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MTI MINETA TRANSPORTATION INSTITUTE

Analysis of the Benefits of Green Streets

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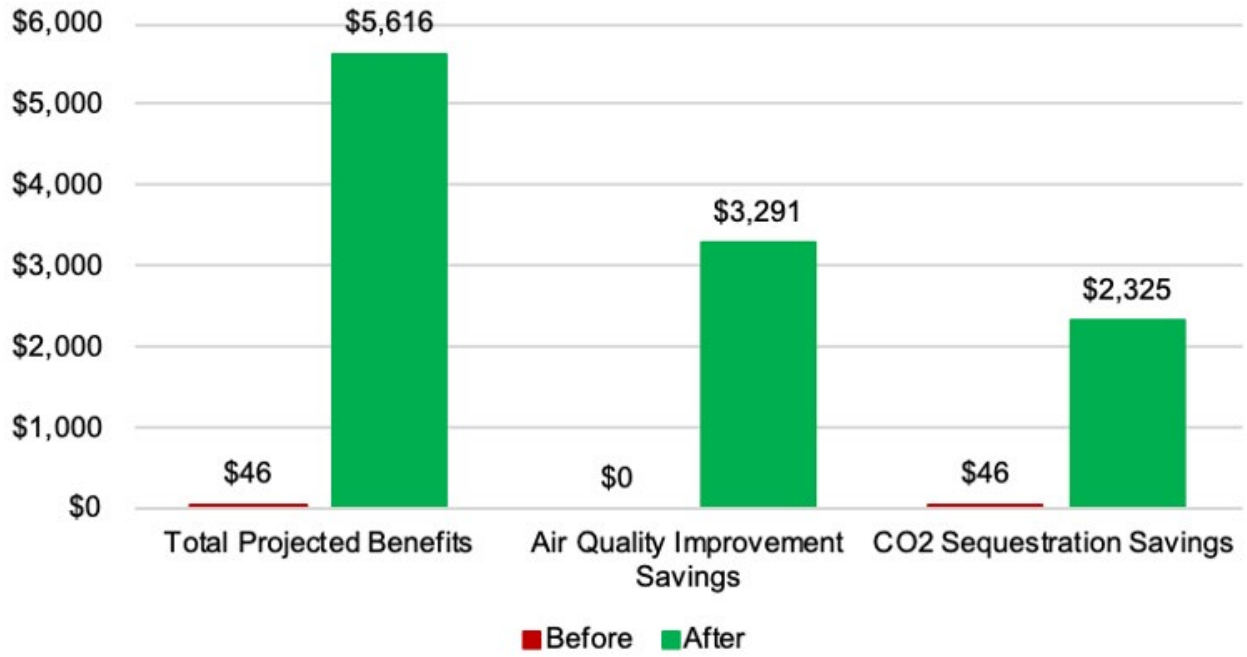

Green streets, as defined by the Environmental Protection Agency, are streets that incorporate different kinds of vegetation and permeable surfaces "…to slow, filter, and cleanse storm water run-off from impermeable surfaces." Unlike traditional streets, green streets retain runoff at the source rather than discharging runoff off-site. Green streets offer many other potential benefits that include improving water quality, absorbing carbon (sequestration), and reducing urban heat island effects. This report summarizes: (1) the research team's analysis of 14 tools calculating green streets benefits; and (2) the results of applying the two most promising calculators to a select group of green streets case studies. The researchers are affiliated with the Mineta Transportation Institute (MTI), which serves the California Department of Transportation ("Caltrans"). The report presents the results of the case study analyses, with an emphasis on carbon sequestration benefits estimated using the i-Tree Design calculator, and improvements to pedestrian levels of service estimated using a Highway Capacity Manual (HCM)-based (the "Landis") method.

Study Methods

The MTI team developed a list of 14 calculators for use in measuring green street infrastructure benefits. From this list, two calculators were selected for testing in consultation with Caltrans: (1) i-Tree Design; and (2) Landis Pedestrian Level of Service (PLOS).

Based on the lessons learned from a literature review and stakeholder discussions, the research team developed a list of 11 potential case study sites. The team then tested these calculators using calculator runs based on hypothetical "before" conditions for the green street sites. These conditions were estimated based on the removal of all green street infrastructure elements from each green site and their replacement with non-green features.

Findings

The monetary value of planting trees over a 20-year period is small but significant, according to analysis performed with the i-Tree Design calculator. The calculator measures these benefits in terms of air quality improvements and carbon dioxide (CO2) sequestration. The total estimated benefits from street trees over a 20-year forecast period on the seven case study sites range from a low of $1,466 for nine trees at site 9A (South Hope Street in Los Angeles) to a high of $9,420 for 56 trees at site 7A (CA 299 in Willow Creek). On a per tree basis, the lowest benefits come from site 3A (Cherry Avenue in San Jose) with $10 per tree, and the highest come from site 1A (San Pablo Avenue in El Cerrito) at $175 per tree.

While the Landis PLOS method accounts for the benefits of short street tree spacings (i.e., a high number of trees) and the benefits of having a continuous biostrip or planter strip serving as a pedestrian buffer, the method does not appear sensitive to tree spacings, while it is very sensitive to buffers. The importance of having a biostrip or planter strip buffer between the sidewalk and street traffic for pedestrian comfort is reflected in the PLOS findings for the other six cases in this study.

The i-Tree Design and Landis Pedestrian Level of Service (PLOS) calculators estimate the CO2 sequestration, air quality, and PLOS benefits of green streets sites.

Policy Recommendations

The report concludes that i-Tree Design's ease of use, sensitivity to a range of tree and environmental characteristics, and scalability—it can be used to analyze one tree or many trees—make it a useful candidate to serve as a common frame of reference and analysis for a variety of potential users within Caltrans and other state departments, as well as local and federal government agencies. A similar argument can be made for the Landis PLOS method. HCM-based methods (such as the Landis method) are already a common standard for the transportation industry. Hence, teaching and advocating for Caltrans and other transportation professionals to use these methods to capture the pedestrian benefits of green streets infrastructure (as done here with pedestrian buffers and street trees) would likely require little effort and would yield significant gains in the appreciation of green streets' benefits.

About the Authors

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To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/1807

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