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INVESTMENT JUSTICE THROUGH THE GREENHOUSE GAS REDUCTION FUND




Implementing SB 535 and Advancing Climate Action in Disadvantaged Communities

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June 2014

Investment Justice through the Greenhouse Gas Reduction Fund:

Implementing SB 535 and Advancing Climate Action in Disadvantaged Communities

Context

California's Greenhouse Gas Reduction Fund will soon result in billions of dollars to reduce carbon pollution while creating local environmental, public health, and economic co-benefits. Senate Bill 535 (de León) requires that 25 percent of these monies go to projects that provide benefits to disadvantaged communities in California. Achieving the goals of SB 535, and the larger umbrella of climate action under Assembly Bill 32 (Pavley), presents California not only with tremendous opportunities but also complex implementation challenges. To support the State's planning and implementation, UCLA organized a working summit and now presents its outcome.

About

This policy paper aims to help advance a systematic path forward for climate action in disadvantaged communities. The paper results from a workshop that included 150 representatives from civil society, academia, government, and the private sector. The California Endowment was a primary sponsor of this convening, which was hosted by the UCLA Luskin Center for Innovation in partnership with many entities on March 21, 2014. The UCLA Luskin Center for Innovation produced this paper.

Authorship

The primary author of this paper is Colleen Callahan, Deputy Director of the UCLA Luskin Center. Center Director J.R. DeShazo also contributed in numerous ways throughout.

The second half of the paper consists primarily of summaries from investment sector discussions at the workshop. Contributing authors included: Liz Bieber, Nathan Otto, Isella Ramirez, CC Song, and Lisa Wu, with editing by Colleen Callahan and Liz Bieber. Participants in the focus groups provided feedback on draft versions.

Herbie Huff of the UCLA Lewis Center also authored a literature review.

Acknowledgments

The UCLA organizers appreciate support from the California Endowment (TCE), the primary sponsor of the SB 535 Workshop, Investment Justice through the Greenhouse Gas Reduction Fund. In particular, we thank Beatriz Solis of TCE. Thank you also to Cara Horowitz and the Emmett Institute on Climate Change and the Environment at UCLA School of Law; and Manuel Pastor and the USC Dornsife Program for Environmental and Regional Equity.

Many thanks to the 150 participants of the workshop who helped inform recommendations in this report. See the Appendix for the full participant list.

Special appreciation goes out to the SB 535 Quad for their leadership and partnership. This includes Mari Rose Taruc of the Asian Pacific Environmental Network; Bill Magavern of the Coalition for Clean Air; Vien Truong of The Greenling Institute; and Marybelle Nzegwu and Richard Marcantonio of Public Advocates, Inc. Their proposal is highlighted in Section 2.3.

The authors also acknowledge Michelle Prichard and those in her Community Scholars course who conducted helpful research for the SB 535 Workshop and beyond; Liz Bieber for her important assistance on this paper and the event; Isella Ramirez and Christian Zarate for also supporting the organizing; and Susan Woodward for report design and layout, event management, and being the backbone behind everything the Luskin Center does.

It deserves mentioning that discussions about implementing SB 535 would not be possible if not for the author of the bill, Senator Kevin de León, and those who worked with him. SB 535 exists under the umbrella of California's landmark climate initiative. We recognize State leaders Mary Nichols and countless talented staff from the California Air Resources Board; Senator Fran Pavley and her staffer Henry Stern; the Governor's Office including senior advisor Clifford Rechtschaffen; George Alexeeff from the Office of Environmental Health Hazard Assessment; and special thanks to Arsenio Mataka at the California Environmental Protection Agency.

Disclaimer

The UCLA Luskin Center appreciates the contributions of the aforementioned individuals. This paper, however, does not necessarily reflect their views and is not a consensus document. Any errors are those of the primary author.

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1. Introduction and Summary

California's Greenhouse Gas Reduction Fund is expected to soon result in billions of dollars to reduce carbon pollution while creating local environmental, public health, and economic co-benefits. Senate Bill 535 (de León), or SB 535, requires that a minimum of 25 percent of these monies go to projects that provide benefits to disadvantaged communities in California, and a minimum of 10 percent go to projects located in these communities.

Achieving the goals of SB 535, and the larger umbrella of climate action under Assembly Bill 32 (Pavley), presents California not only with tremendous opportunities but also complex implementation challenges. California is blazing a new path that others in the nation and the world are already starting to follow. As a climate leader, California is pioneering rather than able to rely on existing models and precedents. There are no easy answers surrounding implementation of the Greenhouse Gas Reduction Fund and SB 535.

To support the State's planning and implementation, UCLA convened 150 representatives from government, non-profits, academia and the private sector on March 21, 2014 to help advance climate action in disadvantaged communities. Called the SB 535 Workshop, Investment Justice through the Greenhouse Gas Reduction Fund, the goal of this convening was to inform and support the State's planning and implementation of strategic investments from the GGRF to maximize co-benefits of carbon reducing projects in, for, and with disadvantaged communities. This policy paper is an outcome of this convening.

1.1 Background

1.1.1 The Opportunity

In 2006, California passed the Global Warming Solutions Act, commonly referred to by its bill number, AB 32 (Pavley).[1] AB 32 requires the state to return to 1990 levels of greenhouse gas (GHG) emissions by the year 2020. The legislature largely delegated to the California Air Resources Board (ARB) the job of establishing programs to achieve this goal. In response, the ARB identified and began implementing a suite of programs to reduce GHG emissions from a variety of sources with the goal of achieving the AB 32 emissions limit.[2]

Among the measures that the ARB adopted is a cap-and-trade program, which places the world's first economy-wide cap on carbon emissions and establishes market mechanisms to price carbon credits. Since November of 2012, ARB has organized quarterly auctions for the sale of current and vintage allowances. Some of the proceeds go to utility ratepayers in the form of rebates and some into the Greenhouse Gas Reduction Fund (GGRF).

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1 California Legislative Information (2006). "Assembly Bill No. 32, Text." http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32&search_keywords

2 Horowitz, C., Enion, M.R., Hecht, S. & Carlson, A. (2012). "Spending California's Cap-and-Trade Auction Revenue." Emmett Center on Climate Change and the Environment, UCLA School of Law.

AB 1532 (Pérez)[3] mandates that moneys [in the GGRF] must be used to facilitate the achievement of reductions of GHG emissions in this state and complementary goals including to maximize economic, environmental and public health benefits to the state. AB 1532 also requires that the Department of Finance, in consultation with the ARB and other State agencies, develop a three-year investment plan.

The current Investment Plan[4] was submitted to the Legislature in May 2013, and creates a general road map for utilizing cap-and-trade auction proceeds. This includes specifying the investment sectors eligible for funding. (The SB 535 Workshop involved break-out discussions organized around the sectors included in the Investment Plan most germane to providing co-benefits to disadvantaged communities. See Chapter 3 for summaries from these focus groups.) Details and annual budget appropriations will be determined in the legislative and budgeting process each year, as is described in more detail in Chapter 1.3.

SB 535 (de León)[5] requires that the California Department of Finance allocate at least 25 percent of the money in the auction proceeds in the GGRF to projects that provide benefits to disadvantaged communities, and to allocate at least 10 percent to projects located in these communities.

The State developed the California Communities Environmental Health Screening Tool (CalEnviroScreen), a science-based tool for evaluating multiple pollutants and stressors in communities. CalEnviroScreen 2.0 was recently released by the California Environmental Protection Agency (Cal/EPA) and the Office of Environmental Health Hazard Assessment and now generates a score for each community in California at the census tract level.[6] It could potentially be used to identify disadvantaged communities for funding allocation purposes under SB 535.

1.1.2 What's at Stake

"This may be the largest environmental investment opportunity that these communities will see for decades," stated J.R. DeShazo of the Luskin Center as he opened the SB 535 Workshop. The State is not making official estimates of future revenue from the cap-and-trade program. But a recent agreement between the Governor and legislators allocates $872 million to investments from the auction proceeds for the 2014-2015 budget year, the first year of program funding. After that, the cap-and-trade program could bring in several billions of dollars each

3 California Legislative Information (2012). "Assembly Bill No. 1532, Text." http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201120120AB1532

4 State of California (2013). "Cap-and-Trade Auction Proceeds Investment Plan: Fiscal Years 2013-14 through 2015-16." http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/final_investment_plan.pdf

5 California Legislative Information (2012). "Senate Bill No. 535, Text." http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201120120SB535&search_keywords=

6 California Environmental Protection Agency and the Office of Environmental Health Hazard Assessment (2014). "California Communities Environmental Health Screening Tool Version 2.0." http://oehha.gov/ej/ces2.html.

year.[7] Some of the proceeds will go to utility ratepayers as rebates, and some into the GGRF.

Despite the recent decisions related to high-level budget allocations from the auction proceeds, some program, project, and process decisions are yet to be made related to implementing the GGRF and SB 535. For instance, although SB 535 mandates that at least 25 percent of the GGRF funded projects should benefit disadvantaged communities, the State has not yet offered a detailed definition of what it means to "benefit disadvantaged communities," what that entails in practice, nor a systematic process for doing so. The details of these upcoming decisions will make a difference in the lives of Californians.

This was underscored by Senator Ricardo Lara and others at the SB 535 Workshop. Senator Lara described how millions of Californians are struggling economically and breathing dirty air while climate change will exacerbate economic and environmental health risks. Mari Rose Taruc of the Asian Pacific Environmental Network stated: "We know the people in California who will be the most hurt by climate change are people with the least resources to face this problem."

1.2 Report Purpose and Organization

The purpose of this report is to help advance an approach to ensure the equitable and effective implementation of SB 535 throughout the life of the GGRF. The suggestions in this report should be taken as a starting point.

This first chapter provides background and context to the recommendations and considerations in Chapters 2 and 3.

Chapter 2 proposes a performance management approach to effectively implement SB 535. Because SB 535 cannot operate in a vacuum, the authors took a broad view of the process in which SB 535 would operate. We introduce a performance management approach for the GGRF involving goals, criteria, indicators, metrics, and thresholds to guide allocation decisions and track investment results. We also recommend addressing key data inputs and community engagement processes that would support such an approach.

Chapter 3 summarizes considerations and recommendations from participants of the break-out sessions at the UCLA hosted SB 535 Workshop focused on specific investment sectors most germane to disadvantaged communities. The authors also highlight key recommendations that are cross-cutting across sectors.

From both a high overall-level and a more focused sector-level, this report seeks to inform a systematic and equitable approach for allocating funds and tracking progress toward meeting the goals of SB 535 and related laws. Not everything can be addressed in one report, and thus we focus on key themes that arose during the workshop and are relevant for the life of the Greenhouse Gas Reduction Fund.

7 Saha, B., Mazurk, J. & Vickery, D. (2013). "Modeling the Economic Impacts of AB 32 Auction Proceeds Investment Opportunities." ICF International. http://www.icfi.com/insights/reports/2013/modeling-economic-impacts-of-ab-32-auction-proceeds-investment-opportunities

1.3 Legal Framework and Next Steps

Cara Horowitz, Executive Director of the Emmett Institute on Climate Change and the Environment of the UCLA School of Law, gave a presentation at the SB 535 Workshop about the legal framework governing cap-and-trade auction proceeds. According to her and other legal experts the safest proposals, from a litigation risk perspective, are:

1) Proposals primarily aimed at funding greenhouse gas reductions;
2) Proposals that achieve other goals explicitly endorsed by AB 32;
3) Proposals supported by a factual record developed by the Legislature or by ARB concerning the achievement of reductions or other goals; and
4) Proposals that avoid direct allocation of money for revenue purposes unrelated to AB 32.[8]

Within these legal parameters, California has a good deal of flexibility for what types of investments can be made with AB 32 revenues. This is important because it would behoove the State to make investments based on what is most strategic at the time while allowing and acknowledging that priorities may need to shift as conditions change on the ground.

The implementing legislation establishes a two-step process for allocating funding to State agencies, which allows for this flexibility. Unless new legislation amends this process, the steps are:

1) Three-Year Investment Plan: The Department of Finance, in consultation with ARB and other State agencies, must develop and submit to the Legislature a three-year investment plan identifying priority programmatic investments of auction proceeds. The first plan was submitted in May 2013 and subsequently, updates to the investment plan must be developed every three years and submitted to the Legislature with the release of the Governor's January budget proposal. The investment plan creates a general road map. It identifies near-term and long-term GHG reduction goals and targets; analyzes gaps in current State strategies for meeting GHG reduction goals; and identifies priority investment areas and existing programs that could be eligible.
2) Annual Budget Appropriations: Funding will be appropriated with State agencies by the Legislature, consistent with the three-year investment plan submitted by the Administration.

Most of the debate about cap-and-trade proceeds has been about what categories to fund. With that mostly settled with the recent budget agreement, State agencies will now need to make process, program, and project-level funding and implementation decisions. Doing so requires a systematic way for decision makers to assess investment options. In the future, this should entail assessing the performance of investments and making decisions based on what can best meet statutory requirements.

8 Horowitz, C., Enion, M.R., Hecht, S. & Carlson, A. (2012). "Spending California's Cap-and-Trade Auction Revenue." Emmett Center on Climate Change and the Environment, UCLA School of Law.

1.4 Summary of Recommendations

1.4.1 Establish a Performance Management Approach

A process for assessing investment options (ex-ante) and tracking (ex-post) their results is critical, but not yet fully developed by the State. Chapter 2 introduces key elements for such a performance management approach—goals, principles, criteria, indicators, metrics, and thresholds—and how they could inform key steps in implementation of the GGRF.

1.4.2 Adopt Criteria and Indicators to Screen and Score Investments

The authors then translate the goals and principles of the germane statutes into specific criteria and indicators. These statutory eligibility criteria would encompass an initial step that all program and project-level investments would need to pass.

1.4.3 Guide Project Selection using Metrics, Thresholds, and Community Input

The organizations comprising the SB 535 Quad have recently proposed a four-step framework process, involving community input, to assess disadvantaged community benefits. Members of disadvantaged communities should have the opportunity to help define, to the extent feasible, investment priorities that then should inform corresponding metrics and performance targets/ thresholds.

1.4.4 Advance Data and Methods for Ex-Ante and Ex-Post Assessment

The State lacks certain methods and data inputs to maximize the utility of a performance management approach. For ex-ante assessment, we do not yet have sophisticated methods to estimate the co-benefits for disadvantaged communities, or even a common method for estimating how investments would achieve the primary goal of GHG reduction. These analytical methods are being developed and the State should ensure as much consistency as possible across the implementing agencies. In terms of ex-post evaluation, it will be important for the State to organize and collect data on outputs and outcomes of the investments, consistent with the criteria, indicators, and metrics of the performance management system.

1.4.5 Sector-Level Recommendations

Chapter 3 provides recommendations relevant to investment sectors germane to implementation of SB 535. Key cross-cutting themes are highlighted.

2. Over-arching Recommendations

2.1 Establish a Performance Management Approach

This section recommends elements for a systematic approach for assessing investment options (ex-ante) and tracking (ex-post) how the investments meet mandates governing the Greenhouse Gas Reduction Fund (GGRF). The aforementioned Investment Plan provides a broad framework, but many questions remain about how investments should be prioritized and implemented to best achieve the goals of SB 535 and other germane laws. This includes directing monies toward the most disadvantaged communities and households in California, and maximizing economic, environmental, and public health benefits for these communities.

The recommendations in Section 2.1 are purposefully high level and relatively basic because SB 535 implementation should operate in a straightforward and systematic process that encompasses the larger context in which this law will operate. We thus start with the goals of AB 32 and implementing legislation including but not limited to SB 535. We then introduce criteria, indicators, metrics and thresholds. Section 2.2 then flushes out and proposes specific eligibility criteria and scoring indicators to guide investment decisions. In Section 2.3, we make suggestions for the development of metrics and targets/thresholds that should be in part informed by investment priorities identified by disadvantaged communities. Finally, we discuss how data advancements can support sophisticated usage of a performance management system.

2.1.1 Definitions

While terminology could evolve, we propose initial definitions for key components of the performance management approach.

Criteria: Criteria encompass and actualize **principles and goals**—what is specifically sought to be achieved[9] with investments from the GGRF. These goals and principles are stated in the germane statutes. The criteria are thus also derived from the laws governing the GGFR and we can use the term "statutory eligibility criteria" or "screening criteria" because each investment made with monies from the GGRF should meet every criterion before it can advance to the next stage of review.

Indicators: Indicators assess progress toward achieving the criteria.[10] Not all investments must meet all indicators. Instead, the indicators could operate in a scoring system designed to incentivize investments to achieve as many benefits as possible, while providing flexibility in how that is done. This is important given the heterogeneity in the investments eligible for funding. The indicators could be weighed to give more importance to certain ones.

9 Fiksel, J., Eason, T. & Frederickson, H. (2012). "A Framework for Sustainability Indicators at EPA." National Risk Management Research Laboratory, Office of Research and Development, US Environmental Protection Agency. http://www.epa.gov/sustainability/docs/framework-for-sustainability-indicators-at-epa.pdf

10 Ibid.

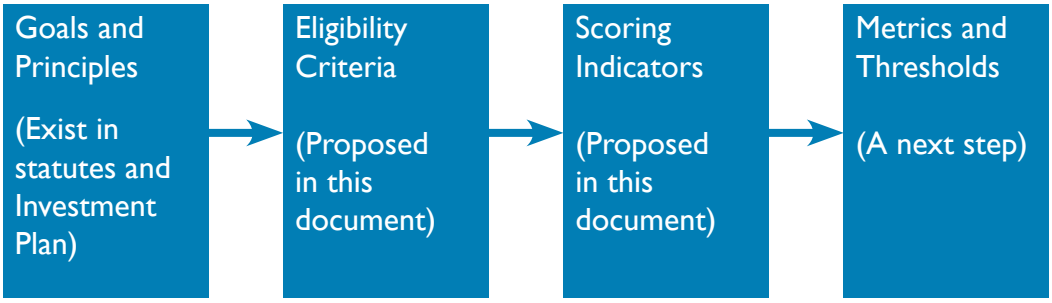
Metrics: Metrics are the measured values used to assess specific indicators.[11] Not all metrics may be relevant to all types of investments and thus, metrics might be most useful at the investment sector, program or even project level.

Targets: Targets could also be established that set minimum thresholds of significance for how the metrics should be met. These could be tailored for certain investment types at the sector, program or even project level.

2.1.2 Overview

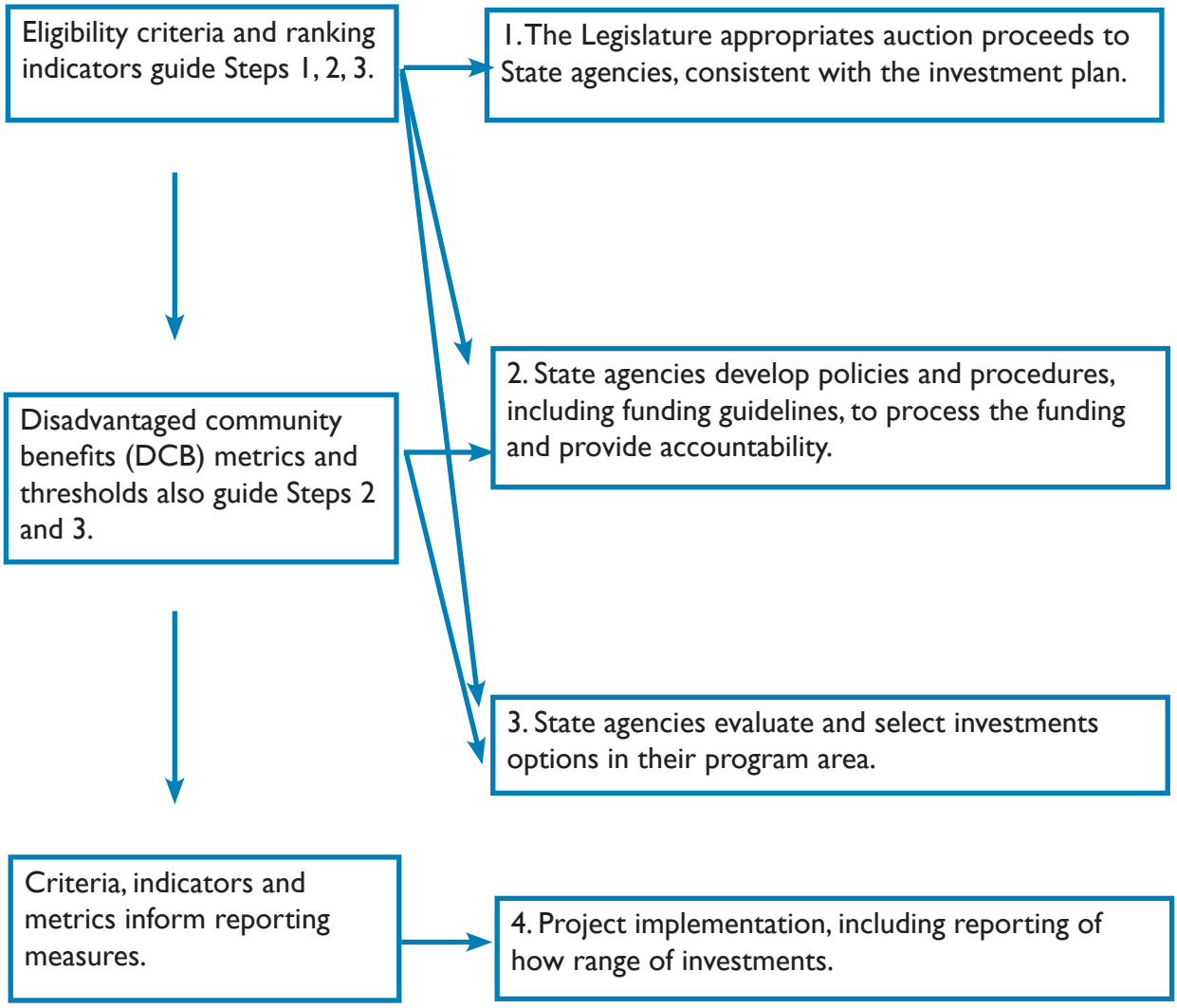
To aid in the assessment of estimated benefits, a performance management approach for the GGRF should be multi-tiered with goals, principles, criteria, indicators, metrics and targets/ thresholds. First are the goals and principles that currently exist, as stated in the germane statutes and in the Investment Plan. From this foundation, eligibility criteria and scoring indicators are introduced in this document to guide implementing agencies in their initial program and project reviews. Finally, we lay the foundation for metrics and targets that can be tailored for specific investment types, and be used to assess disadvantaged community benefits. The logic model below (Figure 1) illustrates the relationships among these components. Figure 2 then shows how these components can be useful at different steps in implementation of the GGRF.

Figure 1:
Key Components for a Performance Measurement Approach



11 Ibid.

Figure 2:
The Approach Informing Key Steps in Implementation of the GGRF



Source: Abbreviated from "Cap-and-Trade Auction Proceeds Investment Plan: Fiscal Years 2013-14 through 2015-16," State of California. May 14, 2013. Page 31.

2.1.3 Goals[12]

Per statute, cap-and-trade auction proceeds must be used to further the greenhouse gas reduction purposes of AB 32 and the other following goals for the use of the proceeds:

1) Maximize economic, environmental, and public health benefits to the state.
2) Foster job creation by promoting in-state GHG emissions reduction projects carried out by California workers and businesses.
3) Complement efforts to improve air quality.
4) Direct investment toward the most disadvantaged communities and households in the state.
5) Provide opportunities for businesses, public agencies, non-profits, and other community institutions to participate in and benefit from statewide efforts to reduce greenhouse gas emissions.

2.1.4 Principles[13]

The Investment Plan lists the following *investment principles*:

1) Investments must further the purposes of AB 32. All investment proposals must show how proposed expenditures will further the purposes of AB 32 to be eligible to receive potential funding. Specifically, to comply with AB 1018, this should include a description of:
   - The proposed expenditure;
   - How it will further the regulatory purposes of AB 32;
   - How a proposed expenditure will contribute to achieving and maintaining GHG emissions;
   - How the agency considered the applicability and feasibility of other non-GHG objectives of AB 32; and
   - How the agency will document results to comply with AB 32.
2) Investments should focus on two broad project types:
   - Projects that achieve near-term GHG emission reduction.
   - Projects that support development of the transformative technologies/approaches needed to achieve the State's long-term GHG emissions reduction goals and maximize air quality co-benefits.
3) Investments should be prioritized toward sectors with both the highest GHG emissions and the greatest need for future reductions to meet GHG goals.
4) State agencies should seek to maximize investment in and benefits to disadvantaged communities whenever possible.

