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POLICY BRIEF

Climate Action Plans Should Quantify Life Cycle Greenhouse Gas Emissions and Costs to Achieve Meaningful, Cost-Effective Emissions Reductions

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Issue

Local governments increasingly prepare Climate Action Plans to lay out specific strategies for achieving local and state greenhouse gas reduction goals. Strategies to reduce transportation emissions are often a key component of these plans, as the transportation sector is responsible for 41% of greenhouse gas emissions in California and 28% in the US. However, many Climate Action Plans do not quantify the emissions reductions or costs of proposed strategies, and even fewer consider the life cycle impacts of the strategies. Life cycle-based assessments consider emissions and costs that occur at the outset of a strategy's implementation (e.g., purchase, installation, and construction), during operation and maintenance, and at end-of-life. Quantifying the life cycle cost effectiveness and emissions reductions of different strategies can, along with other community priorities, inform the design and implementation of Climate Action Plans that achieve climate goals at a reasonable cost. A *marginal abatement cost curve* is a useful way to present this information, offering a visualization of the rank order cost-effectiveness and total possible emissions reductions of alternative strategies in a Climate Action Plan.

Researchers at the University of California, Davis developed a decision support framework for local governments to assess life cycle greenhouse gas reductions and costs of Climate Action Plan strategies. The researchers demonstrated their approach by developing marginal abatement cost curves for two California counties, Yolo and Unincorporated Los Angeles, based on strategies from their respective Climate Action Plans.

Key Findings

Accounting for life cycle greenhouse gas emissions and costs allows local governments to compare and prioritize emissions reduction strategies. Quantifying emissions reductions and costs over the life cycle of projects or actions can identify the most cost-effective abatement strategies for financially constrained local governments, and also may reveal cases where, on a life cycle basis, a strategy may even increase emissions rather than mitigate them. Researchers developed a marginal abatement cost curve for two Los Angeles County Climate Action Plan strategies and found that electrifying the Foothill Transit bus service could achieve emissions reductions at a much lower cost per ton than purchasing alternative fuel vehicles for the county vehicle fleet, though the latter has the potential to reduce more emissions overall (Figure 1).

Applying the marginal abatement cost curve method highlights Climate Action Plan strategies that would reduce emissions at zero or even a negative cost over the long term. These win-win strategies are strong candidates for priority implementation. For example, installing solar canopies across Yolo County parking lots would recoup all installation costs and even provide net cost savings over a 25-year analysis period, while also providing greenhouse gas emission reductions by supplying renewable energy to the grid.

Quantification of life cycle emissions can also reveal greenhouse gas reduction strategies that would actually increase emissions. For example, Yolo County considered in-place recycling technologies for road rehabilitation because they

forego long-distance transportation of materials and also reduce the amount of new material needed. However, the researchers analyzed two alternatives for this technology and found they would result in increased life cycle emissions compared to current road rehabilitation practice.

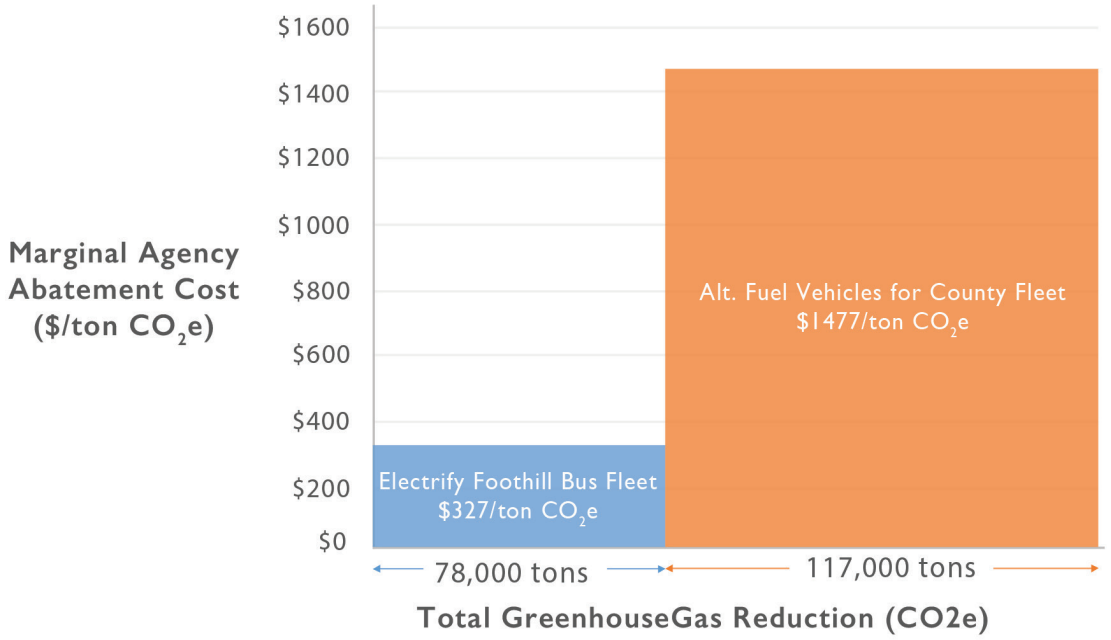

Figure 1. A marginal abatement cost curve comparing two greenhouse gas reduction strategies in Unincorporated Los Angeles County. The width of each bar represents the total predicted emissions reductions for each strategy, expressed in tons of carbon dioxide equivalent.

Data availability is critical for successfully calculating life cycle emissions and costs. The process of calculating life cycle values can be relatively streamlined, but acquiring the necessary data to do the analysis can prove to be time-consuming. Jurisdictions planning to incorporate life cycle-based marginal abatement cost curves in their decision-making will need to be ready to rapidly identify data needs and engage with relevant agencies, divisions, and departments who can provide the necessary data.

Marginal abatement cost curves are site-specific, and implementation decisions will be informed by other local priorities as well as cost-effectiveness. Site-specific information can influence both the cost and emissions reduction potential of a given strategy. The choice of which strategy to pursue will also be shaped by the priorities and interests of the communities where they are undertaken, including co-benefits and priorities unrelated to greenhouse gas reductions and environmental impacts.

More Information

This policy brief is drawn from "Greenhouse Gas Reduction Opportunities for Local Governments: A Quantification and Prioritization Framework," a report from the National Center for Sustainable Transportation, authored by Alissa Kendall, John T. Harvey, Ali A. Butt, Mark T. Lozano, Arash Saboori, and Changmo Kim of the University of California, Davis. The full report can be found on the NCST website at https://ncst.ucdavis.edu/project/greenhouse-gas-reduction-opportunities-local-governments-quantification-and-prioritization.

For more information about the findings presented in this brief, please contact Alissa Kendall at amkendall@ucdavis.edu.

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