DRISI
Caltrans Division of Research, Innovation and System Information

Research Results

# Greenhouse Gas Reduction Opportunities for Local Governments: A Quantification and Prioritization Framework

Approach and research mitigation strategies for two case study cities.

Planning, Policy, and Programming

**SEPTEMBER 2020**

**Project Title:**
Greenhouse Gas Reduction Opportunities for Local Governments: A Quantification and Prioritization Framework

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## WHAT WAS THE NEED?

Local jurisdictions and agencies responsible for managing roadways and associated right of ways, parking, complete streets, and other transportation infrastructure assets and related operation and maintenance may play a crucial role in greenhouse gas (GHG) reduction goals. The researchers propose to provide a decision support framework using a GHG mitigation "supply curve," where the expected cost-effectiveness and total scale of mitigation is represented for a comprehensive set of possible actions.

Local governments need to be able to analyze different alternatives and the actions they can take to reduce GHG emissions, as well as other environmental impacts of importance, and prioritize them using a consistent and transparent process. This will support decision-making regarding actions they can take. Local governments need the process to be validated, and to assess the potential actions that are currently available.

## WHAT WAS OUR GOAL?

The scope of this work does not include an exhaustive development of a supply curve of GHG mitigation strategies for local governments, but developed life cycle assessment (LCA) and life cycle cost (LCC) estimates for a set of GHG mitigation strategies tailored to two selected case study cities in California. The cities were selected through consultation with relevant stakeholders.

## WHAT DID WE DO?

The approach used is primarily based on the development of mitigation "supply curves". The use of a "supply curve" approach offers the ability to combine information on the magnitude of mitigation potential and the cost of implementation to yield cost-effectiveness measures of

numerous GHG mitigation options at the same time (see Figure 1).

The approach is based on the McKinsey abatement cost curves. This project researched mitigation strategies for two case study cities and tested the approach. The certainty of the cost and GHG reduction impacts varied because of the varying certainty of underlying information, from well-documented data to first-order estimations. The results of this analysis for these two cases are provided to demonstrate the usefulness and feasibility of this approach.

## WHAT WAS THE OUTCOME?

The marginal abatement cost curve (MACC) approach shown in this report for Yolo and Los Angeles counties demonstrates the ability to quantify GHG reductions for full-scale implementation of considered strategies and prioritize them based on their cost-effectiveness. In addition, during the quantification process, a number of strategies considered for Yolo County, such as bike lanes, showed increased emissions relative to Business-as-usual (BAU), indicating that they did not abate emissions at all. However, these conclusions, and others, should be interpreted with care. For example, bike lanes may provide other benefits to communities, such as recreation and co-benefits like improved health, so their failure to reduce emissions does not mean they should not be pursued for other reasons.

In addition, the benefits of bike lanes hinge on their ability to reduce vehicle travel, and replacing vehicle travel with bike travel will depend on geographic considerations, such as whether bike lanes are likely to serve commuters. Site- or corridor-specific data collection of potential users could improve estimates of vehicle miles traveled change due to bike paths, and is particularly relevant for Yolo County since University of Califofnia, Davis is its largest employer, and the University and city of Davis, CA have high bicycle mode shares and extensive cycling infrastructure (Lee, 2019; City of Davis, N.D.). These conditions mean that a site-specific analysis could result in a higher substitution rate for vehicle travel on some bicycle corridors in unincorporated Yolo County.

## WHAT IS THE BENEFIT?

The outcome of this study is expected to help local governments analyze and rank different strategies/ actions that could be taken to reduce GHG emissions. The approach of this study along with case studies will provide the local governments with a process that can be used to prioritize the projects/alternatives with the lowest costs and GHG emissions.

More importantly, co-benefits (or dis-benefits) of GHG mitigation strategies are examined, such as their effects on local air quality and pollutants , with the goal of understanding whether the strategies might results in inequitable distribution of local impacts or benefits.

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https://escholarship.org/uc/item/4pp80768

## IMAGE

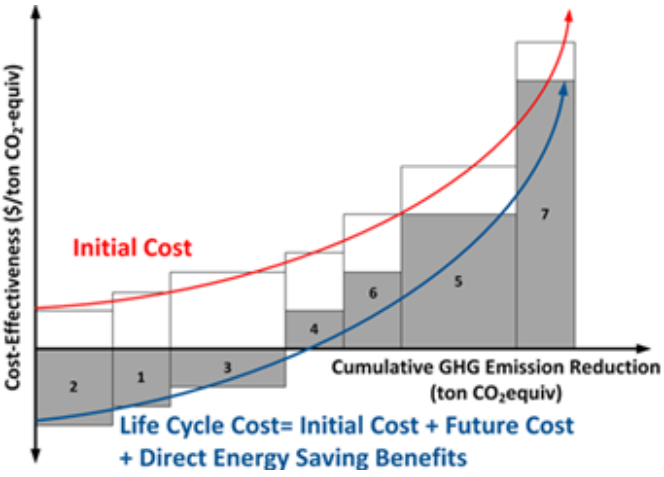


Figure 1. An Example of a Supply Curve adapted from Lutsey (2008)1.