12 State of California (May, 2013). "Cap-and-Trade Auction Proceeds Investment Plan: Fiscal Years 2013-14 through 2015-16." http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/final_investment_plan.pdf
13 Ibid.

5) Investments should foster job creation, including opportunities for training to amplify investment benefits, and maximize economic benefits for California whenever possible.
6) Investment should consider the State's planning principles as set forth in AB 857 to promote infill development and equity; to protect environmental agricultural resources; and to encourage efficient development patterns.
7) Investments should be coordinated with other local, state, and federal funding programs and avoid duplicative efforts. The State should coordinate its clean energy, transportation, and climate change investments to maximize their impacts and, where possible, utilize existing programs and processes.
8) Funding should leverage private and other government investment to the maximum extent possible.

Complementing the investment principles are implementation principles that guide how the state agencies that receive appropriations for auction proceeds will administer their programs. Each agency will need to provide for accountability and transparency in the implementation process as noted in the four principles below:

1) State agencies should maximize transparency in program implementation.
   - Ensure information on funding opportunities is easily accessible to potential applicants, including those in disadvantaged communities.
   - Ensure that any funding solicitations, requests for proposals, notices of funding availability, etc. provide clear descriptions of project requirements, timelines, deliverables, and the criteria that the State agency will use to evaluate proposals.
   - Ensure information on program status and outcomes is reported annually to Finance and is easily accessible to the public, including but not limited to:
     - Estimated GHG emission reduction benefits and the basis for these estimates (where quantifiable);
     - Other quantifiable metrics for the program (e.g. number of zero-emission vehicles funded, gallons of fuel reduced, etc.)
     - Percentage of funding for projects located in disadvantaged communities.
     - Percentage of funding for projects providing benefits in disadvantaged communities and description of how the projects benefit disadvantaged communities without being located in them.
2) State agencies should maximize accountability in program implementation.
3) State agencies should provide support to disadvantaged communities to ensure potential project recipients in these communities are able to access funds, and that the statutory investment requirements for disadvantaged communities are met.
4) State agency funding proposals should specify the agency's costs for administering projects, as well as the administrative/overhead costs for funding recipients, as appropriate, in order to provide the full accounting of administrative costs.

2.1.5 Criteria and Indicators

The second half of this section contains a table in which we propose specific criteria and indicators to guide smart investments. These criteria and indicators can serve three main purposes:

1) Aid decision makers (Governor and Legislature) in making agency/program-level appropriations in the State's annual budget;
2) Guide funded agencies in creating or updating their program funding guidelines and other policies and procedures; and
3) Support funded agencies in their evaluation and selection of project-level investments to meet the intent of the implementing legislation.

We propose three screening criteria derived from statute. These criteria are applicable to all types of investments at both the program and project levels. All investment options should meet all of the criteria in order to pass the first "screen" in the evaluation process.

1) Reduce greenhouse gas emissions.
2) Maximize economic, environmental, and public health co-benefits.
3) Benefits should outweigh costs and burdens.

We also propose secondary criteria that could be used to award additional points to investments in an assessment process. All investments are not required to meet all of these secondary criteria.

The investment options should then be evaluated based on how strongly they meet as many of the indicators as possible. The evaluative/scoring indicators are designed to incentivize and prioritize investments that can achieve as many benefits as possible, as strongly as possible, while providing flexibility in how that is done. Allowing for investment flexibility is important because there is large heterogeneity in impacts and inequalities that the GGRF could address, and different investments will address different impacts. Thus, not all investments must meet all of the indicators but those that do should be scored higher.

Example Indicator: Investment will reduce criteria air pollution.

Determining all of the details for the scoring scheme is outside the scope of this report. One consideration will be whether to weigh certain indicators higher than others. For example, the air quality related indicators could have additional weight, to give an extra point to the investments that significantly improve air quality. In particular, the extent to which a proposed program or project will benefit disadvantaged communities should be weighted more heavily, to ensure that the benchmarks of SB 535 are met.

2.1.6 Metrics and Performance Targets/Thresholds

The final main layer of detail to inform wise investments involves going beyond cross-cutting criteria to add more detailed, quantified metrics and targets tailored to a specific investment type. Because not all metrics may be relevant to all types of investments, metrics will probably be most useful at this investment sector level or at the program level. Likewise targets could be set that establish minimum thresholds of significance for how the metrics should be met, and these targets would be best set at the investment sector or program level. Otherwise, given the diversity of the investment types, apple to orange comparisons could occur.

Hypothetical Metric: X # of pounds of particulate matter pollution reduced via replacing x # of vehicles with zero-emission vehicles.

Hypothetical Target: 100 pounds of particulate matter pollution.

It is beyond the scope of this report to propose specific metrics and targets for each investment sector. However, Chapter 3 contains recommendations from six different investment sector-oriented focus groups. These summaries recommend elements within each sector as important for the State to consider. In addition, Section 2.3 introduces the SB 535 Quad's proposed process framework for assessing disadvantaged community benefits. This process involves performance thresholds for investment priorities informed by members of disadvantaged communities. For instance, the process would categorize investments by whether the majority of beneficiaries will be low-income residents of disadvantaged communities.

2.1.7 Performance Measures

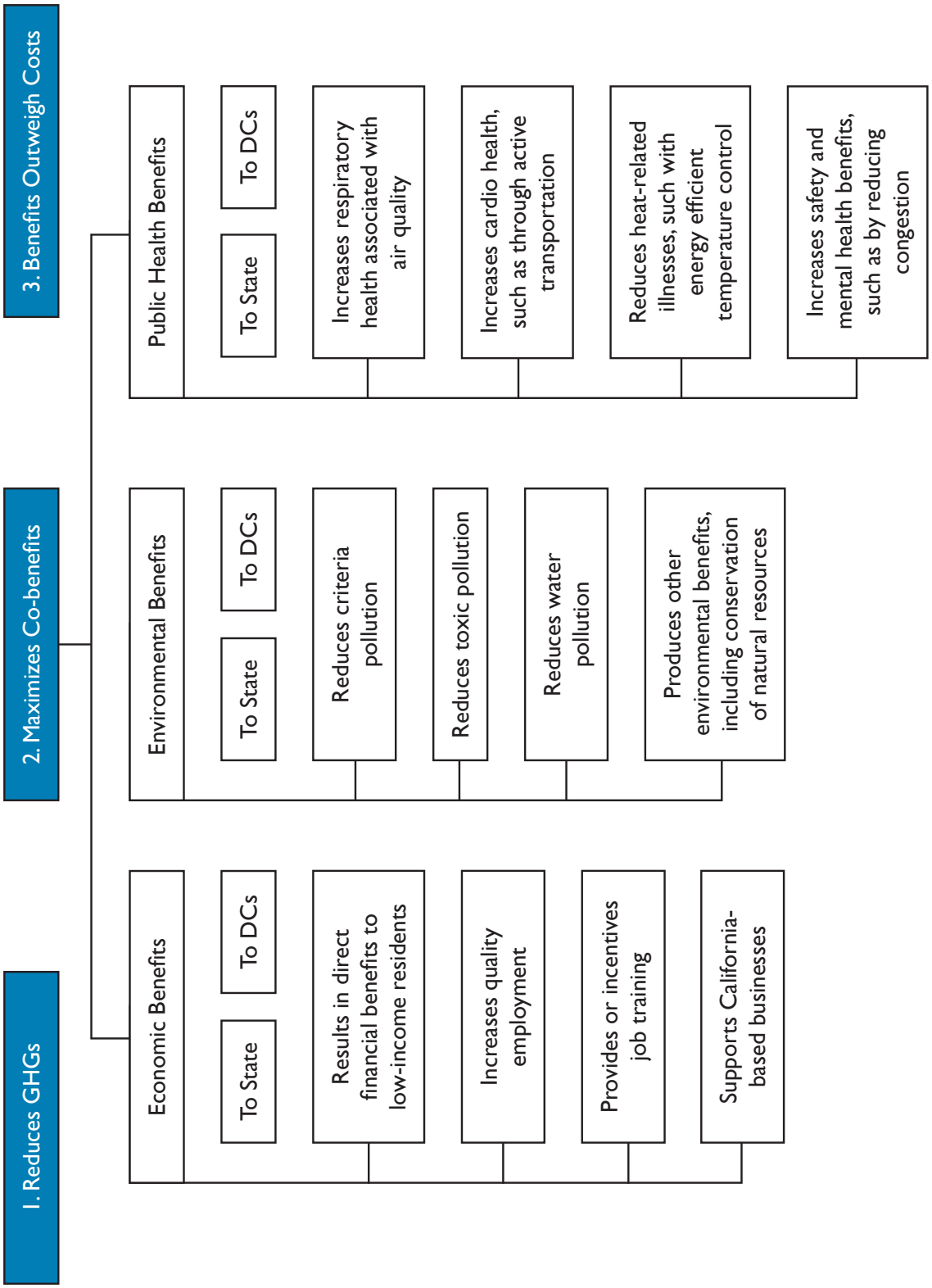
The criteria, indicators and metrics used to evaluate proposed programs and projects (ex-ante), should also inform reporting measures and performance metrics for which progress and results of each investment are tracked and reported (ex-post). Section 2.4 addresses data, reporting and ex-ante evaluation considerations.

2.1.8 Intended Use and Moving Forward

The performance management approach should be iterative, able to be updated as data inputs and other opportunities evolve. Initially, state agencies and their applicant grantees will likely only have the methods and data to qualitatively vs. quantitatively describe how a proposed investment will achieve the criteria and indicators. But as the State's methods and data becomes increasingly sophisticated and high resolution, the tool could be refined.

The following Figure 3 summaries our proposed criteria and indicators, while Table 1 provides layers and others details to the proposal.

Figure 3:
Summary of Proposed Screening Criteria and Scoring Indicators



2.2 Adopt Criteria and Indicators to Screen and Score Investments

The following table provides details about the previously introduced criteria and indicators. We recommend that all investments should meet the three proposed eligibility criteria, per the goals of AB and other germane laws. On the other hand, not all investments need to meet every corresponding sub-criteria or indicator. The sub-criteria and indicators are designed to analyze/score investments for the purpose of prioritizing those that can achieve as many benefits as possible, as strongly as possible, while providing flexibility in how that is done. Allowing for flexibility is important because there is heterogeneity in impacts and inequalities that the GGRF could address, and different investments will address different impacts. The sub-criteria and indicators are worded to aid in the assessment of disadvantaged community benefits.

The secondary criteria (4 through 10) are derived from principles listed in the Investment Plan. These are proposed to further facilitate equitable, sustainable, and strategic investments. Like the indicators, they are not mandatory but could be used to used to give extra weight to certain investments.

Table 1: Proposed Criteria and Indicators

Eligibility Criteria	Indicators	Metric or Explanation
1. Investment will result in reduced greenhouse gas emissions.	Reduces GHGs.	Million metric tons of carbon equivalent (MMCOe)
	Cost effectively reduces GHGs per dollars spent.	MMCOe/$
	The GHG reduction either occurs in the short term and/or results in sustained reductions over the long-term.	Describe whether the investment will: - Primary achieve GHG reductions in the near-term; or - Primarily achieve longer-term GHG reductions (through land use changes or the development of transformative technologies/approaches needed to achieve the State's long-term GHG emission reduction goals), and for how long; or - Neither.

Eligibility Criteria	Indicators	Metric or Explanation
2. Investment will maximize economic, environmental, and public health benefits to the state.	See sections 2.1 – 2.3	See sections 2.1 – 2.3
2.1 Investment will maximize co-benefits: **Economic benefits to reduce poverty.**	Results in direct financial benefits to low-income residents (including but not limited to residents of DCs), such as through ensuring affordable housing and preventing displacement due to gentrification; reducing electricity costs; or reducing transportation costs.	What are the direct financial benefits from the investment? Where will these benefits occur? Who will benefit? When will the benefits occur?
	Increases quality employment for low-income residents of disadvantaged communities (DCs).	What is the nature of the job creation benefits that will flow to residents of DCs? Specify the quality of these jobs, including their wages, benefits and long-term career trajectories. Where will these jobs occur? Explain how the proposed investment will ensure that the job benefits are targeted to low-income residents of DCs. Explain how the proposed investment will incentive employment along high quality transit lines to provide access for the workforces in DCs.

Eligibility Criteria	Indicators	Metric or Explanation
2.1 Investment will maximize co-benefits: **Economic benefits to reduce poverty (cont.).**	Provides or incentivizes job training for low-income residents of DCs.	Describe how training opportunities targeted at low-income residents lead to industry-recognized credentials and certifications to ensure work is done properly to meet statutory requirements
	Supports California-based small businesses.	Describe your procurement policies or otherwise specify how the investment supports California-based businesses.
2.2 Investment will maximize co-benefits: **Environment-al benefits in DCs.**	2.1 Reduces toxic air pollution. 2.2 Reduces criteria pollution. 2.3 Reduces water pollution.	Articulate the nature of the environmental benefit in DCs by quantifying and/or qualitatively answering the following questions:
	2.4 Produces other environmental benefits for low-income households and residents of DCs, including through conservation of natural resources and expansion of green/open space.	What are the environmental benefits of the investment, and how do they address or mitigate needs identified in the CalEnviroScreen index? Where will these benefits occur? Who benefits (both directly and indirectly, if relevant)? When will the benefits occur?

Eligibility Criteria	Indicators	Metric or Explanation
2.3 Investment will maximize co-benefits: **Public health benefits in DCs.**	Increases respiratory health and chronic disease prevention associated with pollution reduction.	Articulate the nature of the health benefits in DCs by quantifying and/or qualitatively answering:
	Increases cardio health, such as through active transportation or having access to clean and safe public spaces to recreate.	What are the health benefits of the investment? Where do these benefits occur?
	Reduces heat-related illnesses, such as with energy efficient temperature control or urban forestry strategies that reduce the heat island effect.	Who will benefit? When will the benefits occur?
	Increases safety and mental health benefits, such as by reducing congestion, reducing noise pollution, or avoiding housing displacement.	
3. Investment will achieve benefits that outweigh burdens in DCs.	Minimizes or avoids unintended burdens/costs, including displacement and health risks.	Describe any potential burdens that could potentially occur from the investments, and describe the steps that will be taken to minimize or avoid these less positive outcomes in disadvantaged communities.

Secondary Criteria Aligned with Principles in the Investment Plan	Suggested Questions for Funding Guidelines
4. Substantially addresses an unmet need that has been identified as a high priority in an inclusive process led by DC residents and groups in the DCs.	Explain.
5. Demonstrates pathways for implementation to effectively utilize local partners such as municipalities, non-profit and community-based organizations in DCs.	Explain.
6. Provides funding guidelines and outreach in many non-English languages and other strategies to target minority and women-owned businesses and households as funding recipients.	Explain.
7. Funding from the Greenhouse Gas Reduction Fund does not crowd out funding that would have otherwise come from another source. Instead it increases the total resources devoted to reducing GHGs and maximizing co-benefits in disadvantaged communities.	Explain.
8. Leverages other funding sources (private or public) or otherwise preserves public capital, such as through a lending mechanism that returns capital.	Explain.
9. Facilitates a systems approach with collaboration or linkages across investment categories. For example, this could include investments in zero-emission transportation coupled with renewables generation and energy efficiency.	Explain.
10. Demonstrates a clear accountability plan for tracking results of the investments and reporting those results.	Explain.

2.3 Guide Project Selection using Metrics, Thresholds, and Community Engagement

Stakeholders from and serving disadvantaged communities should have the opportunity to help inform implementation of SB 535 and the GGRF. The State held public workshops to solicit comments for the Cap-and-Trade Auction Proceeds Investment Plan released in 2013, but not specifically on the equity dimensions per SB 535 implementation. The California Air Resources Board (ARB) now plans to host such workshops later in 2014, for the purpose of developing guidelines for implementing SB 535 in the project-selection process.

Once the ARB has issued statewide guidance for evaluating whether proposed investments would count toward meeting either of SB 535's requirements, we recommend that communities help define, to the extent feasible, project-level investment priorities. Metrics and thresholds should be then be established for these project types. It would be appropriate to tailor metrics and thresholds at the sector, program or even project level given the heterogeneity among the different types of investments and the available data and methods. A challenge will be allowing for this diversity while also standardizing methodologies as much as possible to allow for some comparisons to occur across programs or sectors.

Community engagement lessons can be gleaned from Proposition 84: the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006, and associated disadvantaged communities outreach. The Council for Watershed Health completed a study with support from the California Department of Water Resources and on behalf of the Greater Los Angeles County regional water management group. This study, called the Disadvantaged Communities Outreach Evaluation Study, analyzed how the State of California defines "disadvantaged communities" for purposes under Prop 84 and how the integrated regional water management (IRWM) program can more effectively engage with members of those communities. The study underscores the importance of community-driven projects.[14] What one community really wants may not be perceived as beneficial for low-income residents of another community. Agencies should know what the priorities are for the germane communities.

The process of community engagement to elicit such information takes time and resources, but money should be directed to such planning at a local level to help ensure that resources are appropriately allocated and spent. Communities rarely have existing plans or engagement processes. Facilitating these engagement opportunities requires particular skills. The IRWM study finds that funding directed toward people and organizations with those necessary skills is required for agencies to conduct effective and sustainable disadvantaged community outreach. For the purposes of the GGRF, the State should leverage resources and expertise within local

14 Council for Watershed Health (2013). "Disadvantaged Community Outreach Evaluation Study." Supported by Prop 84, the California Department of Water Resources and the Greater Los Angeles Integrated Regional Water Management group. http://watershedhealth.org/Files/document/844_CWHDACStudy.pdf

entities such as municipalities, academia, and non-profit organizations including those in the SB 535 Coalition.

The advocacy organizations comprising the SB 535 Quad recently proposed a process for the implementation of SB 535 that is driven by community participation. Their proposal is based on the belief that low-income residents of disadvantaged communities should have a seat at the table in defining investment priorities for their particular community, and more generally in defining what counts as a benefit to disadvantaged communities under SB 535. Specifically, the Quad recommends a four-step process for determining whether a proposed project would count toward meeting one of two requirements under SB 535. This assessment addresses: 1) whether the project would close gaps and disparities of the kind that disadvantaged communities experience, or provide greater opportunity to their low-income residents; 2) whether the project benefit(s) are significant; 3) whether the primary beneficiaries are low-income residents; and 4) whether the benefits significantly outweigh any harms, such as displacement.

This process is summarized in the following call-out box and then illustrated in Figure 4. A performance management approach could operationalize the process. As such, the previously proposed eligibility criteria are represented in Figure 4, box 5. Figure 4, box 6 represents the stage at which SB 535 assessment of proposed projects would occur involving thresholds. Box 7 could utilize indicators and metrics to score and rank projects.

Assessing Disadvantaged Community Benefits:
A Framework for Determining which GGRF-Funded Projects will Count toward SB 535

Proposed by the SB 535 Coalition (APEN, Coalition for Clean Air, Greenlining Inst., Public Advocates)

May 20, 2014

Revenues in the **Greenhouse Gas Reduction Fund** (GGRF) must be allocated (a) only to projects that reduce GHGs and provide maximum feasible co-benefits, as required by **AB 1532** (Pérez), while (b) ensuring that the mandates of **SB 535** (de León) are met. SB 535 requires that "a minimum of 25 percent" of GGRF monies go "to projects that **provide benefits** to" disadvantaged communities and "a minimum of 10 percent … to projects **located within**" those communities. Once proposed projects are evaluated on whether they count toward SB 535, they should also be scored and ranked according to criteria (including disadvantaged community benefits, other co-benefits, and community participation in project development) to determine which projects rank highest for funding. A flowchart on the following page illustrates how the SB 535 determination should fit into an overall GGRF investment process.

A Four-Step Process. To count as providing a benefit under SB 535, a project must (a) fill an important need of low-income people (b) in a way that provides a significant benefit and (c) targets its benefits primarily to low-income people while (d) avoiding substantial burdens on a disadvantaged community. ARB should establish a systematic approach for evaluating investment options to ensure that disadvantaged communities receive meaningful benefits that significantly outweigh any burdens, as follows:

- ❑ **The investment will provide one or more of the kind of benefits that meets an important need:**

Low-income residents of disadvantaged communities have needs and priorities that are distinct from those of the public at large. This step ensures that no project counts toward SB 535 if it does not address one of those priority needs.

- ➢ Projects that "provide benefits" to a disadvantaged community (which may, but need not be, located within a disadvantaged area) must address a need commonly identified by low-income residents and households by reducing health disparities; lowering household costs of housing, transportation or energy; increasing family income, job readiness or career opportunities; or improving mobility and access to opportunity.
- ➢ Projects "located within" a disadvantaged community must address either (a) a need highlighted in CalEnviroScreen as a particular priority within the disadvantaged community (e.g., areas where unemployment is especially high should be targeted for jobs) or (b) a need identified as a high priority by the community through an inclusive public process.

- ❑ **One or more of the benefits meets a threshold of significance:**

A merely incidental or nominal benefit is not enough. ARB should develop metrics and thresholds, which administering agencies will tailor to their investment areas, ensuring that benefits provided are significant. For instance, how much rent savings will accrue to low-income households? How many premature deaths will be avoided within the project area? How many jobs will be provided?

- ❑ **The primary beneficiaries are low-income residents or households.**

Some GGRF investments will be expressly targeted to low-income residents or households (defined by CalEnviroScreen as no more than 200% of the federal poverty limit). For those that are not specifically targeted, project sponsors must demonstrate that the overwhelming majority of beneficiaries will be low-income. For example, 70% of the residents living within an appropriate radius of the project are low-income, 65% of the expected users of a service or facility will be low-income, or low-income residents will be eligible for a significant number of jobs created by the project.

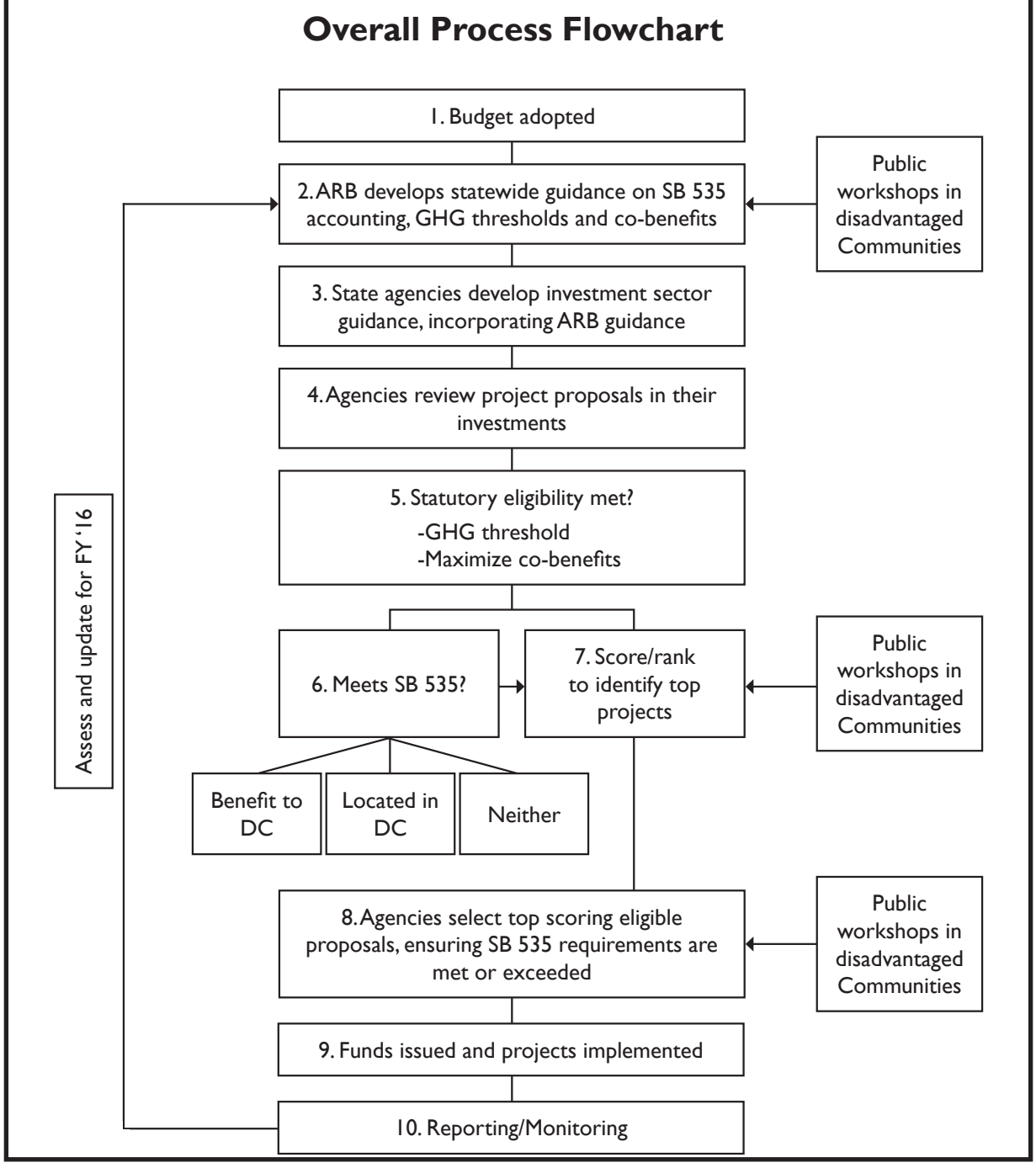
- ❑ **The project must avoid substantial burdens.**

No project should expose the community to toxics or lead to a net loss of affordable housing or to displacement of low-income residents or local businesses. Administering agencies should monitor the adverse impacts of projects receiving funding.

