and Alexis Robert, "Competitive Cities and Climate Change," 2009, http://www.oecd-ilibrary.org/governance/competitive-cities-and-climate-change_218830433146.

[2] Gao, J., Kovats, S., Vardoulakis, S., Wilkinson, P., Woodward, A., Li, J., ... & Liu, Q. (2018). Public health co-benefits of greenhouse gas emissions reduction: A systematic review. Science of the Total Environment, 627, 388-402.

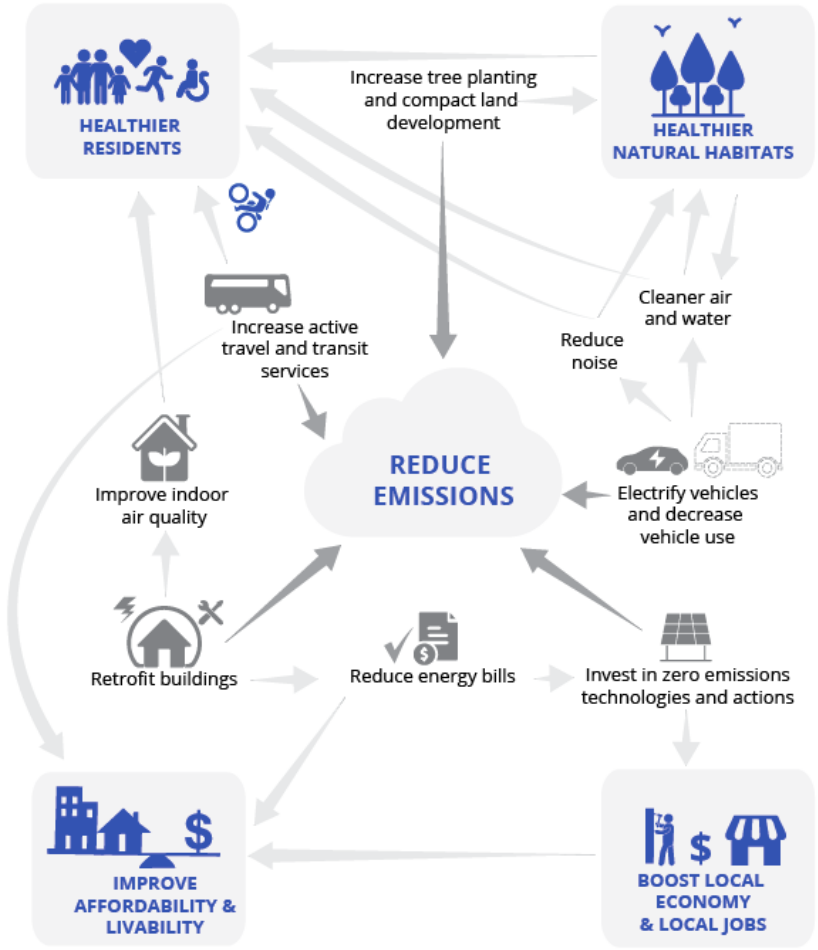

Figure 1. This graph indicates the multiple co-benefits of actions to reduce emissions, for example investing in zero emissions technologies and actions has the potential co-benefit of boosting the local economy and local jobs, while retrofitting buildings improves indoor air quality and therefore the health of residents.

Not all co-benefits or co-harms are equal. One set of criteria by which to consider the co-benefits of initiatives and actions to reduce GHG emissions is as follows:[3]

- Synergies: Many low-carbon actions have multiple socioeconomic benefits. Examples of these types of actions include transit, improving energy efficiency, and fostering a more compact urban design.
- Urgency: Some actions are associated with greater urgency to avoid loss of inertia on action already taken and prevent lock-in effects,[4] irreversible outcomes, or elevated costs. This may occur with road infrastructure decisions, major ecosystems displacement, and urban form. Some low-carbon actions require time to realize their effects, making immediate implementation paramount;
- Costs: Acting early is generally less expensive than acting later. This is because delayed action often involves 'fixing' high emissions infrastructure rather than making it a low-carbon option from the beginning. Examples include buildings that are initially constructed to low energy efficiency standards and then need to be retrofitted later;
- Longevity: Related to urgency, the longevity of planning and development decisions locks cities into their effects for decades, and sometimes centuries. For example, widening a roadway allows more vehicles to travel, encouraging more emissions for as many years as the widened roadway remains in the US; and
- Equity Impacts: Low-carbon actions have different impacts on different subsets of the population: Those with lower income levels may be unable to afford new heating and cooling systems in their homes; those with limited mobility may not be able to use transit as easily as the able-bodied; and those living in future generations will inherit the impacts of climate change caused by those who came before them.

The following tables provide an assessment of the co-benefits and co-harms of implementing the Low Carbon scenario over the BAP scenario.