Figure 4: Overall Process Flowchart

Assessing Disadvantaged Community Benefits:
A Framework for Determining which GGRF-Funded Projects will count toward SB 535

Proposed by the SB 535 Coalition (APEN, Coalition for Clean Air, Greenlining Inst., Public Advocates)
May 20, 2014



2.4 Advance Data and Methods

The State currently lacks certain methods and data inputs to fully maximize a performance management approach. Initially, state agencies and their applicant grantees will likely only have the data and tools to qualitatively versus quantitatively describe how a proposed investment will achieve certain benefits. But as the State's methods and data become more advanced and granular, this can inform increasingly sophisticated investment analyses.

In particular, agencies need both a well-defined method to quantify the co-benefits for disadvantaged communities, and a more consistent method for estimating how investments would achieve the primary goal of GHG reduction.

How do we forecast the effects of GHG emissions from a particular investment (e.g. a High Speed Rail investment or an active transportation investment)?

Take the models we have for estimating GHG emissions ex-ante. The GHG models are calibrated to produce estimates at the policy level rather than at the project level. The ARB recently compiled estimates of GHG potential benefits for major programs and project types but cautions that significant differences in the GHG estimates make comparisons across programs difficult. State agencies make GHG estimates using different levels of certainty, different approaches, and capturing a different scope of emission points (e.g. ranging from just direct combustion emissions to additional downstream or upstream reductions, or avoided emissions), do not identify total project costs, and generally do not reflect ongoing operation and maintenance costs.[15]

More advanced analytical methods are being developed. While some methodological variation may be necessary, the State should ensure as much consistency as possible across the implementing agencies.

How do we forecast the co-benefits to disadvantaged communities from a particular investment?

The aforementioned section spoke to the overall process for assessing disadvantaged community benefits, and underscored the importance of community input. There will be methodological nuances involved in this process.

Depending on the type of investment and germane communities, we would expect a distinct portfolio of co-benefits. In other words, there will be heterogeneity in the types of benefits that are relevant amongst the diverse array of sectors, programs and projects. This is why the authors proposed cross-cutting criteria that are worded relatively broadly, allowing for variation in how investments would meet the primary eligibility criteria. We also propose that investments would not be required to meet all cross-cutting indicators but rather be incentivized to meet as many as possible. The metrics and thresholds, on the other hand, could be tailored for different types of investments.

15 California Air Resources Board (April, 2014). "Memo on Cap-and-Trade Auction Proceeds: Benefits of Investments in the Proposed Fiscal Year 2014-15 Budget."

Allowing for this heterogeneity is important but doing so requires an understanding of the nuances within each investment sector. A full literature review for each investment sector is beyond the scope of this paper but the Appendix contains an example from the Sustainable Communities Strategies (SCS) sector. This literature review and analysis can inform how implementing agencies think about "benefits to disadvantaged communities" within the SCS sector. See the Appendix for details. Also see Chapter 3, which contains recommendations from six different sector-oriented focus groups.

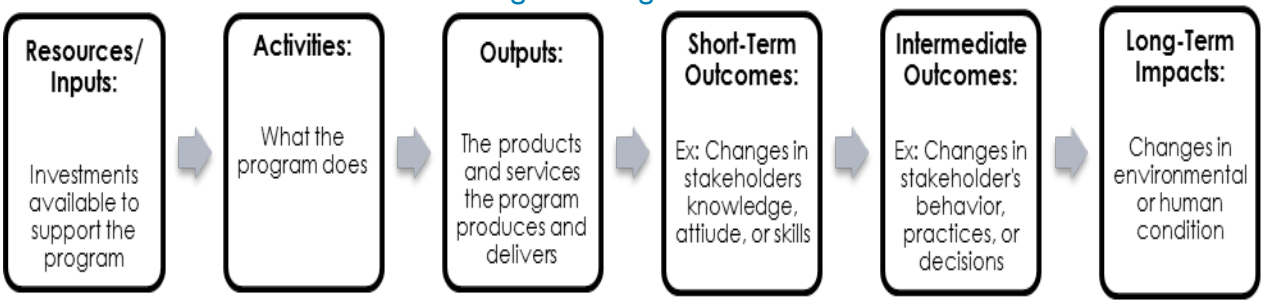
How do we track results of the investments?

The State should organize and collect data on current program performance consistent with the criteria, indicators, and metrics that would be used to guide investment decisions. This way, the State is tracking how the investments are making progress toward the goals required under the germane statutes. Implementing agencies should also track how much has been spent in disadvantaged communities, and investments should also be categorized by whether the majority of the beneficiaries are/were low-income residents of disadvantaged communities.

Data collection can be costly. Ideally to track results of funded investments we would use existing data sources, including those that populate the aforementioned CalEnviroScreen. But most of these speak to baseline conditions at large scales and are not well suited for tracking causal impact from an investment. If even feasible, it would take concerted analyses to tease out the independent effects of GGRF-related projects on economic, environmental, and public health indicators. It also takes a long time for an investment to make a large impact on economic, environmental and public health indicators.

Therefore, what is more realistic, especially initially, is to focus on the earlier steps, inputs, activities, and outcomes in the "logic model" of the GGRF. A l***ogic model*** illustrates the logical (causal) relationships among these program elements. Logic models take a systems approach to communicate the path toward a desired result. Figure 5 is a simplified linear model that shows the relationship between a program investment and its desired results.

Figure 5: Logic Model



"Logic Model" adopted from "Guidelines for Evaluating an EPA Partnership Program (Interim)," EPA and the National Center for Environmental Innovation, 2009.

Figure 5 shows that programs have multiple levels of intended effects: outputs can spark a chain of outcomes that ultimately lead to long-term impacts. The following definitions distinguish among these various levels of effects:[16]

Output: Outputs are the tangible results of a project, program, or policy; the products and services delivered by the project, program or policy makers. (Examples: more field inspectors and citations on industry; a map of EJ areas.)

Outcome: This refers to the response of targeted stakeholders to the project, program or policy outputs; the impact of the outputs on behavior. (Examples: fewer factories out of compliance; more investment in EJ areas). One outcome often leads to another and then another, generating a chain of outcomes.

Impact: (e.g. Environmental Change): This describes the consequences of the behavioral changes, including immediate, intermediate and long term impacts. These impacts include actual changes in the state of the environment, health and quality of life impacts, as well as broader economic and structural changes. (Examples: cleaner air, improved health and reduced environmental disparity).

The connections between outputs, outcomes, and environmental changes are rarely straightforward. It is important to consider effects at various scopes from immediate effects to ultimate objectives–and chart the causal links. This also creates a road map for data collection over the long term while allowing for tracking and evaluation of investments at earlier stages.

It will be important for the State to establish protocols for tracking SB 535-related funds at an agency level and ensuring that results are reported in a transparent manner. We recommend establishing a timeline and process for third party evaluation, as well as harnessing existing entities, such as the Legislative Analyst Office or a consortium from the University of California system, to provide the necessary democratic oversight and accountability.

16 Crabbé, A., & Pieter, L. (2008). *The Handbook of Environmental Policy Evaluation.* Sterling, VA: Earthscan.

3. Investment Sector Level Recommendations

3.1 Introduction and Cross-cutting Themes

The main objective of this chapter is to highlight considerations and recommendations that could guide strategic investments within certain sectors most germane to disadvantaged community benefits. The chapter contains summaries from six different investment sector-focused discussions at the UCLA hosted SB 535 Workshop in March 2014. These focus groups are (in alphabetical order):

1) Clean Renewable Energy;
2) Community Greening and Urban Forestry;
3) Energy Efficiency and Residential Weatherization;
4) Low-Carbon Freight Transport;
5) Sustainable Communities Strategy Implementation; and
6) Zero-Emission Freight Transport.

The charge for each group was to:

1) Review program scope. Discuss existing programs within the investment sector that are eligible for funding per the current Cap-and-Trade Auction Proceeds Investment Plan, and how they can benefit disadvantaged communities.
2) Advance investment criteria and metrics that can be used to assess the benefits of proposed investments within the sector.
3) Apply the criteria and metrics to programs. Begin to ground truth the criteria and metrics and identify what is known and unknown about estimated and actual program performance.
4) Make specific recommendations for implementation. Recommend how programs in the sector could be used, implemented, and perhaps even modified or augmented to help maximize benefits in disadvantaged communities.

This was an ambitious agenda and certain groups got further along than others. Each summary therefore only generally follows those four main steps. All of the summaries begin with an overview of the programs, within their respective sector, that are currently on the table for funding from the GGRF per the aforementioned Investment Plan. The summaries also contain considerations and recommendations that can help inform how those programs are updated

and/or implemented to meet requirements under the GGRF, and otherwise guide strategic investments to maximize co-benefits to disadvantaged communities.

Several themes emerged across the sectors. A preference across several of the working groups was to use the term "community of opportunity" instead of the term "disadvanataged community." Participants also emphasized the importance of: 1) integrated strategies, including linkages of programs across sectors, 2) authentic community engagement, and 3) performance targets, including for job creation and training.

3.1.1 Integrated Strategies

The Investment Plan breaks issues into silos–transportation, energy, urban forestry etc. Thus the break-out sessions at the SB 535 Workshop were organized around these sector and sub-sector categories. Yet, participants acknowledged that integrating these strategies across sectors will be important for California to grow in a sustainable manner. State programs should not operate in a vacuum. Participants made suggestions to integrate and leverage resources across sectors.

For instance, the State could connect weatherization programs with housing programs targeting affordable housing in transit corridors. This could help residents reduce their electricity costs and thus help maintain affordability in multifamily housing stock that might be prone to rent increases after transit related investments. Specifically, the Transit Oriented Housing Program could prioritize developments that exceed water and efficiency standards, provide free transit passes for residents, have electric car sharing, and provide urban greening benefits. These types of integrated strategies can save families money and help achieve GHG reduction goals as soon as possible.

Participants also highlighted the benefits of taking an integrated approach to funding programs and projects. Cap-and-trade auction proceeds should supplement rather than take the place of other state funds. Instead, the GGRF should strategically leverage other funding sources and financing vehicles. In addition, program grants should prioritize cities and other recipients that not only propose good projects, but have supporting plans and policies in place.

3.1.2 Community Engagement

Another common theme across the working groups was the importance of community engagement to help drive revenue allocation. One participant noted that before "we" give "them" projects, "we" need to ask what "they" need. What one community really wants may not be perceived as beneficial for low-income residents of another community. As discussed in Section 2.3, disadvantaged communities should have a seat at the table to identify investment priorities. These community-informed investment priorities should then drive the performance targets appropriate for those types of investments.

Participants recommended seeking public input and providing clarifying to the public on process related matters. For instance, many of the programs currently on the table for funding (as per

the Investment Plan) could better serve the needs of disadvantaged communities if certain changes were made to those programs. But even many informed stakeholders are unclear about the opportunity and process for how this new Fund will allow/require agencies to update existing programs and add in new programs to best meet goals under the GGRF. It is also not clear how much guidance or requirements will be provided by the coordinating agencies—Department of Finance and the ARB—versus how much discretion will be given to the implementing agencies to make investment and implementation decisions.

3.1.3 Performance Targets

Participants also emphasized the importance of setting performance goals/targets for economic, environmental, and public health benefits. This relates to the main recommendation in Chapter 2 about instituting a performance management approach. The following summaries provide recommendations on sector-oriented considerations, criteria, and performance targets. We could also think about the recommendations in terms of the main types of co-benefits—economic, environmental, and public health.

For example, the Green Collar Jobs Council of the California Workforce Investment Board recently released recommendations for a common approach to realizing economic benefits, specifically workforce development and job creation benefits, from California's multiple initiatives under AB 32. Their "Proposed Jobs and Workforce Development Program Elements for Carbon Reduction in California" document is a helpful resource. See the call-out box on the following page for examples of the program elements recommended in this document.

Examples from: Proposed Jobs and Workforce Development Program Elements for Carbon Reduction Investments in California[17]

Developed by the Green Collar Jobs Council of the California Workforce Investment Board, approved January 16, 2014

1) Performance Goals and Data Tracing for Jobs

Issue

Public and ratepayer investments influence the demand for labor, i.e. the types of jobs that are created, but specific goals and related metrics for the job impacts of such investments are not always identified. Policymakers should consider the quantity and quality of jobs created, including wages, benefits and long-term career trajectories. This principle could be applied to all public and ratepayer investments to ensure that the jobs created result in middle-class careers. Policymakers should also enhance access for workers from disadvantaged communities to the entry-level jobs that are created. The current lack of clarity on jobs goals and how to measure them will impede a sound assessment of the trade-offs inherent in policy decisions.

Recommendation

Public and ratepayer investments should set explicit goals for the quantity and quality of jobs created and the demographic and geographic distribution of workers, particularly those in entry-level jobs, based on realistic investment and job projections. Performance metrics and job reporting requirements should be developed using a common cost-effective state-wide computerized job tracking and labor compliance system.[18] These tracking systems can capture quantity and quality of jobs, as well as location of workers. Location can show the distribution of jobs across the state and, if linked to other data, illustrate the job impacts in disadvantaged communities. The Labor Agency should be assigned to coordinate the development of job goals and metrics and oversee the implementation of job tracking. Job goals and metrics should be aligned with state goals and targets for carbon reduction.

2) Contractor Standards and Worker Skill Certifications

Issue

Many of the jobs created through energy efficiency, clean energy and carbon reduction programs will be in the construction industry. These programs should meet the highest standard of quality control in order to maximize carbon reduction and the job benefits of the investments.

Recommendation

Public and ratepayer investments, along with leveraged funds, should explicitly include standards for participating contractors and minimum training and skill standards for workers. A clear tie to high-performing state-certified apprenticeship programs will help assure success in attaining desired carbon reduction goals. As appropriate, carbon reduction programs should coordinate with state-certified apprenticeship to assure specialized skill requirements are met. These should be identified by the Labor Agency, Division of Apprenticeship Standards, with input from the key trade associations who represent contractors eligible for this work as well as representatives from labor unions representing the affected workforce.

17 Green Collar Jobs Council, California Workforce Investment Board (Jan., 2014). "Proposed Jobs and Workforce Development Program Elements for Carbon Reduction in California." http://www.cwib.ca.gov/res/docs/special_committees/gcjc/foundational/GCJC%20program%20elements%20approved%201-16-14.pdf

18 Examples of existing products include LCP Tracker http://www.lcptracker.com/ or Elation Systems http://www.elationsys.com/elationsys/

3.2 Clean Renewable Energy

Author: Colleen Callahan

3.2.1 Introduction

The Clean Renewable Energy working group was tasked with making recommendations that could help maximize disadvantaged community benefits from investments in the renewable energy sector. The group first discussed a couple programs within this sector that the current Cap-and-Trade Auction Proceeds Investment Plan lists as eligible to receive funding from auction proceeds. These two programs, which fall under the California Solar Initiative (CSI), were the program focus of the group because they are germane to disadvantaged communities:

- Multi-family Affordable Solar Homes (MASH)
- Single-family Affordable Solar Homes (SASH)

Next, the group discussed issues for decision makers to consider when updating these or other renewable energy programs per requirements under the Greenhouse Gas Reduction Fund. The group then considered the effects of these and other clean energy programs in terms of three major benefit types: 1) environmental, 2) economic and 3) health and quality of life.

Finally, the group made recommendations to inform the next generation of solar programs and the overall process for making and implementing wise investments from the auction proceeds.

3.2.2 Programs Overview[19]

Per Senate Bill (SB) 1 and Assembly Bill (AB) 2723 of 2006, the California Public Utilities Commission (PUC) instituted that 10 percent of the total 10 year California Solar Initiative (CSI) budget would be reserved for low-income residential solar incentive programs that are now referred to as the MASH and SASH programs. The PUC split this 10 percent evenly between the MASH and SASH programs, with each receiving $108.3 million (for direct incentives as well as administrative, marketing, and evaluation costs). MASH provides incentives, "for solar installations on existing multifamily affordable housing that meet[s] the definition of low-income residential housing established in Public Utility Code § 2852. SASH offers solar rebates to low-income homeowners who install solar systems.

19 Horsford, C. (March, 2014). "The California Solar Initiative: MASH and SASH Program Memo." An assignment in the UCLA Luskin Community Scholars course. http://sb535workshop.files.wordpress.com/2014/01/california-solar-initiative.pdf. Other source: California Public Utilities Commission. "About the California Solar Initiative." http://www.cpuc.ca.gov/puc/energy/solar/aboutsolar.htm

Multi-family Affordable Solar Homes Program

Laura Williams of the California Center for Sustainable Energy (CCSE) discussed the MASH program. CCSE administers the MASH program in the San Diego Gas and Electric (SDG&E) territory, while Pacific Gas & Electric (PG&E) and Southern California Edison (SCE) administer the program within their own service territories.

With multifamily dwellings, the benefits of energy savings from a rooftop photovoltaic (PV) system could accrue to either building owners or building tenants, and the MASH program sought to incentivize a way for both to benefit. Thus, MASH was initially created with two tracks in order to incentive benefits to both groups.

Track 1 offered a fixed rebate amount that was based on the expected capacity of the PV system. Track 1a provided incentives for solar systems that offset common area load, and Track 1b provided incentives for those that offset residential tenant electric load. The initial MASH incentive rate was $3.30 per watt for Track 1a projects and $4.00 per watt for Track 1b projects. Due to incredibly high demand, Track 1a rates were lowered to $1.90 per watt in mid-2011 and Tract 1b was lowered from $4.00 per watt to $2.80 per watt.

Track 2 provided higher incentive rates in exchange for making owners prove that their projects provided a "quantifiable direct benefit" to tenants. (This differs from Track 1b, which was based on expected performance). Track 2 applicants could be awarded rebates up to 100 percent of the solar system's cost as well as ongoing maintenance cost. Track 2 was eliminated after program administrators realized that its higher incentive level was not needed with the strong demand for Track 1, and the remaining Track 2 funds were shifted to Track 1 after July 2011.

Instead of building owners needing to install separate inverters for every meter on their property, which would have been a deterrent, MASH allowed low-income multifamily participants to use virtual net metering. Virtual net metering works when energy generated by a PV system installed on an individual metered building is fed back into the grid through a generator output meter that measures the kilowatt hours (kWh) produced. The utility then allocates the produced electricity to the owner and tenants based on a preexisting arrangement between the different parties. In such an arrangement, the energy allocation to tenants is based on size and allocated kWhs are netted to a tenant's utility bill similar to a net metering setup.

Program administrators first accepted MASH applications in February 2009. Approximately 20 megawatts (MW) of solar has been built on multifamily dwellings as part of the MASH program. More than 35 MW's or $94.1 million worth of projects are on the waiting list (which closed in April 2014). The program is now fully subscribed as of the end of 2013 (two years before the expiration date), which indicates its popularity.

There is high unmet demand among affordable housing developers for the right solar incentives, as highlighted by AB 217. AB 217 was signed by the Governor in October 2013 to renew

funding for MASH and SASH, and now the PUC is planning to make a decision on MASH and SASH 2.0. Cap-and-Trade auction revenues provide an opportunity to update MASH and SASH under this new funding source

Single-family Affordable Solar Homes Program

Stanley Greschner, VP of Government Relations for GRID Alternatives and Michael Kadish, Executive Director of GRID Alternatives Greater Los Angeles, gave a presentation on the SASH program, which their non-profit organization administers. SASH provides fully subsidized solar energy systems to single-family very low-income households and partially subsidized systems to single-family low-income households. The program is available in PG&E, SCE, and SDG&E territories.

The SASH program takes a holistic approach that, in addition to solar incentives, involves energy efficiency, workforce development, and community engagement. This includes:

- Promoting/signing up households for energy efficiency incentive programs;
- Requiring worker training and facilitating workforce development; and
- Conducting community engagement, including involving volunteers in the work.

Focusing on energy efficiency measures helps ensure that the PV system is sized appropriately to net out energy usage (helping residents get their utility bills as close to $0 as possible), without being unnecessarily large. Every SASH project includes a job training component. In fact, job training was incorporated as an "official" component of both SASH and MASH programs in 2013. Over 12,000 volunteers have received basic solar education through SASH. The volunteer-based installation model has helped to reduce overall costs. In addition, GRID Alternatives employs sub-contractors as part of the SASH Sub-Contractor Partnership Program, and has created over 1,450 paid job training opportunities through this effort.

At the end of 2013, over 3,500 PV systems had been installed and interconnected as part of SASH, with many more in process. Through that same period, 12.1 MWs of power had been installed, under review, or reserved.

3.2.3 Criteria to Guide Investments in the Renewable Energy Sector

The following is a compilation of criteria that could be important to consider when prioritizing investments from Cap-and-Trade auction proceeds to maximize benefits for disadvantaged communities and the State.

Environmental Criteria

- *Improve indoor air quality in low-income residences*

  Group participants, including Cheryl Vaughn of Solar Richmond and Strela Cervas of the California Environmental Justice Alliance, suggested linking the MASH and SASH programs to air quality programs. When inspecting a home for energy efficiency and solar potential, the audit could include checking for mold, carbon monoxide, and lead. There could even be a bonus for projects that target household asthma triggers.

- *Improve outdoor air quality in disadvantaged communities*

  Investments should support reductions in local ambient and toxic co-pollutants in California communities. Natural gas power plants are often located in disadvantaged communities and their energy generation results in localized pollutants that can have health impacts. Colleen Callahan suggested that the State should better understand and track how widespread local solar installations can help reduce total peak electricity demand, and thus could reduce the need to fully operate polluting power plants.[20]

  Laura Wisland, Senior Energy Analyst for the Union of Concerned Scientists, and others suggested targeting solar programs (including but beyond residential solar programs) in areas of high air pollution where diesel trucks and other sources of pollution could go electric coupled with local solar power generation. For example, replacing diesel good movement equipment with clean electric along the 710 Freeway "diesel death zone."

- *Reduce climate vulnerability/increase climate resiliency in disadvantaged communities*

  Participants suggested that solar should be just one part of a larger strategy to build climate resiliency in targeted areas. Solar programs could link up with cool roof programs to combat urban heat island effects. Participants expressed that in the future the State should strive to integrate solar, energy efficiency, demand response, storage, and more as part of targeted micro grids. Micro grids could protect valuable economic centers as well as vulnerable populations in health centers or designated

20 This complex issue is relevant in transmission constrained "local areas", such as the Los Angeles area basin, that have system-level constraints that limit the importation of power over transmission lines from other regions of the state. Under peak demand conditions, the central transmission grid may not be able to import all the power demanded by consumers. To operate the grid safely and mitigate the risk of power shortages, the grid operator requires that enough power generation capacity be available within the local area to meet the expected peak demand. In the LA Basin, for example, the vast majority of this local need is currently met with local fossil fuel power plants that emit not only greenhouse gas, but also other local pollutants that affect public health. The widespread installation of local solar energy systems by homeowners and businesses helps reduce the total peak power demand and can reduce the need to operate local fossil fuel power plants to some extent.

emergency cooling centers, which would need to provide electricity even in the case of power failure to the utility grid.

Jose Madrid of the Environmental Defense Fund proposed that projects that are

included in a city/municipal climate resiliency plan should get added weight in the project review process. Projects that include a community outreach/education component could also get added weight.

Economic Criteria

- *Reduce electricity bills for low-income households*

  Participants expressed that solar programs should have a renewed linkage with energy efficiency and other programs that can reduce the amount of power needed to keep homes comfortable. MASH and SASH should also couple with net metering or feed-in tariff programs, so that the owners of a PV system can receive continuous incentives from their utility for the solar energy generated from their system.

- *Create quality jobs in disadvantaged communities*

  Implementing these programs will create jobs; however, it is important that policy makers consider criteria beyond simply the number of jobs created from these programs. Suggested metrics include:[21]

  - *Quantity and types of jobs*

    This should include the total number of workers, along with hours worked and job categories for each worker. We should specifically track number of journey-level craft workers and apprentices. The programs funded by Cap-and-Trade funds are subject to public works laws and prevailing wages, thus apprenticeship numbers are critical to track since they are subject to State Labor Code.

  - *Quality of jobs*

    Tracking wage and benefit rates, along with hours worked, will capture the quality of jobs created in these programs. This includes health, retirement, training, and other benefits that workers earn. This is important to eventually analyze the direct, indirect, and induced economic benefits of these programs. Workers who have access to middle class careers, healthcare, and retirements will have more spending power over time, will contribute more to the local tax base, and will

21 These criteria and metrics are applicable for all Cap-and-Trade investments, not just Renewable Energy. See the California Green Collar Jobs Council's Proposed Jobs and Workforce Development Program Elements for Carbon Reduction Investments in California.

be less dependent on government-subsidized health, welfare, and educational programs.

- *Job access and workforce diversity*

  Tracking demographic and geographic workforce data by job category will show how disadvantaged communities are represented through the full spectrum of jobs.

- *Workforce training*

  Criteria for training programs should not just count graduates or entrants, but also include metrics such as the job placement rate of their graduates in career-track employment, the number and types of credentials awarded, and the cost of training per worker.

- *Job retention measurements*

  Measuring how long energy efficiency technicians stay in their career, and where they go afterwards can help inform how well these training programs are helping these workers in their overall career arcs. It is important to track retention of workers over a period of time instead of a snapshot for one job. Construction jobs are temporary in nature and it is important to ensure that workers can move from one high quality job to others throughout their careers and not just on one project.

- *Leverages and builds local capacity*

  Participants suggested that the State programs should include partnerships with local job training or apprentice programs.

Health, Quality of Life, and Sustainability Criteria

- *Increase thermal comfort and public health*

  Comprehensive solar programs should help families save money by using energy more efficiently, and thus allow low-income residents to own and operate air conditioning units when necessary without breaking the bank. In some cases, family energy use may rise (for example, by now owning an AC unit), so the end goal is not necessarily using less electricity at all times but lowering bills overall. One change that is likely to be profound for individuals in these communities is simply thermal comfort. Measuring this could be a challenge, but may involve before and after surveys, testimonials, cooling and heating degree measurements etc.

- *Prioritize locating solar in areas with public health sensitive populations*

  Some participants suggested targeting solar projects in areas with cumulative sources of air pollution and elevated rates of asthma, blood lead levels, and other indicators of environmentally-related illnesses.

- *Ensure long-term sustainable funding strategy*

  An evaluation of the SASH program conducted by Navigant in 2011,[22] found that SASH is cost-effective for program participants but that due to the highly subsidized PV systems, the program is fiscally unsustainable for the State. The success of the MASH program, evident from its strong demand, highlights that even at a reduced subsidy rate, the program would likely be well received. Regardless of the level of subsidy in the future for both programs, it will be important to leverage other resources to reach a greater scale.

- *Leverage other public dollars*
  For example, additional funding could come from Prop 39, other state or federal funds, or existing city or regional programs.

- *Leverage/attract private capital*
  Some participants suggested using On-Bill Repayment,[23] Property-Assessed Clean Energy (PACE),[24] or a green bank to attract private capital and thus expand the amount of resources available for clean, renewable energy.

3.2.4 Recommendations

The Working Group summarized recommendations to inform the next generation of MASH, SASH, and other solar programs as well as the overall process for making and implementing wise investments from the auction proceeds.

An overall comment was to change the term "disadvantaged community" used in SB 535 to the term "community of opportunity." The Clean, Renewable Energy sector represents that it is not

22 Navigant Consulting, Inc. (August, 2011). "CSI SASH & MASH Impact and Cost Benefit Report. "http://www.cpuc.ca.gov/NR/rdonlyres/13AAEDF8-BB7D-4FBD-AC05-3FC2B9CBF746/0/CSISASH_MASHImpact_and_Cost_Benefit_Report.pdf

23 Through OBR, utility customers can start saving energy right away through a variety of energy efficiency and/or renewable measures. Customers then pay for these energy-saving measures over time through a charge on their utility bill. To qualify for OBR, the expected utility bill, including the OBR charge, must be lower than it was before, ensuring that customers save money.

24 PACE financing allows property owners to fund energy efficiency, water efficiency, and renewable energy projects with little or no up-front costs. With PACE, residential and commercial property owners living within a participating district can finance up to 100% of their project and pay it back over time as a voluntary property tax assessment through their existing property tax bill. http://energycenter.org/policy/property-assessed-clean-energy-pace

just about taking the "bad" out of vulnerable communities, but bringing the "good" in to provide multiple co-benefits.

Other recommendations included:

1) *Expand low-income solar programs to the entire State*

   The MASH and SASH programs only exist in investor-owned utility territories and not in municipal-owned utility territories, such the City of Los Angeles. As a new, statewide funding source, the Greenhouse Gas Reduction Fund could provide an opportunity to expand some version of MASH and SASH to all low-income areas of California. This would require additional steps, but State decision makers should consider what "carrots or sticks" could allow this to happen.

2) *Invest in research to best target program dollars*

   Participants suggested more statewide research is needed to effectively target investments. The State could invest in mapping high solar potential areas and leveraging existing data sources to do so. Los Angeles County's Solar Map, UCLA's Los Angeles Solar Atlas and UCLA-EDF's Los Angeles Solar and Efficiency Report (LASER) are examples of such tools that could be utilized and expanded statewide. Laura Wisland of the Union of Concerned Scientists suggested targeting investments using this type of solar hot spot data layered with data about vulnerable communities disproportionately affected by pollution, per CalEnviroScreen.

   Stanley Greschner of Grid Alternatives, however, cautioned that too much targeting could unnecessarily limit the programs' goal to bring solar to the affordable housing sector.

3) *Leverage other financing vehicles*

   Although MASH and SASH have been popular, the public subsidy has been significant. To be more sustainable over time, the program could link up with other financing vehicles, such as previously mentioned On-Bill-Repayment (OBR), Property assessed clean energy (PACE), or a green bank.

4) *Enhance linkages with complementary programs*

   While the SASH and MASH programs already take a fairly holistic approach, phase 2.0 could do even more. Participants emphasized the importance of complementary/ enabling technologies and programs to help optimize solar programs.

   First, this includes improving accessibility to existing energy programs including the:

   - Weatherization Assistance Program for low-income households;
   - Energy Savings for low-income households program;

- California Alternative Rates for Energy (CARE) programs in which enrolled low-income customers can receive a 30-35 percent discount on their electric and natural gas bills;
- CSI Thermal Program, which offers cash rebated for the installation of solar water heating systems (up to $2,719 for single-family homes and up to $500,000 for multifamily or commercial properties);
- Feed-in Tariff programs, which allow participating property owners to sell their solar energy generated on their rooftop to their utility; and
- New Solar Home Program to reach new, affordable housing.

Equally important to participants was linking to the next generation of energy programs including demand response, smart metering, and micro-grid storage, and targeting these programs in low-income communities. This would support goals of increasing community resiliency to heat waves and other impacts of climate change. PG&E has a zero net energy sub-station pilot that was highlighted as an example.

Participants also suggested linking to air quality programs. For example, when inspecting a home for energy efficiency and solar potential, the audit could include checking for mold, carbon monoxide, and lead.

5) *Increase marketing, education, and economic benefits*

Participants suggested increasing partnership with non-profits who serve disadvantaged communities in order to reach more low-income residents and help them go solar and save money on their utility bills.

More partnering with unions and their training and career ladder programs could also enhance the economic benefits of the program in local communities. Many CSI sub-contractors pay at or close to minimum wage, which keeps program costs down, but a living wage could better incentivize trained workers to stay in the field, providing an increasingly skilled workforce necessary to complete the more holistic, multi-component work described in the aforementioned section (#4 above).

6) *Prioritize training and building lasting, quality job opportunities*

Along the lines of #5 above, job training can help ensure that the projects will yield expected results. Job training as part of a comprehensive workforce development system is ideal because what it important is not just the first job, but continued placement as part of a career ladder that provides family-supporting wages, retirement benefits, and continuous training pathways.

7) *Invest in tracking and evaluation*

MASH and SASH programs post publicly accessible data on application numbers, MWs created, and other evaluative metrics. These metrics could expand to be aligned with

the goals of the Cap-and-Trade auction proceeds. Third-party, independent evaluations should be conducted and inform program updates and improvements over time.

3.2.5 Participants of the Clean Renewable Energy Working Group

Cheryl Vaughn, Co Executive Director, Solar Richmond

Colleen Callahan, Deputy Director, UCLA Luskin Center for Innovation

Gordon Snead, Community Organizer, South Bay Center for Community Development

Jackie Reynolds, Chief Information Officer, UCLA Anderson School of Management

J**an McFarland,** Consultant, Center for Energy Efficiency and Renewable Technologies

Jorge Madrid, Coordinator for Partnerships and Alliances, Environmental Defense Fund

Laura Williams, Renewables Project Manager, California Center for Sustainable Energy

Laura Wisland, Senior Energy Analyst, Union of Concerned Scientists

Matthew Miller, Researcher, MIT Department of Urban Studies and Planning

Michael Kadish, Executive Director, GRID Alternatives Greater Los Angeles

Michael Samulon, Research Analyst, UCLA Luskin Center for Innovation

Miya Yoshitani, Executive Director, Asian Pacific Environmental Network

Ray Gonzalez, Consultant, Green Workforce Development

Ria Langheim, Research Analyst, California Center for Sustainable Energy

Stanley Greschner, Vice President, Government Affairs & Market Development GRID Alternatives

Strela Cervas, Coordinator, California Environmental Justice Alliance

Tamara Gishri, Senior Manager, California Center for Sustainable Energy

3.3 Community Greening and Urban Forestry

Author: Liz Bieber

3.3.1 Introduction

The Community Greening and Urban Forestry working group focused on the Natural Resources and Waste Diversion sector of the Cap-and-Trade Auction Proceeds Investment Plan. The group analyzed how to maximize benefits from investments in the Forests and Ecosystems Management sub-sector, particularly the impacts of urban forestry. Urban forestry is defined as the cultivation and management of trees and associated vegetation in urban areas. Urban forestry can also be thought of as an ecosystems management approach to help communities benefit.

The Investment Plan puts on the table several program areas within the sub-sector, including the Urban Forestry and Urban Greening Grant Programs, referred to as the Urban and Community Forestry Grant Programs (U&CF). The California Department of Forestry and Fire Protection (CAL FIRE) administers the U&CF Programs. The group decided to focus on the U&CF Programs because the participants stated that these programs create benefits that are particularly germane to serving disadvantaged communities. [25] The participants discussed the ways in which U&CF programs create local benefits, and then made suggestions for maximizing and sustaining disadvantaged community benefits from these and other such programs that could be supported with auction proceeds.

3.3.2 Program Overview

The U&CF programs were established to "maintain optimal urban and community forests to help improve the quality of life of urban citizens and the quality of urban natural resources."[26] The U&CF programs involve partnerships with local governments, nonprofit organizations, and private companies. One partnership that assists with the structure and delivery of the programs is with the Urban Forest Ecosystems Institute (UFEI). UFEI supports urban forest management and houses publications, resources, tree selection software, and urban forest-related job listings and events.

The working group received a presentation from John Melvin, State Urban Forester at CAL FIRE, who described how in addition to adding to the beautification of the built environment, urban forestry serves sustainability, economic, social and environmental needs. Melvin said that, "urban forestry has more benefits than costs." Yet, implementing urban forestry projects

25 According to the Urban Forestry Act definitions (PRC 4799.09), a "disadvantaged community" is defined as a community with a median household income less than 80 percent of the statewide average.

26 State of California Department of Forestry and Fire Protection. "Urban and Community Forestry Program Overview." Accessed April 15, 2014, http://www.fire.ca.gov/communications/downloads/fact_sheets/UrbanCommunityForestry.pdf

can involve challenges for local grantees. Melvin described that his position involves technical assistance on urban forestry-related issues. CAL FIRE's project management requires uniquely assisting grantees through the project, and leveraging the grant funds to accomplish grantees' goals.

The group discussed the five main granting programs within U&CF: Green Trees for the Golden State, Leading Edge, Leafing Out, Urban Forest Tree Inventory and Urban Forest Management Planning Grant Programs. All U&CF programs serve applicants that currently do not have an urban or community forestry program or project. U&CF programs have multiple objectives to provide environmental services and cost-effective solutions to the needs of urban communities and local agencies.[27]

Green Trees for the Golden State Grant Program

This program will provide funding for tree planting projects in urban areas and up to two years of initial maintenance. Preference will be given to tree planting projects that provide multiple benefits, with an emphasis on air quality and energy conservation benefits. Additional benefits include storm water runoff reduction, storm water quality improvement, improvement of public health, creation of "green jobs," social benefits, and environmental justice. Grant requests for Green Trees for the Golden State should be within $30,000 to $75,000. Some specific criteria include an educational component, ongoing maintenance for the trees planted for at least three years after project completion, and evidence of long-term care for the trees. Trees that require excessive maintenance or deemed to be invasive will render a project ineligible.

Leading Edge Granting Program

The purpose of Leading Edge is to improve greening in urban areas or arrest the decline of urban forest resources. The program will address climate change mitigation or adaptation, facilitate the planting of trees in cities, improve the quality of the environment in urban areas through the establishment of, and/or improved management of urban vegetation to optimize benefits to urban areas.[28]

Examples of projects that can be funded under Leading Edge include: preparing and implementing community-supported urban forest ordinances; establishing urban forestry education centers to restore abandoned urban land and develop community awareness;

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27 State of California Department of Forestry and Fire Protection, Urban and Community Forestry. "Leafing Out Grant Program." Accessed April 19, 2014, http://ufei.calpoly.edu/files/grantinfo/2012/CALFIRE_UFGrants_Leafing%20Out_2012_2013.pdf

28 State of California Department of Forestry and Fire Protection. "Urban and Community Forestry: Leading Edge Projects Grant Program." Accessed April 9, 2014, http://www.fire.ca.gov/resource_mgt/downloads/CALFIRE_UFGrants_Leading%20Edge_2012_2013.pdf

constructing green roofs, bio-remediation projects, edible landscaping, and new technologies that may benefit urban greening efforts. John Melvin emphasized, "Leading Edge is known to fund anything that doesn't fit under the other categories…it has previously funded everything from mapping tools to rain gardens and bio-swales." The grant program description states, "If your project somehow advances urban forestry, urban greening, or the management of urban natural resources, it may be eligible."[29] Lastly, Leading Edge projects can stimulate urban forestry or urban greening job creation, but, "education programs and management plans are not the primary focus of this grant."

Project applications must be within $30,000 and $150,000, and cannot devote more than 15 percent of funds to education programs. The Leading Edge Granting Program meets many core metrics relevant to SB 535, such as GHG reduction and air pollution removal. It could also meet the need for education and job training, but as shown by the programs' criteria, the potential for job creation is limited. However, projects under Leading Edge can contribute to needed tree maintenance, which is implied by the grant's statement, "improve management of urban vegetation to optimize benefits" and the expressed disallowance of management from the project qualifications.

Leafing Out Grant Program

The Leafing Out Grant Program funds the creation and implementation of early-stage urban forestry projects or programs. Such programs are characterized by a community's historic absence of urban forestry programs, and a lack of qualified personnel, and/or non-existent or low budgetary resources for urban forestry activities. Projects can include tree planting, tree inventory, tree policy and/or ordinance development, and education, training, and outreach. Though similar to the Leading Edge granting program, Leafing Out funds smaller scale projects, with a range of $2,500 to $30,000. John Melvin explained that Leafing Out grants target communities that lack the capacity to host a large project, but can apply for this less-competitive funding source. Some project attributes include using trees and vegetation to reduce energy consumption, the heat island effect, and air pollution. Additionally, a desirable project would be located in an area with a higher than average unemployment rate, and an educational component that develops public awareness.

Urban Forestry Tree Inventory Grant

This program enables cities, counties, and qualifying districts to acquire or implement a tree inventory system to be used for urban forest management. Projects may integrate new or existing software into inventories; inventories must be community friendly and must have a minimum level of training or education. No other practices may be funded under this grant program, and grant requests can range $30,000 to $150,000. Applicants must allow public access to the inventory data, which must be compatible with GIS.

29 Ibid.

Urban Forest Management Planning Grants

This grant supports cities, counties, and qualifying districts (which include school, park, recreation, water, and local taxing districts) in need of creating an urban forest management plan. Plans should be holistic, long-term, and take an ecosystem management approach—funding can include a minimum level of training or education, but no other practices may be funded by this grant program. Grants requests can range $30,000 to $75,000. Applicants must have an existing public tree inventory and urban forest protection system (such as a city ordinance or general plan). The management plan must be 40-50 years, and must be "holistic," not solely relying on maintenance.[30]

Other Programs to be Considered for the GHG Reduction Fund

The group identified the Statewide Parks Program as having a model implementation process. This program developed the "Community Fact Finder," a web-based tool that combines mapping and demographic data to calculate the ratio of park acres per 1,000 residents. This tool enabled the Program to determine areas with low-income households that have the least available parkland within a ½ –mile radius, and target them as the highest need. The Program worked in tandem with youth, seniors, and families to determine the types of parks and services they need through community-based planning. Tori Kjer of the Trust For Public Land commented that this level of community engagement is key to directing funding where the community needs it most.

3.3.3 Key Considerations and Program Recommendations

The group identified key considerations to inform how existing State programs could be updated to meet requirements governing the Greenhouse Gas Reduction Fund. Specifically, the group discussed the divide between forestry maintenance and management, and expressed the need to devote additional funding to maintenance. Melissa Guerrero of the Mountains Recreation and Conservation Authority described that it is hard to convince poor cities that once they build a park or plant trees, maintenance will not be a large expense when they are already running deficits. Additional maintenance funds can make urban greening feasible, she added. People want parks and greening, but need funding for operations, and financial support would build trust among those communities that are not that trusting.

Participants discussed that **urban forest management** includes the long-term strategies used for managing an entire urban forest, such as plans and ordinances that cities develop to regulate existing urban forests over a long period of time. Past management plans were 40-50

30 State of California Department of Forestry and Fire Protection. "Urban and Community Forestry: Urban Forest Management Plan Grant Program." Accessed April 20, 2014, http://ufei.calpoly.edu/files/grantinfo/2012/CAL-FIRE_UFGrants_Mgmt.Plan_2012_2013.pdf

year strategies. Good urban forestry management plans ensure cost reduction and efficiency for tree care. Participants explained that better management practices also ensure greater GHG reduction; the longer a tree is kept alive, the more carbon it sequesters. Additionally, good management practices reduce GHG emissions during tree decomposition. The faster trees can be removed when they reach states of decomposition, and taken to a biomass generator for sustainable processing, the less greenhouse gases will be emitted.

On the other hand, **urban forest maintenance** is understood as the micro focus of urban forestry, such as the caring for an individual plant, and is the sector of urban forestry that provides the most entry-level jobs. The group identified a key challenge: many cities are failing to maintain trees effectively, putting maintenance responsibilities on homeowners who are not financially able to shoulder the burden, or lack tree maintenance knowledge. The 2007 City of Los Angeles' Million Trees Los Angeles Program (MTLA), for example, had no budget to irrigate or maintain trees, and in general, tree maintenance is borne either by residents or by nonprofit organizations.[31] In affluent neighborhoods, residents hire gardeners and arborists to maintain trees. But in disadvantaged neighborhoods, this is often not possible. Thus, inequities in tree canopy occur. The group discussed that benefits from tree planting are still not important enough to take priority in the City budget. In contrast, the City/taxpayers pay for "gray infrastructure costs," such as sewage pipes and the corresponding maintenance care.[32]

Participants also identified the importance of expanding maintenance responsibilities to the management agenda. The group proposed creating an endowment for local governments, which would become active towards the end of a UC&F grant, for the purpose of taking care of the trees and vegetation as part of a longer-term strategy. Although some participants expressed concern for "awarding" cities that have failed to provide proper tree maintenance, the general consensus was that disadvantaged communities need additional support. The goal for the endowment would not be to take away cities' responsibility for maintenance, but to ensure that communities are protecting the longevity of trees that have already been paid for.

SB 535 represents a unique set of new opportunities to fund maintenance. Andy Lipkis, President of Tree People, described that past funding for urban forestry programs has been in the form of bonds, which provide capital outlay and a short time cycle, and generally do not pay for maintenance. With SB 535 funding allotted for maintenance, the group believes more jobs could be created via basic urban forestry sector entry-level labor positions. Chuck Mills at California ReLeaf explained that SB 535 presents an excellent opportunity to "form a transformative process around community greening."

31 Pincetl, S., Gillespie, T., Pataki, D., Saatchi, S. & Saphores, J.D. (2013). "Urban Tree Planting Programs, Function or Fashion? Los Angeles and Urban Tree Planting Campaigns." *GeoJournal,* no. 78, 475-493, p. 490.
32 Ibid, p 489

3.3.4 Quantifying Benefits: Considerations for Developing and Applying Criteria, Indicators and Metrics

Quantifying the benefits of urban forestry programs poses challenges. Advocates for tree planting programs believe that tree benefits include: increasing property values; economic development; reducing surface water runoff and erosion; conserving energy; improving air quality; sequestering carbon; reducing noise pollution; enhancing health; providing wildlife habitat; and providing aesthetic benefits. However, the magnitude and even the direction of the impacts of trees on specific urban environments have seldom been directly measured. [33]

In the paper "Urban Tree Planting Programs, Function or Fashion?" (20012), Drs. Stephanie Pincetl et al examined the claims that tree planting programs provide multiple environmental and health benefits. This team of ecologists, economists, geographers, remote sensing experts and urban planners found that a key lesson for urban forestry programs is that tree species are highly variable in their environmental costs and benefits. Treating the urban forest as a homogenous entity can lead to grow errors in quantifying the net value of ecosystem services, such as the wide range of possible estimates of urban forest water use as a function of species. And tree benefits should not be calculated without also estimating their costs; the greatest of which they estimate are water use and irrigation. The tradeoff between water lost in transpiration and carbon sequestration is called Water Use Efficiency (WUE), and it varies by tree species, location, and management.[34] Pincetl et al provide a list of the most "efficient" trees at sequestering carbon and conserving water.

Environmental Benefits

The group proposed criteria and metrics that could help guide investments for the community greening and urban forestry sector.