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[3] Adapted from (Fay et al., 2015).

[4] Lock-in effect refers to implementation of a strategy or action that improves performance of an object or activity in the short term but is prohibitive to future change. Lock-in effect can refer to building upgrades or land use, for example. As an example. where quick building retrofits are undertaken, no additional improvements in the equipment installed can be expected over the course of its lifetime without considerable additional expense. In this way, lower levels of energy reductions can be locked in for a long period.

Table 1. Summary of health impacts.

1. Health				
Co-benefits/ co-harms	Buildings	Transportation	Energy	Waste
1.1 Co-benefit: Improved air quality	Energy-efficient buildings with low-carbon heating/cooling systems have fewer drafts, less condensation, and less temperature variation, resulting in greater comfort and better health.	Reduced combustion of gasoline and diesel in vehicles reduces NOx and particulate matter in the air. This, in turn, reduces respiratory illnesses and flare-ups.	Reduced natural gas combustion in furnaces and industrial processes reduces NOx and particulate matter in the air. This, in turn, reduces respiratory illnesses and flare-ups.	Treating waste to reduce and capture methane reduces odor issues.
1.2 Co-benefit: Increased physical activity and health		Comprehensive, well-maintained, and safe cycling and walking infrastructure results in increased activity, better mental and physical health, lower obesity rates, and lower rates of absenteeism from work.		
1.3 Co-benefit: Reduction in noise pollution	Improved insulation in buildings reduces residents' exposure to exterior noise.	Switching to electric vehicles reduces total vehicle noise as EVs do not produce as much noise as combustion engines.		
1.4 Co-benefit: Improved accessibility		Transit-oriented development provides easier access to transit corridors and hubs.		

Table 2. Summary of economic impacts.

2. Economic prosperity				
Co-benefits/ co-harms	Buildings	Transportation	Energy	Waste
2.1 Co-benefit: Increased employment	Retrofitting buildings and building to new higher standards will create a significant number of direct and indirect jobs annually.		Supplying, installing, and maintaining renewable and alternative energy systems, renewable fuels, and energy storage will generate a significant number of new jobs annually.	Waste mining for the circular economy, recycling, and the conversion of waste-to-fuel will all generate new jobs.
2.2 Co-harm: Decreased employment		The large-scale shift to EVs will result in a reduction in overall maintenance requirements for vehicles.		
2.3 Co-benefit: Increased long-term affordability	Initial capital costs for more energy-efficient buildings are more than offset with the resulting long-term savings in energy costs.	EVs have higher initial capital costs than ICE vehicles; however, in the longer-term, they save the owner more in avoided fuel and maintenance. Increased use of transit and active transportation also costs less than personal vehicle use.	Initial capital costs to replace high emissions heating and cooling technologies are more than offset with the resulting long-term savings in energy costs.	
2.4 Co-benefit: Increased leadership reputation	A requirement for high-performance buildings creates a reputation for the County's developers and builders as having the skills required for innovative and sustainable building.	Less congestion, shorter commutes, more bike and walking infrastructure draw new young residents to the County's reputation of being a more livable community.	Large-scale renewable and alternative energy deployment increase the County's exposure as a climate leader and prepare the local labor force to maintain the energy systems of the future.	The County continues to deliver high quality waste management services.

2.5 Co-benefit: Increased social capital		Increased active transportation and transit use promotes more interaction among citizens, improving social cohesion.		
2.6 Co-benefit: Improved environmental capital	More-efficient buildings require less energy generation, decreasing the need for new energy generation facilities in green spaces outside the County boundary.		Energy generation within the County boundaries decreases the need to import energy (losing some in the process) and reduces the need for new generation facilities in green spaces beyond the County.	Waste managed as a valued resource results in less methane pollution.

Table 3. Summary of social impacts.

3. Social equity				
Co-benefits/ co-harms	Buildings	Transportation	Energy	Waste
3.1 Co-benefit: Quality of life for the elderly improves	Low-carbon buildings are healthier for residents who are more susceptible to illness and are more comfortable.	Sidewalks and cycling infrastructure is developed to be safe for "anyone aged 8–88", improving seniors' ability to continue to move in their communities.	Heat exchange systems provide air conditioning to all residents, reducing the impacts of heat waves.	
3.2 Co-benefit: Quality of life for children improves	Low-carbon buildings are healthier, meaning the important development that occurs during childhood years takes place in cleaner spaces.	Safe, connected, well-maintained, and well-used bike paths, sidewalks and transit infrastructure make these options better for children.		
3.3 Co-benefits: Increased intergenerational equity and resilience	Low-carbon actions that begin early avoid locked-in emissions and increased costs to fix stranded assets in all of these areas. Action now also ensures changes are made before the worsening impacts of climate change begin to damage outdated infrastructure. This reduces the burden on future generations.			