- *Green House Gas Reduction: Carbon Storage and Sequestration*

  Trees sequester and store carbon in their tissue. But their total impact on carbon sequestration is still debated as not all scientists are content with the current tools available. One key tool is the Urban Forest Effects (UFORE) Model: Quantifying the Urban Forest Structure and Functions. This tool is described in the proceeding section.

  Pincetl et al find that total carbon sequestration by the urban forest cannot appreciably offset the CO2 emission from urban fossil fuel combustion. They argue that the greatest benefits of urban forestry programs do not lie in their ability to sequester CO2 and other greenhouse gas emissions.

33 Ibid, p 476
34 Ibid., p 481

- *Air Pollution Removal*

  Trees remove gaseous air pollution through "uptake in the leaf stomata," and plant surfaces intercept airborne particles, to be retained in the plant or tree.[35] Vegetation is often only a temporary vessel for air pollution, as most particles are washed off in the rain. There is some evidence that air quality improves with increased tree canopy and cover. Nowak found that in urban areas with 100 percent tree cover, short-term improvements in air quality from pollution removal from trees included reductions of 15 percent ozone, 14 percent sulfur dioxide, and13 percent particulate matter.[36]

Economic Benefits

- *Workforce Development and Education*

  Paul Baer of the Union of Concerned Scientists explained that if you focus on just GHG reduction, you get tree planting. But what really matters is getting people more involved over the long term. The group's emphasized the importance of workforce development and education through urban forestry training programs. Such programs can not only further the social welfare and enhance workforce development for disadvantaged communities, but also create local knowledge around tree maintenance and care. John Melvin, stated that the urban forestry-related industry in 2009 added $3.6 billion to the California economy, and created 60,000+ jobs.

  Kemba Shakur, Executive Director at Urban Releaf in Oakland, California discussed some of her most successful workforce development programs funded by CAL FIRE and California Releaf to train young people to become arborists. Her organization hosts the "Urban Forest Education & Stewardship Training Program (UFEST), which has helped cultivate leadership and skills for young people in the field of urban forestry. Through this civic-oriented and environmental stewardship program, young people have helped create sidewalk gardens and urban gardens and planned for long-term maintenance and care.

  Job creation programs are specifically important in disadvantaged communities where unemployment rates are high, and there are disproportionately high rates of high school drop-out rates. The UFEST program not only employs youth that might be at a disadvantage to find work, but also trains them in a field that offers upward mobility. Urban Forest Mentors (the title for youth in the program) will become ISA Certified Arborists, who are trained to help maintain the urban forests in their community. Linda Rudolph of the Center for Climate Change and Health at the Public Health Institute explained that through community engagement, we can enhance the long-term revival and maintenance of the trees.

35 Nowak, D. J. (2002). "The Effects of Urban Trees on Air Quality." Northern Research Station, USDA Forest Service, Syracuse, NY. Page 1. http://www.nrs.fs.fed.us/units/urban/local-resources/downloads/Tree_Air_Qual.pdf

36 Crane, D. E. & Nowak, D. J. (1998). "The Urban Forest Effects (UFORE) Model: Quantifying Urban Forest Structure and Functions." P 718. http://www.nrs.fs.fed.us/pubs/gtr/gtr_nc212/gtr_nc212_714.pdf

One significant aspect of education is engaging the community in urban forestry, and achieving buy-in. Nancy Hughes, Executive Director of the California Urban Forests Council said that, "We are making a lot of assumptions about what a community will embrace, what they want, and what they don't want. Is this just going to be an exercise or fundamentally contributing and making a difference? How do we have residential community ownership in what we're trying to do?" Tori Kjer at the Trust for Public Land noted that AB31 grant guidelines stipulate that a certain level of community engagement has to happen before a project can be funded.

- *Increased Economic Development and Residential Property Value*

  Some studies show that urban trees contribute to private residential property values and public commercial corridors. In the private housing market, a 1980 study by Dominic J. Morales concluded that houses with increased tree cover, all other things held constant, can achieve as much as a six to nine percent increase in total house sales price.[37]

  These earlier studies, however, have methodological issues and few study the West coast. To address some of these issues, Pincetl el al studied the Los Angeles market for single family detached houses, Analyzing 20,660 transaction, they found that Amgelenos like trees but not so much on their parcels: additional parcel trees would decrease the value of almost 40 percent of the properties examined and they woudl have only a small positive impact on most of the others. By contrast, additional neighborhood trees would slightly increase the value of over 88 percent of the properties analyzed. This suggests that while Los Angeles residents may want additional trees, many are unwilling or unable to pay for them. Similar results were found in the analysis of over 1,000 multifamily buildings.[38]

Public Health Benefits

- *Temperature Reduction and the Heat Island Effect*

  A significant benefit of urban forestry programs is in reducing the urban heat island effect. The urban heat island effect "refers to the characteristic warming of urban areas compared to their rural surroundings attributed to the large expansion of non-evaporative impervious material covering large urban areas."[39] In a study focused on Los Angeles, Pincetl et al found that the percentage of shaded tree cover in city blocks explains more than 60 percent pf land surface temperature variations, and city blocks with more than 30 percent tree cover can be 5 degrees cooler than areas with less than 1 percent trees.[40] Nowak also found that tree transpiration and tree canopies

37 Morales, D. J., Boyce, B. N., & Favretti, R. J. (1976). "The Contribution of Trees to Residential Property Value." Manchester, Connecticut, Valuation, 23(2), 26–43. p 308.
38 Pincetl et al, p 483.
39 Pincetl et al, p 484.
40 Ibid.

affect air temperature, wind speed, and humidity.[41]

Reducing the urban heat island effect can provide indirect public health benefits. The heat island effect often causes human discomfort and increase the risk of heat stroke and heat-related mortality. Thus, by reducing temperatures, shade trees can provide public health benefits, especially in lower-income communities that may not be able to afford to own or operate an air conditioning unit. By reducing air conditioner usage, electricity demand can decrease, thereby reducing air pollution associated with electricity generation.

- *Supporting Active Transportation and Obesity Prevention*

  Street trees could also increase walkability in central business districts. And more pedestrian traffic often leads to more economic activity, contributing to continued commercial viability. Many cities today are adopting the "complete streets" model, which redesigns streets to support multi-modal activity (driving, biking, walking, running) and mixed-uses. In addition to widening sidewalks, creating bike lanes, and slowing traffic flow to promote safer street activity, trees are an important part of the equation. Promoted by US DOT's focus on livable communities and National Complete Streets Coalition, greening and tree planting have been important elements to revitalizing downtowns.[42]

  Andy Lipkis added that increased tree canopy could mean a distribution of fruit trees and orchard networks, which serve to alleviate food deserts, and mitigate obesity.

Sustaining the Benefits: Management and Maintenance

The group recommends evaluating urban forestry programs by the amount of funding that will go towards management and maintenance. The group has expressed concern over a lack of maintenance funding, as explained in the Key Considerations section. The group would evaluate a program as more successful if it includes specific funding to maintain the project over a short and long timeline. This is particularly important in disadvantaged communities, as previously described.

3.3.5 Tools to Measure Benefits

The State has access to several tools that are making headway to measure GHG reduction and other benefits from tree planting programs. Both the UFORE and i-Tree software programs utilize the USDA Climate Change Resource Center's Tree Carbon Calculator, developed to

41 Nowak, p 1.

42 Local Government Commission Center for Livable Communities. "US DOT Policy Supports Walking and Biking." Accessed April 10, 2014, http://www.mccog.net/Complete%20Streets/Liveable%20Communities%20-%20Complete%20Streets.pdf

provide quantitative data on carbon sequestration and building heat/cooling and energy savings provided by individual trees.[43]

Urban Forest Effects (UFORE)

Urban Forests Effects (UFORE) is a computer model that standardizes field data to quantify urban forest impacts. UFORE was developed to help managers and researchers quantify urban forest structure and functions. Currently, UFORE has five model components. [44]

First, UFORE-A: Anatomy of the Urban Forest quantifies the urban forest structure, which includes tree density, tree health, leaf area, and leaf and tree biomass. Second, UFORE-B: Biogenic Volatile Organic Compound (VOC) Emissions quantifies hourly VOC emissions that contribute to O3 and CO formations, which the EPA describes may have short and long-term adverse health effects. Third, UFORE-C: Carbon Storage and Sequestration calculates the total carbon stored and the gross carbon sequestered by urban forests based on field data. Fourth, UFORE-D: Dry Deposition of Air Pollution quantifies the pollution removed by urban forests and calculates an associated percent improvement in air quality throughout a year. Fifth, UFORE-E: Energy Conservation estimates the effects of trees on building energy use and consequent emissions of carbon from power plants.

i-Tree

The second tool, *i-Tree*, is an adaptation of the UFORE model; it is a peer-reviewed software suite from the USDA Forest Service that provides urban and community forestry analysis and benefits assessment tools.[45] The Forest Service, Davey Tree Expert Company, National Arbor Day Foundation, Society of Municipal Arborists, International Society of Arboriculture, and Casey Trees have entered into a cooperative partnership to further develop, disseminate and provide technical support for the suite. *I-Tree* tools help communities strengthen their urban forest management and advocacy efforts by quantifying the environmental services that trees provide and the structure of the urban forest. Like UFORE, *i-Tree* has separate applications focused on evaluating specific elements of urban forests, including: *i-Tree Eco, i-Tree Streets, i-Tree Canopy; i-Tree Hydro; i-Tree Design;* and *i-Tree Vue*.

i-Tree Eco provides communities with statistically-based sampling and data collection protocols. These protocols include a central computing engine that makes scientifically sound estimates of the effects of urban forests based on peer-reviewed scientific equations to predict environmental and economic benefits.[46] Second, *i-Tree Streets*, is useful for creating a cost-benefit

43 USDA Climate Change Resource Center.

44 US Department of Agriculture. "Urban Forest Effects Model." Accessed April 4, 2014, http://www.nrs.fs.fed.us/tools/ufore/

45 US Department of Agriculture, Forest Service. "i-Tree." Accessed April 19, 2014, http://www.itreetools.org

46 US Department of Agriculture, Forest Sergice. "i-Tree Streets." Accessed April 11, 2014, http://www.itreetools.org/streets/overview.php

analysis of urban forestry programs. Users import data collected in a sample or complete inventory and enter community specific information (e.g., program management costs, city population, and price of residential electricity) to customize the cost-benefit data.[47] The application calculates the species compositions, environmental and aesthetic benefits that trees give to the community, the monetary value of the benefits provided, and management needs that the trees need. *i-Tree Streets* helps calculate whether the accrued benefits of the street trees outweigh their management costs. Communities have used *i-Tree Streets* to focus their investment dollars by determining which trees maximize canopy cover, which has helped shaped communities' management budgets by concentrating resources on the most beneficial trees.

3.3.6 Information Gaps

The process of appropriately directing investment funds into urban forestry and community programs requires a more solidified evaluative process. The group discussed the merits and shortcomings of using CalEnviroScreen to determine disadvantaged communities most in need of community greening, and identified key research gap in appropriately directing investment funds in the community greening and urban forestry sector.

Canopy Study

Participants underscored the need for a canopy study, which would provide helpful data for the whole state to use. Dr. Rudolph described how data representing the existing tree canopy would create a base for measuring all metrics and criteria, and would provide an excellent method for determining high-need areas across the state. A canopy study, she added, should provide the nature of service, the color of projected heat (light or dark), the proportion of people living under the canopy that are at high risk, which would include low-income, elderly, and chronic disease populations. Andy Lipkis recalled the UCLA Los Angeles tree canopy study published in 2012, and claimed that recreating that study statewide, with finer grained maps showing where severe heat is coming from, would meet the group's aim.

Evaluating CalEnviroScreen

Several participants expressed the view that CalEnviroScreen should be adapted to better serve as an evaluative tool for determining disadvantaged communities, and that it could be expanded or used in conjunction with other tools to identify areas most in need of community greening. The group recommended incorporating tree canopy coverage as an indicator in CalEnviroScreen. Dr. Rudolph stated that the tool inadequately captures the projected weather vulnerability of disadvantaged rural communities in the Central and Imperial Valleys, and Coachella, because the tool is urban-oriented.

47 Ibid.

3.3.7 Leveraging Benefits

The group recommended that community greening strategies be incorporated into projects that emerge as foci from the other work groups. For instance, Dr. Linda Rudolph stated that in order for transportation-oriented development projects to succeed, there must be shaded places to accommodate multi-modal traffic including pedestrians and bicyclists. Greening elements make transportation projects more inviting and walkable, while adding to the aesthetics and design of the new development.

Community greening and forestry is also a key component to creating more energy efficient buildings through shading and green roofs, which enables cooling and energy conservation. Dr. Rudolph added that community greening includes creating green infrastructure, open space, stream and river revitalization, and watershed conservation. It also includes cultivating peri-urban and urban agriculture land local food systems, and schoolyard greening in sustainable communities.

All of these community greening elements might not qualify for funding in the U&CF grants, but should be considered when the State ranks investment options within other sectors, such as Energy Efficiency or Sustainable Communities.

3.3.8 Participants of the Community Greening Working Group

Andy Lipkis, President, Tree People

Chuck Mills, Grants Program Manager, California ReLeaf

Daphne Hsu, Staff Attorney, The City Project

Kemba Shakur, Executive Director, Urban Releaf

Kevin Jefferson, Director of Research, Urban Releaf

Krista Kline, Director, The Los Angeles Regional Collaborative for Climate Action

Jeanne Merrill, Policy Director, California Climate and Agriculture Network

Jill Sourial (Facilitator)

John Melvin, CAL FIRE, State Urban Forester

Laura Ratcliffe, Staff Counsel, Mountains Recreation and Conservation Authority

Dr. Linda Rudolph, MD, MPH, Center for Climate Change and Health at the Public Health Institute

Liz Bieber (Recorder), Graduate Student Researcher, The Luskin Center for Innovation

Melinda Parshall, Master's Candidate, UCLA Urban Planning

Melissa Guerrero, Project Manager, Mountains Recreation and Conservation Authority

Nancy Hughes, Executive Director, California Urban Forests Council

Dr. Paul Baer, Climate Economist, Union of Concerned Scientists; Assistant Professor, School of Public Policy, Georgia Tech

Tori Kjer, Project Manager, The Trust for Public Land

Tulsi Patel, Master's Candidate, UCLA Urban Planning

3.4 Energy Efficiency and Residential Weatherization

Author: Nathan Otto

3.4.1 Introduction

The Energy Efficiency working group was tasked with making recommendations that could help maximize benefits in disadvantaged communities from investments in the energy efficiency sector. First, the group discussed the existing programs that the Investment Plan puts on the table within the energy efficiency (EE) sector particularly germane to disadvantaged communities:

- Weatherization Assistance Program for low-income households. Administered by the California Department of Community Services & Development (CSD).
- Energy Savings Assistance Program for low-income households. Administered by the California Public Utilities Commission (CPUC).

Next, the group discussed issues for decision makers to consider when updating these and/or other programs to meet requirements under the Greenhouse Gas Reduction Fund and SB 535.

The group then considered the effects of these and other energy efficiency programs in terms of three major types of benefits: 1) environmental, 2) economic and 3) health and quality of life. Within these three categories, the group suggested indicators and metrics to guide smart investments. Many of these indicators carry implications and spillover effects across categories. For example, increasing energy efficiency can conserve water, a major input to energy generation, and conservation of water has significant implications both in environmental and economic terms.

Finally, the group summarized key recommendations to inform several components of program design updates, evaluation, tracking, reporting, and the overall process for making and implementing wise investments from the cap-and-trade revenues.

3.4.2 Programs Overview

Catherine J.K. Sandoval, Commissioner of the California Public Utilities Commission, discussed the Energy Savings Assistance Program (ESA Program) and other programs administered by the PUC.

Energy Savings Assistance Program

The objective of the ESA Program is to help low-income households reduce their energy consumption and costs while also improving their quality of life. The program provides

income-qualified customers with free weatherization measures, and energy-efficient appliances to reduce gas and electric usage. Services provided include attic insulation, energy efficient refrigerators, energy efficient furnaces, weather stripping, caulking, low-flow showerheads, water heater blankets, and door and building envelope repairs that reduce air infiltration. The ESA Program also provides information and energy education that promote energy-efficient practices. The goal for the program's education component is to ensure long-term energy savings awareness and to change the culture of energy consumption in low-income communities.

The ESA Program is operated by the State's largest four investor-owned utilities (IOU) company – Southern California Edison (SCE), Pacific Gas and Electric (PG&E), San Diego Gas and Electric (SDG&E) and Southern California Gas (SCG) – with oversight by the California Public Utilities Commission, and input by the Low Income Oversight Board (LIOB). Small and multi-jurisdictional utilities (SMJU) also operate the ESA Program. The ESA Program serves all housing types including single-family, multi-family and mobile homes. Homeowners and renters are both qualified for the program if they meet eligibility requirements.

Jason Wimbley, Acting Chief Deputy Director of the California Department of Community Services and Development (CSD), gave a presentation to the Working Group about the CSDF and how they serve low-income families. The agency administers four primary programs, including the Weatherization Assistance Program.

Weatherization Assistance Program

The mission of the WAP Program is "[to reduce] energy costs for low-income families by increasing the energy efficiency of their homes, while ensuring their health and safety. Some common types of weatherization include: sealing the holes and cracks around windows, doors and pipes; ensuring proper levels of insulation; fixing or replacing windows; and making sure heating and air conditioning systems are working properly.

The WAP is currently funded by the U.S. Department of Energy, which could be leveraged with funding from cap-and-trade auction revenues. Jason noted that "CSD is combining the experiences and lessons learned from over 30 years providing energy services to the low-income community, with experience gained during ARRA [American Recovery and Reinvestment Act of 2009] relevant to the cap-and-trade (C&T) program." He shared lessons from ARRA that could help CSD update the program for new funding from C&T auction proceeds:

- Ramp Up – some ramp-up time is needed to ensure a solid program structure (contracts in place, understanding and adhering to ARB and other expectations, workforce development, etc.).
- Reporting and Accountability – both were emphasized under ARRA and will be with C&T. IT systems need to be ready to handle new reporting requirements.
- Maximizing Job Creation – CSD had a lot of experience under ARRA with documenting job creation and retention.

CSD's program goals under C&T include:

- Maximize energy savings and GHG reductions.
- Leverage Low Income Home Energy Assistance Program funds (and other public/ private investments).
- Require local hire requirements and build workforce development partnerships.
- Coordinate with CPUC and IOU low-income.
- Weatherization efforts to eliminate redundancy and better direct outreach.
- Continue to provide comprehensive weatherization services.
- Continue to serve the neediest of the needy: 100 percent of C&T funds will be spent in disadvantaged communities.

3.4.3 Program Considerations

Participants discussed several key themes important for decision makers to consider when updating the programs to meet requirements governing cap-and-trade auction proceeds.

The Rebound Effect and Energy Equity

First, it is important for policymakers to be aware of "rebound effects" from energy efficiency programs. That is, when a participant faces lower energy bills as a result of EE improvements, they face less incentive to conserve, and behavior tends to change. For example, a direct install program that replaces old, inefficient air conditioning units in a hot area may lead to a family using their new air conditioner more often, while enjoying a safer and more comfortable temperature. Thus, even with a new, more efficient air conditioner, the family may actually end up using more energy, albeit enjoying a corresponding increase in their quality of life and maybe even health. Mortality rates related to heat stroke decrease with access to air conditioning.[48]

A robust debate in the professional literature exists about the magnitude of the rebound effect. Suffice it to say that an important consequence of these rebound effects can be a smaller beneficial effect–both environmental and economic–than might be expected without taking them into consideration. Policymakers should consider carefully how these potential effects of energy equity fit within the goals of SB 535. In this context, it is important to consider the full suite of pros and cons (beyond traditional air quality benefits) associated with the investments.

The group framed the consideration of this phenomenon in terms of "energy equity." Even in the unlikely event that rebound effects completely offset the environmental and economic gains from energy efficiency, it is important for decision makers to understand that disadvantaged communities have historically used considerably fewer resources overall, and should be allowed

48 Basu, R. & Samet, J. (2002). "Relation between Elevated Ambient Temperature and Mortality: A Review of the Epidemiologic Evidence." *Oxford Journals, Epidemiologic Reviews*, Vol. 24, Issue 2, Pages 190-202.

to enjoy more equitable use of our shared natural resources. Policymakers should think hard about how this potential effect of energy equity fits with the goals of SB 535. How these programs are designed and carried out also has a key impact on how beneficial such efforts will be for "communities of opportunity." Questions of equity and distribution should be at the forefront of policymakers' minds when considering these programs.

Program Accessibility and Distribution

- *Minimize co-pay level for program participants*

  One participant stated that the existing Energy Upgrade Program, a home retrofit program, is the EE program in the state least germane to disadvantaged communities. Because the co-pay level is so high (in the thousands of dollars before the benefits of the program are realized), it dramatically skews participation to wealthier families with longer planning horizons. Multi-thousand dollar co-pays will lead to very poor program uptake by the disadvantaged communities identified in SB 535.

- *Focus on targeting relevant ratepayers*

  See co-pay example above. Targeting rebate efforts effectively may be much more cost-effective, and co-pays are not the only factor that can be identified to affect uptake. For example, a 2013 Haas UC-Berkeley study found that a 2005 statewide electricity rebate program produced a 5 percent energy consumption reduction in inland areas, with no discernible effect in coastal areas.[49]

- *Outreach in multiple languages*

  Program participation rates can be increased by expanding the number of languages in which information is shared.

- *Ensure that programs are elder-friendly*

  Expanding the cultural competency of the State's EE programs should include a focus on age appropriateness. Alan Meier of the Lawrence Berkeley National Laboratory and the UC Davis Energy Efficiency Center noted, *"If we were in Japan, this would be the first question policymakers would ask."*

- *Address the "small shared buildings gap"*

  Participants noted current programs could do a better job of targeting Californians who rent small, shared units. Most programs currently target either single-family

49 Ito, K. (2013). "Asymmetric Incentives in Subsidies: Evidence from a Large-Scale Electricity Rebate Program." Energy Institute at Haas, UC Berkeley. http://ei.haas.berkeley.edu/pdf/working_papers/WP244.pdf?utm_source=New+Working+Paper+%23+244&utm_campaign=WP244&utm_medium=email

homes or large multi-family buildings, overlooking a considerable fraction of Californians.

- *Partner with housing agencies to reach the affordable multifamily housing stock*

  Claudia Monterrosa, a director with the Los Angeles Housing and Community Investment Department, noted that the State should prioritize EE retrofits for affordable multi-family properties, and to specifically partner with the California Department of Housing and Community Development (HCD) to do so. She suggested that the HCD make joint decisions for expending the Cap-and-Trade auction proceeds on EE programs to ensure appropriate coordination and allocation resources across departments. Through the HCD, weatherization funds could be directly allocated to local housing finance agencies. Said agencies are well positioned to communicate the benefits of weatherization and enroll income-eligible households in the program.

- *Track program penetration and other key metrics*

  The amount of participating units within an area should be tracked, both in terms of the gross number and relative percentage of participating units within an area. Not all participation is equal. The intensity of program participation should also be measured. For example, did the tenant change one light bulb or complete a whole home/business retrofit? One participant mentioned that some energy service companies that require a high profit margin will target only the low-hanging fruit but leave other opportunities unrealized.

Simplicity and Harmonization

A recurring theme expressed in the working group was the extent of confusion–both among experts and even more so the public–over various "green" programs and their eligibility criteria. Recommended questions for policy makers, State agency staff, and implementing utilities to consider include:

- Is there a way our EE goal could be incorporated into an existing program, and/or could an existing program be expanded to include it?
- Are ratepayers aware of this program? How much education has been needed for this program? Have ratepayers learned about it relatively quickly, or does it remain stubbornly unrealized?
- How could EE goals be harmonized or simplified, both for professionals and end-users?

"Confusion is a serious issue. I am confused, even as an expert," noted one anonymous working group participant.

Training, Quality of Work and Career Ladders

Participants emphasized the need for a holistic approach to maximize the job benefits of energy efficiency programs supported with resources from Cap-and-Trade auction proceeds. Three main issues regarding workforce were brought up: 1) job creation (ie. are there investments that would actually create jobs in the first place); 2) job quality (i.e. Do these jobs pay middle class wages? Do workers have access to health, retirement, and other benefits? Do these jobs pay the prevailing wages for the region? Do workers have access to state approved apprenticeship programs and continuing education programs so workers can improve skills and earning potential?); and 3) job access (Can workers from diverse backgrounds, especially disadvantaged backgrounds, access these jobs? Are there programs that can facilitate entry and retention of disadvantaged workers into these jobs, while also supporting incumbent workers that are already working in the industry?).

Training is important to ensure the labor force is well equipped to effectively conduct energy efficiency work. Training has an impact on how well workers do on the job, and how well the project is done can impact overall energy efficiency outcomes. In the California Public Utilities Commission's (CPUC)'s Long Term Energy Efficiency Strategic Plan, the CPUC recognized the critical importance of a well-prepared workforce, and directed that "by 2020, California's workforce is trained and fully engaged to provide the human capital necessary to achieve California's economic energy efficiency and demand-side management potential."[50] Yet the CPUC awards credit to projects assuming that all of the work was done correctly, which may not be the case today. Especially due to a lack of comprehensive verification, the State may want to require that projects receiving state funding abide by certain training standards, as well as other requirements per SB 535.

Safety is another critical component that needs to be tracked with proper training. In many cases, workers installing EE will be working in existing buildings which may contain lead, asbestos, and other hazards in addition to the typical construction workplace hazards such as falls, etc. Safety does not just impact workers but also building dwellers who may be exposed to contaminants. OSHA 10 and OSHA 30 certifications should be required for a percentage of the workers on the jobsite in order to address this issue.

Uyen Le of IBEW 11 described that it is important to distinguish between short, one-off certificate programs and a robust workforce development system. Union training programs can be characterized as more robust approaches that include on-going training and apprenticeship with experienced journeymen. Importantly, they also include career pathways, with continued placement after training. She added that, *"it is not just the initial placement that is important, but continued placement and longtime opportunities for career advancement."*

Contractor standards, in addition to workforce standards, are also critical to the success of

50 California Public Utilities Commission (2008, updated 2011). "California Long Term Energy Efficiency Strategic Plan." Retrieved from: http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

energy efficiency programs and should be implemented and tracked for the cap-and-trade programs. The quality of installation of EE retrofits greatly impacts the actual energy savings, utility bill savings, and GHG reductions that can be realized as a result of retrofits. By requiring that contractors are properly licensed to perform the specific work as well as certified in areas such as HERS for residential and California Advanced Lighting Controls Training Program (CALCTP) for non-residential, this would ensure that contractors have the updated skills and knowledge to install the EE systems properly.

Project labor agreements (PLAs) target hiring. PLAs are a contract between the owner or managing entity of a construction project and a set of labor unions. Most PLAs include community workforce goals that increase access to construction jobs for local residents, disadvantaged workers, and small businesses.[51]

3.4.4 Criteria to Guide Investments in the Energy Efficiency Sector

The following is a compilation of criteria that could be important to consider when prioritizing investments from the Greenhouse Gas Reduction Fund to maximize benefits for disadvantaged communities and the State.

Environmental Criteria

Energy generation produces a number of negative environmental consequences, of varying types and magnitudes. By more efficiently using the energy that is being generated, energy efficiency programs can have positive environmental impacts in many ways, including:

- *Reduce greenhouse gases*

  Per implementing statue (AB 32), investments from the Greenhouse Gas Reduction Fund should reduce greenhouse gas emissions.

- *Reduce localized pollutants and toxic air contaminants*

  Investments should also support reductions in local co-pollutants. Electricity generation in natural gas power plants results in localized pollutants that carry a disproportionate impact to disadvantaged communities.

- *Conserve water*

  Substantial amounts of water are used in energy generation. By lowering overall energy use, more water can be conserved for other purposes.

51 Villao, D., Le, U., Sarmiento, H. & Ritoper, S. (2012). "Beyond Green Jobs: Building Lasting Opportunities in Energy Efficiency." California Construction Academy and UCLA Center for Labor Research and Education.

Economic Criteria

The main economic criteria should be the creation of jobs. However, it is important that policymakers consider more than simply the number of jobs created from these programs. Suggested metrics include:[52]

- *Quantity and types of jobs*

  This should include the total number of workers, along with hours worked and job categories for each worker. We should specifically track number of journey-level craft workers and apprentices. The programs funded by Cap-and-Trade funds are subject to public works laws and prevailing wages, thus apprenticeship numbers are critical to track since they are subject to State Labor Code.

- *Quality of jobs*

  Tracking wage and benefit rates, along with hours worked, will capture the quality of jobs created in these programs. This includes health, retirement, training, and other benefits that workers earn. This is important to eventually analyze the direct, indirect, and induced economic benefits of these programs. Workers who have access to middle class careers, healthcare, and retirements will have more spending power over time, will contribute more to the local tax base, and will be less dependent on government-subsidized health, welfare, and educational programs.

- *Job access and workforce diversity*

  Tracking demographic and geographic workforce data by job category will show how disadvantaged communities are represented through the full spectrum of jobs.

- *Workforce training*

  Criteria for training programs should not just count graduates or entrants, but also include metrics such as the job placement rate of their graduates in career-track employment, the number and types of credentials awarded, and the cost of training per worker

- *Job retention measurements*

  Measuring how long energy efficiency technicians stay in their career, and where they go afterwards can help inform how well these training programs are helping these workers in their overall career arcs. It is important to track retention of workers

52 These criteria and metrics could be applicable for all Cap-and-Trade auction proceeds investments, not just in the energy efficiency sector. See the California Green Collar Jobs Council, "Proposed Jobs and Workforce Development Program Elements for Carbon Reduction Investments in California."

over a period of time instead of a snapshot for one job. Construction jobs are temporary in nature and it is important to ensure that workers can move from one high quality job to others throughout their careers and not just on one project.

Health and Quality of Life Criteria

Some ways of measuring the effects of EE programs go beyond traditional environmental and economic dimensions:

- *Reduce environmentally-related illness and health*

  Important metrics for targeting areas with program/project outreach include:

  - Which areas have the highest rates of asthma, blood lead levels, and other indicators of environmentally-related illnesses?
  - Are these significantly decreased after an EE program implementation?
  - Measuring the number of sick time taken – though this measurement could be prone to many confounding and unrelated other variables.

- *Increase thermal comfort*

  One change that is likely to be profound for individuals in these communities is simply thermal comfort. Measuring this could be a challenge, but may involve before and after surveys, testimonials, cooling and heating degree measurements etc.

3.4.5 Summary of Recommendations

The group summarized key recommendations to inform program design updates, evaluation, tracking, reporting, and the overall process for making and implementing wise investments from the cap-and-trade revenues.

1) *Prioritize coordination and harmonization of existing programs*

   Throughout the session, participants agreed that confusion is a serious issue, both for the general public but also even among the experts gathered at the breakout session. Coordination and harmonization of existing programs should be a top priority – for example, creating or advertising a "one-stop shop" where people can go to understand what energy efficiency programs they might be able to participate in. Energy Upgrade California exists, but as previously noted, this is not tailored to low-income individuals and families.

2) *Increase program predictability*

Another common theme from our group's participants is that, "there is too much start and stop in many of these programs." By varying funding or unpredictably authorizing or de-authorizing various efforts, participants shared that it is hard to plan and stay informed of which programs or services best serve the current project.

3) *Improve accessibility/lower barriers to entry*

The *Energy Upgrade* program was specifically singled out as a particularly ineffective program at targeting low-to-moderate income communities – primarily because it currently has a co-pay in the thousands of dollars. As a result, program participation is skewed heavily towards higher-income households. Energy audits and direct install programs were much preferred among the group, though policymakers need to be conscious that even a "free" install program can entail some opportunity costs for program participants such as missing a day of work.

4) *Focus on community engagement*

It is important for policymakers to recognize that many of the SB 535 communities are disproportionately comprised of the elderly, immigrants, foreign-language speakers, and other demographic groups that can take extra efforts to reach and convince to participate. Targeted community outreach and an effort to establish trust will increase program participation rates.

5) *Target renters in fourplex homes and affordable housing*

Several members of the group stated that many current programs overlook in either eligibility or implementation those Californians who rent small shared units. That is: most programs target either single-family homes or large multi-family buildings, overlooking a considerable fraction of Californians. It is also important to think about partnerships with affordable housing agencies including the California Department of Housing and Community Development (HCD) and local housing finance agencies. These agencies are well positioned to communicate the benefits of weatherization and enroll income-eligible households in the program.

6) *Prioritize training and building lasting, quality job opportunities*

Job training can help ensure that the energy efficiency projects will yield expected results. Job training as part of a comprehensive workforce development system is ideal because the focus is not just about the first job but continued placement as part of a career pathway that provides family-supporting wages, retirement benefits, and continuous training pathways. Such a strategy is good for retaining trained workers, maintaining a quality workforce able to help the State reach its energy efficiency goals.

7) *"Take time to get this right" and then verify results*

SB 535 represents a large amount of revenue to be spent over time. Measuring the progress of service delivery and gradual expansion and reform are more preferable than sweeping new programs with little follow-up. It is important to consider the range of benefits associated with energy efficiency programs and how outcomes from publicly supported programs can be tracked and verified.

Importantly, the SB 535 funding represents an opportunity to conduct policy experiments and robust evaluations. This should include studies about the effectiveness of various policy design features to affect household bill savings.

3.4.6 Participants of the Energy Efficiency Working Group

Alan Meier, Senior Scientist, Lawrence Berkeley National Laboratory; UC Davis

Catherine Sandoval, Commissioner, California Public Utilities Commission

Celia Andrade, Assistant Director, Pacific Asian Consortium in Employment (PACE)

Clay Sandidge, President, Muni-Fed Energy, Inc.

Cynthia Strathmann, Research & Policy Analyst, LAANE

David Jacot, Director of Efficiency Solutions, Los Angeles Department of Water & Power

David Nahai, President, David Nahai and Associates

Karen Palmer, Senior Fellow and Research Director, Resources for the Future

Jason Wimbley, Chief Deputy Director, California Department of Community Services & Development

Jim Stewart, Co-chair, Sierra Club California Energy-Climate Committee

Jodi Pincus, Executive Director, Rising Sun Energy Center

Laurie Firestone Siedelman, Training & Development Career Coordinator, UCLA Campus Human Resources

Lynn Wiley, Research Analyst II, California Department of Community Services & Development

Megan Scott, Policy, Associate, UC Berkeley Donald Vial Center on Employment in the Green Economy

Nathan Otto, Graduate Student, UCLA Luskin School of Public Affairs

Susan Davidson, Program Manager, California Center for Sustainable Energy

Tanya Peacock, Environmental Policy Manager, Southern California Gas Company

Uyen Le, Compliance & Outreach Representative, International Brotherhood of Electrical Workers Local Union 11

Zyshia Williams, Office Intern, USC's Program for Environmental & Regional Equity

Not present but submitted comments:
Claudia Monterrosa, Director of Public Policy and Research, Los Angeles Housing + Community Investment Department

3.5 Low-Carbon Freight Transport

Author: Isella Ramirez

3.5.1 Introduction

The Low-Carbon Freight Transport working group was tasked with making recommendations that could help maximize disadvantaged community benefits from investments in the low-carbon freight transport sector. The group first discussed freight programs that are included in the current Cap-and-Trade Auction Proceeds Investment Plan as eligible for funding from auction proceeds. Participants suggested how these programs could be updated to meet requirements under a new supplemental funding source, the Greenhouse Gas Reduction Fund. The group also made process recommendations to guide and track specific investments to this sector from the Greenhouse Gas Reduction Fund.

The group was made up of environmental, public health and labor representatives as well as academics and community leaders. The participants came from different regions across California impacted by freight transport.

3.5.2 Program Overview

The Low-Carbon Freight Transport breakout session began with context about the existing programs listed within the freight transport sector of the Investment Plan. Matthew Botill, Manager of Climate Change Programs for the California Air Resources Board (ARB), provided background information on the Air Quality Improvement Program and what a new funding source could mean for it in the future.

The Air Quality Improvement Program (AQIP), established by the California Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007 (Assembly Bill 118), is a voluntary incentive program administered by ARB to fund clean vehicle and equipment projects, research, and workforce training.[53][54] Since being signed into law in 2007, AB 118 has provided approximately $200 million annually (through 2015). The AB 118 dedicated revenue stream comes from smog abatement, vehicle registration, and vessel registration fees.[55] AQIP is an umbrella program that currently includes the following four sub-programs.

53 AB 118, Statues of 2007, Chapter 750.

54 California Air Resources Board (2013). "Background Information Regarding the Air Quality Improvement Plan." http://www.arb.ca.gov/msprog/aqip/bkgrnd.htm#AB118.

55 Ibid.

The Clean Vehicle Rebate Project

The Clean Vehicle Rebate Project (CVRP) is designed to promote the purchase of battery electric, plug-in hybrid electric, and fuel cell vehicles. Rebates of up to $2,500 per light-duty vehicle are available for individuals, non-profits, government entities, and business owners who purchase or lease an eligible vehicle. Over 50,000 rebates have been issued to date, totaling about $100 million.[56]

The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)

The Hybrid & Zero-Emission Truck/Bus Voucher Incentive Program aims to promote early production volumes for eligible vehicles as well as lower long-term production costs by making a limited amount of vouchers available toward the purchasing of hybrid and zero-emission trucks/buses. "Hybrid and zero-emission vehicle technologies have the potential to reduce criteria pollutant, air toxic, and greenhouse gas emissions."[57]

The Advanced Freight Technology Demonstration Projects

The Advanced Freight Technology Demonstration Projects aim to accelerate the commercialization and deployment of cleaner technologies in California, while supporting the State's goals for criteria pollutants, air toxics, and greenhouse gas emission reductions. The Advanced Freight Technology Demonstration Projects funding is administered by the ARB and distributed to applicants working to demonstrate their technologies via a third party entity, such as local air districts, or Ports.

The Truck Loan Assistance Program

The Truck Loan Assistance Program aims to reduce diesel emissions and meet emission reduction goals in California, as it facilitates financing of cleaner trucks to small business.[58] The Truck Loan Assistance Program provides funds to smaller fleets in their early compliance of regulatory standards. It is based on the California Pollution Control Financing Authority's California Capital Access Program. "It enables lenders to provide affordable financing to small business owners that fall just outside the conventional underwriting standards and that may not qualify for traditional financing, particularly in California's tight credit market."[59]

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56 California Air Resources Board. "Clean Vehicle Rebate Project." http://www.arb.ca.gov/msprog/aqip/cvrp.htm.

57 California Air Resources Board (2013). "Assembly Bill 118 Air Quality Improvement Program Funding Plan For Fiscal Year 2013-2014."

58 California Air Resources Board (2013). "Funding Plan, 2013."

59 Ibid.

3.5.3 Program Recommendations

As a new funding source, the Greenhouse Gas Reduction Fund provides an opportunity for ARB to update the AQIP to be most beneficial to disadvantaged communities. Key recommendations from working group participants included expanding program scope, incentivizing projects that provide multiple benefits, and increasing the cultural competency of program materials.

Patricia Ochoa with the Coalition for Clean Air stated that Advanced Technology Demonstration Projects program funding should move beyond a demonstration phase and incorporate a mechanism toward the implementation of pilot programs that include significant commercialization of zero-emission technologies (i.e. fifty zero-emission electric hybrid trucks) within defined disadvantaged communities.

Bill Magavern also with the Coalition for Clean Air discussed how focus should be on the projects that provide multiple benefits. For example, the programs could target California-based businesses that are developing, deploying, and maintaining clean freight technologies.

Isella Ramirez of the UCLA Luskin Center expressed that program information, forms, and application processes should be accessible and reflective of the largely non-English speaker population (the majority of truck drivers), to ensure a funding resource available to persons in disadvantaged communities.

3.5.4 Process Recommendations

The State will need to establish a comprehensive process for implementing SB 535. The following are recommendations pertaining to how investments are made within the freight sector.

Process for Targeting Where Investments Should Go

Joy Williams with the Environmental Health Coalition of San Diego discussed that the State should include up-wind census tracts of currently defined disadvantaged communities by Cal Enviro 2.0 in designation of disadvantaged communities to better include all residential areas impacted by pollution.

Anthony Eggert of the UC Davis Policy Institute stated that due to the fact that goods movement (freight) trucks do not stay in a single geographical location, program funding should consider origin, destination, and routing on the impact and benefits to adjacent communities.

Process for Targeting What Projects are Funded

Mary Silverstein of the Harbor Community Benefit Foundation said that funded programs and projects should have a defined emission reduction baseline and program-specific performance metrics to ensure tangible and measurable emission reductions and co-benefits.

Adrian Martinez with Earthjustice explained how funded programs should incorporate and implement tools to assess potential and actual impact to disadvantaged communities. Current tools to calculate diesel PM and NOX reduction need to be better understood and communicated.

Catalina Garzon with the Pacific Institute recommended prioritizing projects that build climate change resiliency, and thus recommended adopting a metric on climate change resiliency.

Process for Targeting Who Distributes the Funding and Ensures Accountability

The nature of freight prompts the consideration and planning for ongoing maintenance needs, which encompasses appropriate labor sources (e.g. mechanics for maintaining and upgrading infrastructure as needed). This consideration should be paired with targeted workforce development that aims to educate the next generation within the fields of engineering and trades who will both develop and maintain these new technologies.

Margaret Gordon with the West Oakland Environmental Indicators Project emphasized the importance of establishing a local partner with demonstrated community leadership and accountability. Such a requirement would promote meaningful public participation and local implementation pathways, especially important in disadvantaged communities.

Adrian Martinez recommended establishing a process that is similar to the Harbor Community Benefit Foundation's role in distributing funds from the Port generated revenues.

Gisele Fong of End Oil said that incorporating an inter-agency collaboration and accountability system within funding criteria would foster a system of checks and balances.

3.5.5 Conclusion

Overall, the Low-Carbon Freight working group recommended clear performance criteria, metrics, and evaluation requirements that cascade to the implementing agency. Peter Peyton of the Harbor Community Benefit Foundation noted that this performance-based approach should be integrated with a holistic systems-approach to effectively move cargo through urban areas, with a focus on connectivity and emission reduction.

Regional and local agencies should develop (or participate in the development of) a clean freight planning process with representation from disadvantaged communities. Representation of disadvantaged communities needs to be coupled with financial and technical assistance in those communities to ensure meaningful participation. Additionally, disadvantaged community representatives should help to develop a baseline (ex-ante) and subsequent transparent program evaluation (ex-post) to determine whether the project/program provided the benefits expected. This would include where the project is, what benefits were promised or expected, and what was actually achieved.

3.5.6 Participants of the Low Carbon Freight Working Group

Adrian Martinez, Staff Attorney, Earthjustice

Anthony Eggert, Executive Director, UC Davis Policy Institute

Bill Magavern, Policy Director, Coalition for Clean Air

Catalina Garzón, Program Director, Pacific Institute

Gisele Fong, Executive Director, EndOil / Communities for Clean Ports

Isella Ramirez (Recorder), Researcher, UCLA Luskin Center for Innovation

Julia Sanchez, Career Development Manager, UCLA Campus Human Resources

Joy Williams, Research Director, Environmental Health Coalition

Margaret Gordon, Co-Founder and Director, West Oakland Environmental Indicators Project and Ditching Dirty Diesel Collaborative

Matthew Botill, Manager Climate Change Programs, Air Resources Board

Mary Silverstein, Executive Director, Harbor Community Benefit Foundation

Michele Prichard, Director, Common Agenda Liberty Hill Foundation

Patricia Ochoa, Deputy Policy Director, Coalition for Clean Air

Patricia Castellanos, Deputy Director, LAANE

Peter Peyton, Executive Board Member, International Longshore & Warehouse Union (ILWU)

Rey Leon, Executive Director, San Joaquin Valley Latino Environmental Advancement Project

3.6 Sustainable Communities Strategy Implementation

Author: Lisa Wu

3.6.1 Introduction

The Sustainable Communities Strategies (SCS) Implementation break-out discussion was multi-faceted. First, participants of the SCS Implementation working group discussed the State programs listed in the current Investment Plan as eligible for funding in the SCS Implementation sector. These programs include: Active Transportation Program, High-Speed Rail Program, Intercity Rail Program, State Transit Assistance Program, Sustainable Communities Planning Grant and Incentive Program, and Transit Oriented Development Housing Program.

The group focused on three in particular: the Active Transportation Program (ATP), the Transit-Oriented Development Program, and Sustainable Communities Planning Grants, and how they meet criteria important for implementation of the Greenhouse Gas Reduction Fund, particularly SB 535. In addition to discussing these existing programs listed in the Investment Plan, the group also discussed what is missing from the current Investment Plan. Interspersed in this discussion were key priorities and considerations to guide strategic and equitable investments from the Greenhouse Gas Reduction Fund to the SCS sector.

Participants in the break-out session included a diverse group of experts from disadvantaged communities, government agencies, academia, non-profit organizations, and the private sector. Expertise within the group also spanned the gamut from public health, affordable housing, transit, environmental justice, labor, and business.

3.6.2 Program Overviews

Transit Oriented Development Housing (TODH) Program

The group first heard from Linda Wheaton of the California Department of Housing and Community Development (HCD), who described the Transit Oriented Development Housing (TODH) Program. The TODH Program is administered by HCD and is currently funded through Proposition 1C as originally part of the Housing and Emergency Shelter Trust Fund Act of 2006. The Program's primary objective is to finance development of higher density infill housing and mixed-use development near transit stations to increase transit ridership and minimize auto trips pursuant to AB 32 greenhouse reduction goals through decreased vehicle miles traveled.

Eligible uses for TODH funds include 1) low-interest loans for housing developments within a quarter mile of a transit station or 2) infrastructure grants necessary for qualifying housing developments or support connections between housing and transit stations. Developers are

only eligible for housing loans. Cities, counties and transit agencies are eligible for both housing loans and infrastructure grants. Criteria considered for qualifying housing developments include:

- Appropriate design (e.g. mixed use, walkability, reduced parking)
- Green retrofitting
- Affordable housing
- Project readiness
- Developer past performance
- Leverage of other funds
- Community support
- North-South regional distribution of qualifying sites

Respective to benefiting disadvantaged communities, TODH may finance both new affordable housing and protect against displacing communities by rehabilitating existing housing. Although TODH sets a threshold of 15 percent of units (rental or owner-occupied) in a housing project with restricted affordability, many projects consist of 50-100 percent affordable housing and deep affordable housing projects are most competitive.

Active Transportation Program (ATP)

The group also heard from David Giongco from the California Transportation Commission about the Active Transportation Program (ATP). The ATP was created through Senate Bill 99 and Assembly Bill 101 as a consolidation of existing bicycle and pedestrian programs including the Transportation Alternatives Program (TAP), Bicycle Transportation Account (BTA), and State Safe Routes to School (SR2S). The purpose of ATP is to promote use of active modes of transportation through meeting the following objectives:[60]

- Increase the proportion of trips accomplished by biking and walking;
- Increase safety and mobility for non-motorized users;
- Advance the active transportation efforts of regional agencies to achieve greenhouse gas (GHG) reduction goals;
- Enhance public health;
- Ensure that disadvantaged communities fully share in the benefits of the program; and
- Provide a broad spectrum of projects to benefit many types of active transportation users.

Currently, the State Highway Account ($103M) and the Federal Trust Fund ($257M) fund this Caltrans-sponsored program. The program guidelines were recently adopted (on March 20,

60 California Transportation Commission. "Active Transportation Program Guidelines." Retrieved from http://www.catc.ca.gov/programs/ATP.htm

2014). To encourage comprehensive, bundled projects, funding requests must be a minimum of $250,000 and the project must include at least 11.47 percent in matching funds. Exceptions to the minimum funding request and match requirement include non-infrastructure projects, SR2S, and projects benefiting a disadvantaged community.

Consistent with the SB 535 requirement, the ATP program requires that a minimum of 25 percent of their funds benefit disadvantaged communities. Under ATP's criteria, projects qualify as serving disadvantaged communities based on any of the following: 1) median household income is less than 80 percent of statewide median based on US Census tract data, 2) area ranks among top 10 percent of most disadvantaged communities according to EPA's CalEnvironScreen Tool, or 3) at least 75 percent of public school students in the area qualify for free or reduced-price lunch under the National School Lunch Program. Applicants are also allowed to petition their community if they do not meet these standards.

The Commission will select the first set of projects (the statewide and rural/small urban components) on August 20, 2014. Projects for the metropolitan planning organization (MPO) component will be adopted on November 12, 2014.[61]

3.6.3 Program Recommendations

Participants emphasized several points for the State to consider when investing in programs within the SCS Implementation sector. A common theme was the importance of meaningful community engagement during the project cycle, from project development to evaluation. Many participants also encouraged leveraging other funding sources (e.g. municipal, regional, state, or federal) and integrated collaboration across sectors to facilitate comprehensive, synergistic benefits for disadvantaged communities. Participants emphasized that all programs should build in mechanisms to avoid displacement of existing communities and ensure that the character of the community is preserved. The following is a list of specific recommendations tailored to each program.

Transit Oriented Development Housing Program (TODHP)

Dr. Marlon Boarnet of the University of Southern California suggested that the TODH program should focus on increased affordable housing, to a 20 percent minimum per project. To reduce housing rents, Sandra McNeill of Trust SouthLA suggested unbundling parking costs from unit rents. Several participants emphasized the need to increase access to transit and increase ridership in disadvantaged communities by providing transit passes for low-income residents. Dr. Boarnet added that to reduce transportation costs, a decreased fare for low-income residents could be offset by slightly higher fares for other passengers.

61 Giongco, D. "Active Transportation Program" [PowerPoint Presentation]. Retrieved from http://sb535workshop.files.wordpress.com/2014/04/david-giongco-atp_sb535-workshop.pdf

Many participants emphasized the need to prevent the displacement of low-income residents around TODs. Claudia Monterrosa of the Los Angeles Housing and Community Investment Department (HCID) stated that where cap-and-trade funds make infrastructure investments near TODs, the State must ensure that affordable housing near transit remains affordable. The HCID TOD & Preservation Study of 2012 shows that transit ridership is lost if low-income housing is not retained near TODs; approximately 70 percent of public transit riders have incomes of $25,000 or less. Additionally, McNeill stated that anti-displacement measures should include land banking and assembly, and building in additional neighborhood services to support existing residents. She also recommended quality of life improvements for existing residents such as preserving neighborhood character, creating on-site open spaces, street improvements, and improving walkability.

Boarnet suggested that criteria and metrics for evaluating TODH projects should consider the level of transit service and ridership elasticity, with a link between vehicle mils traveled and health. Manal Aboelata of the Prevention Institute and Lisa Wu of the UCLA Luskin Center discussed the importance of a jobs-housing balance and locating jobs near transit.

Madeline Wander of the USC Program for Environmental and Regional Equity wants to ensure that increasing density near transportation corridors does not exposure residents and transit riders to elevated levels of air pollution. Herbie Huff of the UCLA Lewis Center added there needs to be more research on ways to avoid disproportionate exposure to air pollution through the design of transit oriented developments. UCLA is currently studying urban design and transportation planning factors that influence air pollution levels.

Monterrosa identified the need to create more energy retrofits for affordable multifamily housing. She recommended that funds are best awarded through a loan fund or another financing mechanism, rather than individual loans, in order to maximize public monies and allow for additional private sector leverage and more flexibility in the project's design and timeline. She explained that financing for multifamily retrofits in affordable housing projects will complement other sustainable efforts in Los Angeles.

Lastly, Aboelata proposed allowing rural communities to have the option of applying for TODH program funding. She said that creating a tailored metric for CalEnviroScreen, or within TODH funding guidelines, could identify high-density pockets within rural communities in a ratio population similar to what exists in metro areas.

Active Transportation Program (ATP)

Sandra McNeill recommends that the ATP fund innovative community planning to create infrastructure plans. Plans should implement first and last mile infrastructure, and create linkages with education, public health programs, and clinical services. Mari Rose Turac of the Asian Pacific Environmental Network wants to ensure that walking and bike pathways are not located next to freeways or major sources of air pollution exposure. Shannon Muir, of the LA

County bicycle coalition, added that to increase bike safety, Type I bike lanes, those which are completely separated from traffic, should be added in rural and disadvantaged communities to ensure safety.

Madeline Wander recommends targeting Safe Routes to School (SR2S) projects in disadvantaged communities where residents tend to walk, bike, and take transit at higher rates. Muir added that providing non-infrastructure support, such as educational campaigns, would increase active transportation use. Thomas Yee of the Little Tokyo Service Center recommends a focus on reducing fatalities and traffic related injuries, and facilitating access to jobs. Lastly, Turac and Aboelata recommend including rural disadvantaged communities in the ATP.

Sustainable Communities Planning Grants

Participants recommended that Sustainable Communities Planning Grants (SCP) involve meaningful community engagement by partnering with community-based organizations. SCPs should analyze any possible unintended consequences in project proposals, and establish anti-displacement policies and other measures to prioritize and ensure affordable housing.

The members of the Alliance for Community Transit-Los Angeles, or ACT-LA, (participating individuals/organizations are listed at the end of this summary) recommend providing space for small scale and local economic development, such as for vendors, merchants, and small businesses, and awarding additional points for organizations that require local hire for permanent jobs. Lizzeth Rosales of the Strategic Actions for a Just Economy (SAJE) adds that the grants should co-op land ownership with business ownership.

Herbie Huff recommends coordinating transit and zoning to ensure transportation and land use compatibility. She and others also recommend collecting data in disadvantaged communities about vehicles miles traveled (VMT) and other performance measures, and then targeting resources accordingly.

Thomas Yee recommends an increased focus on green infrastructure, brownfield remediation, access to jobs, and access to community amenities such as fresh food and open spaces for active recreation.

Participants also recommend integrated strategies. This could include linking the SCP Grants to weatherization programs to improve indoor air quality, and urban forestry programs including edible landscapes and community gardens.

3.6.4 Considerations for Investing in Sustainable Communities Strategies

A holistic approach was taken by the working group in regards to what impacts could be addressed through investments in the Sustainable Communities Strategies sector. The following is a compilation of considerations that could be important when prioritizing investments to maximize as many benefits as possible.

Environmental Benefits

Many participants suggest that the State consider a variety of environmental benefits from SCS investments, including how the investment will result in fewer vehicle miles traveled, improve ambient air quality, and contribute to improved indoor air quality, especially in multifamily homes and in sensitive land located near the freeway. They added that there should be buffer zones between housing and corridors with high levels of transportation-related pollution. Other goals recommended by Lizzeth Rosales are clean storm runoff, low-impact design of transportation infrastructure, and enhancing and facilitating an electric vehicle fleet. She adds it also important to focus on safe transitions from freeways to neighborhoods and avoid the use of local streets as secondary highways.

Public Health Benefits

Participants recommend focusing on how the investments will reduce or address the public's exposure to air pollution. Extra counts could be awarded to transit-oriented development projects that include air filters and monitors installed near transit. They add that the improvement of habitability will decrease stress levels and related illnesses and improve mental health.

Many participants recommend analyzing the reduction of injury rates from bike and pedestrian collisions, as well as bike and pedestrian activity numbers. Conducting walkability ratings (excellent, fair, poor) and the number of steps walked, and increased cardio also serve as good measures. Additionally, Thomas Yee and Marjorie Phan recommend tracking reductions in obesity rates and chronic diseases such as Type 2 diabetes, asthma, and cardiovascular disease. Improved access to health care and fresh food are also helpful measures.

Economic Benefits

Isela Gracian recommends that public funds to the SCS sector require contractors to pay a living wage. Many participants recommend maintaining the prevalence of small local businesses including street vendors and merchants. ACT LA suggests expanding job training in disadvantaged communities that specifically align with job training in that area, particularly

to clean jobs. Gracian and ACT LA also recommend ensuring affordable housing in TODs by county, census tract, and community, contributing to transportation and cost savings.

Costs & Burdens

Unintended consequences of SCS investments could be increased rent and transportation costs that lead to displacement/gentrification of both residents and businesses. This includes a net loss in affordable housing and rent controlled units, evictions observed five years after the project's completion. Participants strongly believe that the State should take every measure to minimize such risks and ensure that affordable housing near transit remains affordable in order to prevent displacement of existing residents.

Participants recommend that program effectiveness ne measured by having no reduction in bus transit ridership, core transit riders, transit capacity, or bus service. The group recommends that investments should not only outweigh costs, but should exceed a certain benefit-cost threshold.

Other Considerations for Funding Equity

The group felt strongly about the importance of authentic community engagement and recommended that it should include partnerships with community-based organizations, culturally-appropriate community decision making, and should reflect the entire community and not just property owners or stakeholders.

Many of the participants emphasized the importance of transit subsidies to under-served communities. Many of the participants also discussed the importance of adapting the SCS programs to rural communities.

3.6.5 Other Recommendations

In addition to providing recommendations for existing programs identified in the Investment Plan, participants also suggested including other programs that in the future should (or should not) be eligible for funding under SB 535. For example, participants recommended subsidizing transit passes and improving transit service frequency and reliability for residents of transit-oriented affordable housing units. Some participants, on the other hand, expressed that High Speed Rail *should not* count as meeting the SB 535 requirements for disadvantaged community benefits.

Another concern with currently eligible programs is they are not well suited to serve disadvantaged communities living in rural areas. To ensure funds are equitably distributed, some programs should increase benefits in less dense developments outside of metropolitan areas.

Other issues to consider include investing in more research on what types of investments most effectively reduce greenhouse gases, local air pollution and improve public health. Programs such as TODH encourage dense development that may reduce vehicle miles traveled regionally, but may have unintended public health consequences of increasing local concentrations that disproportionately expose residents in disadvantaged communities. More research is needed to explore how programs can most effectively reduce greenhouse gases while mitigating public health impacts.

The following section represents specific topics of concern and programs (with suggested criteria and metrics where appropriate) that may ensure benefits for disadvantaged communities beyond the current programs eligible for SB 535 funding.

Transit Operations and Passes

Participants suggested that criteria include decreasing GHGs, air pollution, and noise exposure at transit stops. Transit projects should demonstrate long-term benefits and efficiency, and serve first and last mile connections. Transit operations need to consider community engagement, public health benefits, and be mindful to not supplant (replace) existing operations funding. There should be reliable and frequent transit service for disadvantaged communities, which increase network connectivity, incentivize transit usage among families, students, and seniors, and integrate bike and car share programs at transit stops.

Suggested metrics include maintaining and/or increasing low-income transit ridership, and decreasing bus headways (measured in minutes) for buses to arrive to transit stops less than every 10 minutes. Participants also suggested that there should be service metrics (excellent, fair, poor) for multi-modal stations with bicycle and pedestrian oriented designs. Additional measurements include a community engagement marketing strategy (excellent, fair, poor), and the reliability of off-peak transit service (excellent, fair, poor).

Rural Community Benefits

Participants recommended targeting benefits to rural communities through a new rural communities program or better integration into existing programs Criteria and other considerations for such a program would include the conservation of farmland and open space. Participants said that a "complete communities" rural program would offer health service, jobs, food security, reliable transit, public infrastructure. The program should create brownfield clean up and promote infill, and a natural conservancy with green space sequestration. Additionally, a rural communities program should focus on reduced sprawl, and improvements in health, drainage, and creating alternatives for fumigants.

Anti-Displacement

Criteria for anti-displacement generally include the prevention and protection against gentrification to preserve existing affordable housing and benefit existing communities. More specifically, participants recommend increasing requirements of affordable housing for programs, and creating a "needs level" housing point system. Metrics could include the percentage of affordable housing appropriate to the county/region and census tract level, and measuring that there was no net loss of affordable housing and rent control, nor that the number of evictions haven't increased five years out of the project date. Additionally, measuring living wage jobs (not including construction) with a targeted hire number.

Public Safety and Violence Prevention

Criteria for public safety and violence prevention include identifying and reducing crime hot spots, and improving the built environment to prevent crime. Additional criteria include improving safe routes to school and increasing safety around transit stops. Metrics include reductions in the numbers of traffic-related injuries/fatalities, and the rating of safe transit operations (excellent, fair, poor). Additionally, providing safe transit facilities and amenities (excellent, fair, poor) that are lighted, and well-protected bus stops. Participants also recommend using a composite score of well-being (0-5 rating), and measuring healthy community infrastructure and community violence reduction strategies. Additionally, lowering crime rates within ¼ mile of a transit stop can be recorded in the number of crime events per transit stop.

Greenhouse Gas Reduction Research

Criteria include balancing GHG reductions with a quantity of co-benefits, and investing in improving current forecast models to increase accuracy of projected GHG emissions. Metrics include using a portion of project funding designated to evaluate actual GHG reductions (percent) and including community-based organizations in evaluation process. Additionally, using a comprehensive environmental review that includes cumulative impacts (excellent, fair, poor), and a life cycle analysis (CO_2-equivalent). Participants recommend modeling tools to project cumulative impacts for pre- & post studies, trip origins, VMT, vehicle mix, and EMFAC. Lastly, a metric should be measuring the money spent on a project compared to number of benefits (ratio).

3.6.6 Summary

A main objective of this diverse group of stakeholders was to evaluate how existing programs eligible for Cap-and-Trade proceeds in the SCS sector would benefit disadvantaged communities while reducing greenhouse gases. For the TODH program to maximize benefits, participants

emphasized the importance of mechanisms to prevent displacement of existing residents in disadvantaged communities, preserve neighborhood character, and enhance quality of life. While ATP was recognized for the program's potential to reduce greenhouse gas emissions and benefit disadvantaged communities through improved public health and safety, recommendations were made to facilitate connectivity of active transportation with other transit modes to enhance mobility and mitigate exposure to air pollution.

General recommendations include prioritizing programs that incorporate meaningful community engagement, leveraging other (e.g. municipal, regional, state, or federal) funding sources, and integrating collaboration across sectors to facilitate comprehensive, synergistic benefits for disadvantaged communities. Other programs were proposed to fill research gaps or disadvantaged community needs that were not addressed by existing eligible SCS programs.

Lastly, criteria and performance metrics were suggested to evaluate a program's ability to provide environmental, health, economic, and other co-benefits to disadvantaged communities. Ultimately, this discussion group and report was generated to inform the Department of Finance and the Air Resources Board on how to prioritize SB 535 funds for SCS programs that contribute to greenhouse gas reductions and ensure co-benefits to disadvantaged communities.

3.6.7 Participants in the SCS Working Group

Andres Ramos, Community Scholar- Sustainable Planning Initiative Grant UCLA Community Scholar Program

Ann Sewill, Vice President, California Community Foundation

Azibuike Akaba, Policy Analyst, Public Health Institute

Beatriz Solis, Director Healthy Communities Southern Region, The California Endowment

Cara Horowitz, Executive Director Emmett Center, UCLA School of Law

Cesar Campos, Coordinator, Central California Environmental Justice Network

Cynthia Guzman, Associate, Estolano LeSar Perez Advisors

David Giongco, Transportation Engineer, California Transportation Commission

Dean Toji, Board / member, Little Tokyo Service Center / A3PCON

Delia Esmeralda Arriaga, Project Coordinator, UCLA Labor Center

Gwendolyn Parker, Principal Consultant, IMC Municial Consulting

Herbie Huff, Research Associate, UCLA Lewis Center for Regional Policy Studies

Isela Gracian, Vice President of Operations, East LA Community Corporation

Jerard Wright, Policy Analyst, Move LA

Jessica Meaney, Southern California Policy Director, Safe Routes to School National Partnership

Juan Matute, Associate Director, UCLA Lewis Center for Regional Policy Studies

Katherine Perez-Estolano, Co-Founder, Estolano LeSar Perez Advisors

Linda Wheaton, Assistant Director for Intergovernmental Affairs, Department of Housing and Community Development

Lisa Wu (Recorder), Project Manager, UCLA Luskin Center for Innovation

Lizzeth Henao Rosales, Assistant Director of Equitable Development, Strategic Actions for a Just Economy (SAJE)

Luis Olmedo, Executive Director, Comite Civico Del Valle, Inc.

Malcolm Carson, General Counsel and Policy Director for Environmental Health Community Health Councils

Manal Aboelata, Managing Director Prevention Institute

Manuel Pastor, Director, USC Program for Environmental & Regional Equity

Margarita Luna, Program Manager, The California Endowment

Mari Rose Taruc, State Organizing Director Asian Pacific Environmental Network

Marjorie Phan, Community Scholar, UCLA Community Scholars Program

Marlon Boarnet, Professor, University of Southern California

Martha Dina Arguello, Executive Director, Physicians for Social Responsibility-Los Angeles

Mary Leslie, President, Los Angeles Business Council

Marybelle Nzegwu, Staff Attorney, Public Advocates Inc.

Megan Kirkeby, Sustainable Housing Policy Manager, California Housing Partnership

Meghan Sahli-Wells, Vice Mayor, City of Culver City

Paul Ong, Professor, UCLA Luskin School of Public Affairs

Rigoberto Rodriquez, Facilitator, SCS Implementation

Russell Horning, Program Officer, Southern California Enterprise Community Partners, Inc.

Ryan Wiggins, Cap-and-Trade Campaign Manager, TransForm

Rye Baerg, Regional Policy Manager, Safe Routes to School National Partnership

Sandra McNeill, Executive Director, TRUST South LA

Shannon Muir, Active Streets L.A. Initiative Coordinator, Los Angeles County Bicycle Coalition

Thomas Yee, Director of Planning, Little Tokyo Service Center

Not present but submitted comments:

Claudia Monterrosa, Director of Public Policy and Research, Los Angeles Housing + Community Investment Department

Additional comments (post workshop) were submitted by the following members of the Alliance for Community Transit-Los Angeles (ACT-LA) (some who also participated in the workshop):

Albert Lowe, Former Campaign Director, ACT-LA

Doug Smith, Equal Justice Works Fellow, Public Counsel

Isela Gracian, Vice President of Operations, East LA Community Corporation

Joe Donlin, Director of Equitable Development, Strategic Actions for a Just Economy (SAJE)

Lizzeth Henao Rosales, Assistant Director of Equitable Development, Strategic Actions for a Just Economy (SAJE)

Monika Shankar, Health & Environment Associate, Physicians for Social Responsibility – Los Angeles (PSR-LA)

Shashi Hanuman, Directing Attorney of Community Development Project, Public Counsel

Sissy Trinh, Executive Director, Southeast Asian Community Alliance (SEACA)

Thomas Yee, Director of Planning, Little Tokyo Service Center

3.7 Zero-Emission Passenger Transportation

Author: CC Song

3.7.1 Introduction

Major themes from the Zero-Emission Passenger Transportation session revolved around defining direct co-benefits of existing programs in the zero-emission vehicle (ZEV) sector, and debating whether indirect co-benefits should be taken into consideration when the State evaluates programs for the purpose of guiding revenue allocation from the Greenhouse Gas Reduction Fund (cap-and-trade revenues). The working group discussed that, in general ZEV programs could strongly meet many objectives of the Greenhouse Gas Reduction Fund, but low program participation from residents in disadvantaged communities poses challenges for achieving SB 535 goals within the ZEV investment sector.

3.7.2 Overview of Current Programs

The California Alternative and Renewable Fuel, Vehicle, Technology, Clean Air, and Carbon Reduction Act of 2007 (AB 118) established funding for California Energy Commission (CEC) and California Air Resources Board (CARB) programs that reduce criteria pollutants and toxic pollutants from the transportation sector through low-carbon clean vehicle technologies.

The AB 118 programs have not yet received revenue from cap-and-trade, and rather are funded by fees collected through motor vehicle fuels. The CEC has spent $400 million to date to invest in advanced clean vehicle technologies. Another $50 million has gone through CARB to fund vehicle rebate programs. As a new funding source, the Greenhouse Gas Reduction Fund provides an opportunity for the agencies to update programs to meet new requirements such as under SB 535.

The CEC administers some direct rebates for vehicle purchases, but most of the funding is geared toward developing promising clean vehicle technologies, and investing in building the infrastructure for those technologies. These include electric vehicles, hydrogen fuel cell vehicles, and related fueling stations and infrastructure. CEC also spends considerable resources to fund workforce development programs that provide job training related to clean transportation.

The working group began with a presentation from Edie Chang and Matthew Botill of CARB. They provided an overview of CARB's AB 118 overarching program, and the two projects/programs under AB 118 most targeted to the passenger vehicle sector: the Clean Vehicle Rebate Project (CVRP), which administers rebates for electric vehicles; and the Enhanced Fleet Modernization Program (EFMP), also referred to as the "cash for clunkers" program.

The CVRP provides rebates when consumers purchase eligible vehicles. As the project continues, CARB has been engaged in thinking about identifying market trend indicators, and

the timing for discontinuing the rebate program once the market for advanced clean vehicles matures. The rebates are intended to be a bridge to help the market reach a point where it can fly on its own, and the staff is working on metrics that can measure market maturity.

The EFMP provides $1,000 to $1,500 to consumers to replace their old cars. EFMP can be thought as the "cash-for-clunkers" program for vehicles. The uptake rate for this program is very low—only 21 people have taken advantage of the incentives to date.

The Board reviews AB 118 program funding proposals annually, and CARB staff continues to identify existing or new projects to fund, metrics for measuring success, and establishing funding targets. Of all rebates provided, only four percent of the recipient vehicles are registered in disadvantaged communities per CalEnviroScreen.

Recently, CARB staff has been engaged in conversations about how these programs can increase benefits in disadvantaged communities. This includes running pilot projects to encourage more benefits in disadvantaged communities. The existing dealer network is not necessarily the most useful in reaching disadvantaged communities, because lower-income individuals are less likely than affluent individuals to purchase new cars from traditional dealerships. CARB staff has paid more attention to alternatives to the rebate model, such as neighborhood-focused car-sharing programs run through community organizations, underwriting loans, providing transit passes for the whole family, and rebates for public fleets that serve disadvantaged communities.

3.7.3 Program Considerations

Group participants discussed the types of benefits that these programs should achieve to be considered for cap-and-trade revenue funding. The group looked at direct benefits in three criteria: environment, health, and economy, and discussed how existing programs perform in these criteria, and what their limitations are.

When a benefit is incurred to individuals in a disadvantaged community directly, the group labeled it as "direct benefits." There are also "indirect benefits," which provide positive benefits to disadvantaged communities but not as the primary recipient. An example of an indirect benefit may be air quality improvements related to clean car incentives: many disadvantaged communities are bisected by freeways and other major roadways with high traffic-related air pollution and thus cleaner cars in a disadvantaged community, even if not driven by members of the disadvantaged community, can provide indirect benefits to that community if the clean cars are replacing less clean vehicles.

In fact, the CVRP does support a cleaner vehicle fleet, which in turn reduces both GHG and criteria pollutant emissions. Although the vast majority of these rebated clean vehicles have historically been registered in a non-disadvantaged community, disadvantaged communities intersected by major roadways and freeways could indirectly benefit from clean vs. dirty vehicles impacting local air quality and associated health outcomes. By replacing older vehicles through the EFMP, we can also reduce air pollution while increasing safety and reliability of

transportation. Individuals can also benefit from lower maintenance costs will as a result of replacing older vehicles. Another indirect benefit is creating a supply chain that creates manufacturing opportunities and jobs for people from disadvantaged communities.

The CEC's AB 118 program provides employment opportunities and workforce development for building, installing, and maintaining new infrastructure to support a cleaner fleet. CEC currently prioritizes funding for charging stations that provide access for multi-unit dwellings, which can potentially encourage targeted benefits to disadvantaged communities. Installation of infrastructure will be the main job creator. Maintenance of vehicles is currently mostly serviced by traditional dealerships, but once the market matures and secondary market emerges, there will be a demand for trained mechanics. In terms of economic benefits to households, ZEVs can increase a family's savings by reducing gasoline consumption, and the money saved can be spent locally to increase economic activities.

There are many challenges in encouraging these direct benefits in disadvantaged communities. A major challenge revolves around meeting charging needs in multi-unit residential buildings. Installing home charging infrastructure remains a barrier because of zoning and building codes, and building owners' willingness or lack thereof. Another issue is that while rebates help reduce the price tag, it is still expensive to own an electric vehicle, and not everyone is qualified for tax credits. Challenges related to price can be addressed by making leases more accessible, which can overcome upfront cost barriers. The State should also do more to inform consumers in disadvantaged communities about the economic and environmental benefits of leasing electric vehicles.

Outreach methods should also be included in the funding proposal to demonstrate how staff will work with community-based organizations or local governments to deliver the desired outcomes of the program. Outreach strategies should be tailored and involve an understanding of needs in different communities. For example, not all communities have a robust presence of community-based organizations, and sometimes local governments need to play the role to build trust with community members.

3.7.4 Key Criteria and Evaluating Investment Benefits

The group then proposed key criteria, and began to rate some of the programs in terms of these criteria.

Clean Vehicle Rebate Project

Greenhouse gas emission reduction/environmental benefits - High

- Direct rebates incentivize consumers to purchase ZEVs, which ultimately results in reduced petroleum consumption and greenhouse gas emissions.

Criteria air pollution reduction and local health benefits - High

- By supporting the transition to a zero-emission fleet, we reduce pollutants' health impact on local communities, and in particular disadvantaged communities bisected by interstate freeways.

Direct cost savings for individuals - Medium/high

- If the rebate program was re-designed in tiered rate structure to better target lower-income buyers with a higher proportion of the cost of a ZEV covered, disadvantaged communities could potentially see more cost savings in terms of ZEV purchase and fuel cost savings.

Direct cost savings for communities - Low

- The program is not as widespread and well-adopted in disadvantaged communities, since current users of rebates are often high-income individuals, who do not reside in disadvantaged communities.

Local economic development - Low in the short term, high in the long run

- Individuals who take advantage of a rebate can spend their savings on local services and goods, thus benefiting the local economy.
- While consumers charge their vehicles in disadvantaged communities, they can visit local restaurants, entertainment, and retail stores and increase local economic activities indirectly.

Equity - Low/medium

- Currently most people who take advantage of CVRP rebates are not from disadvantaged communities, though the program can be redesigned to encourage more uptake in disadvantaged communities.

Burdens - Possible increased congestion, and loss in gas tax

- Congestion and accidents could increase assuming a rebound effect in which lower gasoline costs incentivize more vehicle miles traveled.
- The state and nation depend on fuel taxes to fund road infrastructure, and even clean vehicle rebate programs. Electric vehicles can avoid these gasoline taxes, which over time can affect resources available to maintain our transportation infrastructure.
- Lower petroleum usage and production could produce economic shift and labor market transition.

Enhanced Fleet Modernization Program

Greenhouse gas emission reduction/environmental benefits - Low

- EFMP has very lax requirements for retiring vehicles.
- Since the incentive uptake is currently so low, EFMP has very little effect on GHG reduction, and produces little environmental co-benefits.

Local health benefits - Medium

- If uptake can be increased, EFMP can potentially produce more local health benefits than it currently does. By strengthening requirements and improving outreach, less fuel-efficient vehicles can be replaced by cleaner, more fuel-efficient vehicles. This will in turn reduces pollutants in disadvantaged communities, and will also indirectly improve traffic safety.

Direct cost savings for communities - Low

- Current users of rebates are mostly high-income individuals; the program is not as widespread and well-adopted in disadvantaged communities.

Direct cost savings for individuals - Medium/high

- If the program can be scaled up, and the rebate program designed to cover a higher proportion of ZEV costs for lower income drivers, then individuals and households could potentially see more cost savings in terms of ZEV purchase and fuel cost savings.

Local economic development - Low

- Since uptake is so low, also limited are the community-wide economic benefits resulting from individual direct cost savings.

Equity - Medium/high

- Equity is built into EFMP to incentivize low-income individuals and families to replace their older vehicles with more efficient vehicles. Even though current uptake is low, if redesigned uptake could increase.

Workforce Development

Local health benefits - Medium/high

- Workforce development programs can help individuals in disadvantaged communities gain economic mobility. As a result, people can afford better healthcare, better access

to healthier food, and reduce stress level related to unemployment. Potential health benefits can be significant, as workforce development opportunities increase with more ZEV deployment.

Direct cost savings for individuals - High

- Workforce development programs provide individuals access to job training programs and job placement, which translates directly into more discretionary income for individuals and families.

Local economic development - Low/medium

- Job placement can lead to increased family or individual income. The increased income can be spent on local goods and services to increase economic development.
- Training programs can improve individuals' skills, and can improve their chances at being gainfully employed in the future.

Equity - High

- By enrolling individuals in workforce development programs, they can gain hard and soft skills and increase their employment ability. If the program can be coupled with job placement, workforce development can increase many health and economic co-benefits directly in disadvantaged communities.

3.7.5 Recommendations

Most high-leverage programs that can increase clean vehicle uptake are financing programs. However, individuals from disadvantaged communities are less likely to qualify for tax and loan incentives. A loan loss reserve fund or other financing programs could be created or modified to better target disadvantaged communities. These programs may also expand scope to include hybrid vehicles, which are more affordable than electric vehicles, and can still achieve emission reductions.

There also needs to be more financial support for residential charging equipment. We can leverage private capital through public-private partnership or other methods, to broaden access to home charging infrastructure in disadvantaged communities.

The State should consider ways to leverage other State programs, including in particular residential energy efficiency programs. The cost of charging at home will increase electricity usage, and in energy inefficient homes, the aggregate electricity use can trigger a higher tiered electricity rate. This can be unfavorable for consumers. The State should make an effort to provide information about EV and infrastructure incentive programs to homeowners and renters that are part of a low-income energy efficiency or weatherization program, such as the

State's Energy Savings Assistance Program, and vs. versa providing information about energy efficiency incentives to people buying an electric vehicle.

Utilities, particularly municipally-owned utilities, can also sponsor electric vehicle purchasing programs, and incentivize vehicle owners to charge during off-peak hours to take up extra electricity generated in the grid. Developments in disadvantaged communities will need smart energy management infrastructure to be ready for larger adoption of electric vehicles. This will require a change in California's green code, especially for multi-dwelling units. While landlords may resist upgrading the building, we can make a convincing argument that energy efficiency upgrades and electric vehicle home charging can reduce tenant turnover, and reduce costs for landlords.

3.7.6 Participants in the Zero-Emission Transportation Working Group

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4. Appendix

4.1 Example Literature Review: Sustainable Communities Strategies Sector

Author: Herbie Huff, UCLA Lewis Center for Regional Policy Studies

Consider this review a triage of what is known and not known about various project types that are candidates for cap-and-trade revenue investment. By necessity, the review deals in broad strokes. The focus is on GHG reductions and impacts on disadvantaged communities. The literature on economic and public health benefits is also considered in some cases. The literature review roughly corresponds to the matrix in this document.[62] Each cell in the matrix corresponds to a body of literature.

High-Speed Rail

There is a consensus in both the academic literature and other independent analyses of high-speed rail that it is not a cost-effective GHG reduction strategy in California in the near term (before 2020). Here we just consider some representative evaluations of HSR from the literature.

The **CA legislative analyst's office** has stated in unequivocal terms that High Speed Rail would not advance AB 32's goals of reducing GHG emissions by 2020. As such, the LAO has stated that there could be serious legal risks if C&T revenues are used to fund HSR.

http://www.lao.ca.gov/analysis/2012/transportation/high-speed-rail-041712.aspx

Much of the literature concerns ridership projections and HSR's ability to compete with driving and air travel. Subsidy per trip is likely to be very high, and any greenhouse gas reductions would be far in the future, particularly if life cycle costs are considered.

Kanafani (1997), in "Balancing Act: Traveling the California Corridor," provides an overview comparison of the costs of rail, highway, and air travel in the CA corridor between San Francisco and Los Angeles. He states the amount of the surcharge that each mode would require to cover its full costs, including externalities like crashes, noise, and pollution. For air, the surchage is $2.50 / km; for highway, it's only $.0012 / km, and for rail it is $0.09 / km. The surcharge for rail is equivalent to $45 for a trip between SF and LA, which would adversely affect demand. Even with the most generous assumptions the surcharge to cover external costs of a HSR trip between SF and LA comes down to $28.

http://econpapers.repec.org/paper/cdluctcwp/qt3h4870jf.htm

62 https://docs.google.com/spreadsheet/ccc?key=0AkAvsa-bEaCDdDBqRy10Wm1sM29kS2VBeVNlLVNKclE&usp=drive_web#gid=0

Chester and Horvath (2010), in "Life-cycle assessment of high-speed rail: the case of California," inventory the greenhouse gas emissions of various modes in the California corridor. They stress the importance of life-cycle analysis, which is comprehensive and takes into account the emissions due to building the infrastructure to operate the rail, and electricity sourcing for vehicle operations, for example. Only under very optimistic ridership projections does the HSR have an immediate return-on-investment in terms of GHG reductions. With low ridership, HSR never returns on its investment.

http://iopscience.iop.org/1748-9326/5/1/014003/fulltext/

On the ridership potential of HSR in California, **Kanafani (1994) "No Rush to Catch the Train"** provides a comparison to other systems around the world. Ridership and market share is a crucial unknown in HSR. In contrast to systems in France and Japan that serve multiple highly dense population centers, HSR in CA would only serve one type of inter-city trip: SF to LA. Driving and flying are also incredibly cheap in CA compared to other places with HSR, and connecting public transit is poor in CA compared to other places with HSR.

http://www.uctc.net/access/access04.pdf

Here are two other sources on the GHG reducing potential of HSR.

Sonnenberg, 2010. Transportation energy and carbon footprints for U.S. corridors.

https://smartech.gatech.edu/handle/1853/37316

Levinson et al, 1996. The Full Cost of Intercity Transportation - A Comparison of High Speed Rail, Air, and Highway Transportation in California

http://escholarship.org/uc/item/8mm50358#page-4

Inter-City Rail

This review also does not deal extensively with inter-city rail (e.g. Amtrak) because this mode is quite marginal in the US and CA and unlikely to deliver much GHG reduction potential. Below is some background from two sources.

Haikalis 2002. Intercity Passenger Rail that Works: You've Got to Have Connections!

"American Travel Survey indicated that more intercity travelers preferred driving to flying for trips up to 1000 miles." Competing with travel times for auto may be more important than competing with planes (20). The only corridors available in urban areas are the ones operated by freight rail (21). Sharing track with freight degrades travel times and reliability.

http://trid.trb.org/view.aspx?id=726749

Perl 2002. Improving U.S. Passenger Train Performance: Three Challenges and Two Questions that Must be Resolved

Challenge 1: Institutional Isolation. Aviation, highway, and transit have federal partnerships that build and finance infrastruture. Federal Railroad Administration by contrast plays a minimal role. "Amtrak is funded through legislation that is isolated from other transportation modes" (22).

Challenge 2: Flawed Corporate Structure... fails to distinguish between profitable and unprofitable operations

Challenge 3: Atrophy of the Supporting Industry. Technical skills, engineering, R&D have gone to aerospace etc., no innovation in rail

Question 1: Defining government roles. Amtrak was created hastily and the relationships weren't made clear.

Question 2: How to incorporate the private sector, which is prominent in other transportation modes.

http://trid.trb.org/view.aspx?id=726750

Roadway Operations and Maintenance

The investment plan mentions several project types in this category, each dealt with briefly here.

Smooth/GHG pavements

Wang et al (2012), in "Life cycle energy consumption and GHG emission from pavement rehabilitation with different rolling resistance" conduct a life-cycle analysis for repaving to increase smoothness. They find that where traffic volumes are low and construction quality is poor, repaving can be a net GHG emitter, not a reducer. In other words, the literature indicates that this strategy should only be used where traffic volumes are very high, and that the actual smoothness achieved is a quite important performance metric.

http://www.sciencedirect.com/science/article/pii/S0959652612002235

Ramp meters / Traffic Management

This is an effective capacity improvement. The literature has thoroughly debunked the notion that expanding capacity leads to more free-flowing traffic, which would be the mechanism of reducing emissions from stop-and-go traffic. In fact, adding capacity in the form of adding roadway miles is associated with an increase in traffic. http://www.sciencedirect.com/science/article/pii/S0301421511006446, http://www.jstor.org/stable/20053915 and https://www.fhwa.dot.gov/policy/otps/060320c/060320c.pdf just to cite a few). Only where there are bottlenecks in capacity specifically due to metering or traffic management issues, may there be the potential for some GHG reductions.

Compact Development

Also known as sustainable communities strategies, smart growth, or location-efficient growth, or the opposite of sprawl, compact development is fiercely debated in the literature. Scholars disagree on whether these strategies reduce VMT (and thus GHG) at all. Various measures of compactness and connectedness are associated with lower VMT, but until recently, we have not had analytical methods sufficient to tease out correlation from causation. Self-selection (e.g. people who don't want to drive or can't afford to drive choose to live in more compact areas) and demographics are among the factors that are difficult to control for.

Much of the conversation begins with **Gordon and Richardson (1997), "Are Compact Cities a Desirable Planning Goal?"** It names some of the contentious questions in the debate. To what extent do people simply prefer low-density settlement patterns? To what extent is open space and agricultural land at risk? What effect does sprawl have on energy consumption, transit usage, and congestion? Is sprawl an inequitable settlement pattern that leaves the poor behind? Or are the suburbs a site of opportunity? Despite the fact that policy conversation often assumes that these questions are answered, is is important to note that there is no consensus on any of these. It's very difficult to tease out causation from correlation to answer these questions. In particular, empirical results do not exist that demonstrate that increasing density or increasing measures of compactness results in reductions in VMT or GHG.

Here are some selections from the debate.

Growing Cooler (2007) by Ewing et al is a major flashpoint in the literature. The report projects large GHG reductions and VMT reductions from compact growth policies. The overview cites numerous studies that find a correlation between measures of sprawl and increased VMT. They cite this finding in studies that consider metropolitan areas and studies that consider households. The authors also cite numerous model simulations and scenarios that show reduced VMT/GHG from compact development. They argue for compact growth's benefits in terms of emissions, air quality, and public health.

http://www.smartgrowthamerica.org/documents/growingcoolerCH1.pdf

Ewing et al (2008), "Characteristics, Causes, and Effects of Sprawl" is an academic, refereed review of the same literature.

http://link.springer.com/chapter/10.1007%2F978-0-387-73412-5_34

Well-known scholars differ from Ewing et al's view. **Glaser and Kahn (2004), "Sprawl and Urban Growth,"** argue that sprawl's environmental harms are offset by technological advances, e.g. in terms of fuel economy and energy efficiency. As cities have become much more sprawling over the past 40 years, air pollution has decreased dramatically. The authors recognize that sprawl is associated with increases in greenhouse gas emissions, but argue for taxing these directly rather than promoting compact growth policies. Further, the authors cite evidence that sprawl is associated with better quality of life, shorter travel times, bigger houses, and lower levels of income segregation.

http://people.missouristate.edu/davidmitchell/Urban/Sprawl%20and%20Urban%20Growth.pdf

Ewing and Cervero (2007) in "Travel and the Built Environment: A Synthesis" review 50 empirical studies on the relationship between measures of compactness: density, diversity, design, and regional accessibility. They find evidence that greater rates of walking and transit use in urban centers are due to substitution of vehicle trips rather than self-selection. Various outcome measures have been examined: trip frequency, trip length, VMT, mode split. The built environment probably influences VMT primarily via its influence on trip length, not on trip frequencies or mode split, both of which are strongly influenced by socioeconomics. However, trip length is relatively understudied in the literature. The authors find that regional accessibility has the greatest potential to reduce VMT, with elasticities of approximately -30 percent. Density, diversity of land uses, and connected street networks have much smaller elasticities, -5 percent or less.

http://cp298pedbiketranspo.wikispaces.com/file/view/EwingCervero_TravelAndTheBuiltEnvironmentSynthesis_TRR1780_2001.pdf

Giuliano (1995), "The Weakening Transportation-Land Use Connection" argues that transportation constitutes too small a share of household budgets to factor strongly in decisions about where to live. She argues that if we want to reduce VMT, we should use pricing strategies rather than land use strategies. This view is shared by many urban economists.

http://www.uctc.net/access/access06.pdf

Public Health Co-Benefits

The public health profession is increasingly concerned with the health impacts of sprawl. Frumkin (2002), in "Urban Sprawl and Public Health," catalogues a number of health impacts that derive from automobiles and auto-dependent communities. Frumkin states that "accidents" have known, predictable causes; health-wise, we should be reducing exposure to driving. Frumkin notes the connection between auto-dependent communities and rates of crashes, and calls for more research on sprawl and sedentary lifestyles.

http://www.cdc.gov/healthyplaces/articles/urban_sprawl_and_public_health_phr.pdf

Disadvantaged Communities

Many scholars express concern about the social equity consequences of sprawl. **Glaser and Kahn (2007),** who might be classified as sprawl skeptics, cite social problems as among the most concerning consequences of sprawl. They argue that sprawl leaves behind those who cannot afford a car. **Giuliano (1995)** argues that if we want to reduce white-flight style suburbs and the inequity associated with them, we should increase employment and housing choices. In particular, she argues for the elimination of exclusionary land-use policies in effect in the suburbs that prevent the less affluent from seeking housing and employment there.

On the other hand, empirical research produces contradictory findings here. **Foster-Bey**

(2002) in "Sprawl, Smart Growth, and Economic Opportunity," find that sprawl is associated with higher levels of social equity (10) (http://www.urban.org/UploadedPDF/410536_SprawlandEquity.pdf). Downs (1999) has the counternarrative finding that there is no relationship between sprawl and concentrations of poor minorities in the urban core (http://www.tandfonline.com/doi/abs/10.1080/.UyoW-a1dVMg#.U5nvl_ldUdM). Again, methodological issues trouble the literature, and observed correlation - or lack thereof - is usually the finding, rather than causation.

There are a fair number of studies on the economic impact of rail stations, many of which concern the impact on disadvantaged communities. These are reviewed in the TOD section below.

Transit-Oriented Development

Transit-oriented development (TODs) lies under the heading of compact development and sustainable communities strategies more generally, and has received specific attention in the literature. As with sprawl/compactness, studies have difficulty sorting out causation from correlation, and self-selection is a confounding factor. TODs are associated with greater transit usage and lower vehicle ownership, but its unclear if TODs themselves, rather than demographics and self-selections, are the causes. Here are two examples of studies on both sides.

Renne et al (2005) in "Transit-oriented Development: Developing a Strategy to Measure Success" conducts a historical trend analysis comparing travel behavior and vehicle ownership change in 103 TODs. These are limited to rail stations. The authors find that transit share of travel to work in TODs was twice the regional average.

Overall, TODs displayed higher shares of transit use, walking, and cycling to work compared to MSAs. Reconnecting America found that within transit precincts, people owned 0.9 vehicles per household compared to 1.6 vehicles per household across the regions. Renne's study confirms this. "This has implications for parking standards."

Others note that TODs have little effect on non-work travel.

"Some scholars argue that because the work trip accounts for only a quarter of all trips, TODs are best judged based on the non-work travel, but a recent study, based mainlyin California, proved inconclusive with respect to TODs and non-work travel behavior (Boarnet and Crane 2001 - Travel by Design)."

Economic Benefits

In the literature, economic benefits of TOD fall into three categories. (1) Increased accessibility, particularly job accessibility, for those without a car. (2) Increased affordable housing production. (3) Increased economic development in TOD areas. Note that (3) is particularly due to CEQA streamlining regarding development in TOD areas.

Yingling and Fan (2012), "Impact of light rail implementation on labor market accessibility: A transportation equity perspective." The literature review in this paper is quite helpful in that it summarizes the mixed literature about transit and the poor. On the one hand, studies have not found that increased transit service results in measurable improvements in terms of employment outcomes. On the other hand, the literature demonstrates that transit is important to the poor, inasmuch as they are disproportionately likely not to have access to a car.

Abstract: "This study seeks to examine transit's role in promoting social equity by assessing before-after impacts of recent transit changes in the Twin Cities, including opening of the Hiawahta light rail line, on job accessibility among workers of different wage categories. Geo-spatial, descriptive and regression analyses find that proximity to light rail stations and bus stops offering direct rail connections are associated with large, statistically significant gains in accessibility to low-wage jobs. These gains stand out from changes in accessibility for the transit system as a whole. Implications of the study results for informing more equitable transit policies are discussed."

The authors observe greater accessibility gains around new light rail stations when connecting transit service is good. They emphasize the importance of the transit network, rather than a focus on a single corridor.

https://www.jtlu.org/index.php/jtlu/article/view/240

Schuetz (2014) reviews the literature about economic development around TODs:

"The urban economics literature provides several models of retail firm location that provide a theoretical framework for why the presence of public transportation should affect the amount and composition of local retail outlets. The addition of a new rail station to a neighborhood decreases transportation costs between neighborhoods that are connected by the rail line, thus expanding the market area – and number of potential consumers – for stores at each station. If rail stations attract additional riders to the neighborhood, either residents who move to the area or commuters who work nearby, the station will effectively increase the buyer density in the neighborhood, and so should lead to an increase in the number of retail establishments and employees (Berry 1967, Stern 1972). A larger consumer base may also encourage product differentiation, leading to greater diversity of store types by goods and services offered (Fisher and Harrington 1996).

Previous empirical studies on the impacts of rail stops on other outcomes, such as property values, population and employment, have shown that the extent of impacts depend crucially on increases in ridership (Baum-Snow and Kahn 2005; Brown et al 2013; Kahn 2007; Bollinger and Ihlanfeldt 1997). Therefore whether rail stations result in an increase in the quantity (or quality) of surrounding retail will depend on the number of transit users at that location. Moreover, an increase in retail establishments near a newly built train stop could represent either a net increase in retail activity through new store creation or redistribution from other, less accessible sites, as stores relocate closer to the rail station. "

http://lusk.usc.edu/sites/default/files/working_papers/retail tod 2_8_2014.pdf

Schuetz tests retail employment at rail stations in CA's large metropolitan areas. Findings are mixed. In some cities, adding a rail line is associated with an increase in retail employment, while in others a decrease is observed. Increases in employment tend to be more common in suburban areas.

Gentrification

Although the literature about gentrification and displacement is extensive, the literature about gentrification around TODs is more nascent.

Pollack et al (2010) looked at 42 rail stations in 12 metropolitan areas, and found that transit investment frequently changes the surrounding neighborhood, and that the predominant pattern is one in which housing becomes more expensive, neighborhood residents wealthier, and vehicle ownership more common. The authors recommend a suite of policy tools to prevent this pattern, including preservation of affordable housing, coordinated planning between local land-use authorities and transit agencies, community benefits agreements, TDM, parking reform, and car sharing.

http://nuweb9.neu.edu/dukakiscenter/wp-content/uploads/TRN_Equity_final.pdf

Chapple (2009), "Mapping Susceptibility to Gentrification: the Early Warning Toolkit" looked at neighborhoods in the Bay Area between 1990 and 2000 and found that neighborhoods near a rail station were twice as likely to gentrify. She says that preservation of affordable housing is the key policy measure to combat displacement.

http://communityinnovation.berkeley.edu/reports/Gentrification-Report.pdf

Kahn (2007), "Gentrification Trends in New Transit Oriented Communities: Evidence from Fourteen Cities that Expanded and Built Rail Transit Systems" uses tract-level time-series data and finds that communities near walk-and-ride stations tend to gentrify, while communities near park-and-ride tend to experience increased poverty.

http://reconnectingamerica.org/assets/Uploads/2007-gentrification-kahn.pdf

Transit

Transit Capital vs. Operations

There is a literature on the overcapitalization of the transit system. In general, this implies that GHG reductions per dollar would be higher for many operations investments than for many capital investments, though capital investments are often the only ones considered.

Taylor, Brian D. and Kelly Samples. 2002. "Jobs, Jobs, Jobs: Political Perceptions, Economic Reality, and Capital Bias in U.S. Transit Subsidy Policy," Public Works Management & Policy Journal, 6(4): 250–263.

BRT vs. Rail

Specific comparisons (Chester et al 2013) have shown that BRT outperforms LRT in the short term in terms of GHG emitted on a life cycle basis.

http://iopscience.iop.org/1748-9326/8/1/015041

Transit Service Improvements

Improving transit frequency and reliability is associated with higher ridership.

Public Health Co-Benefits

http://www.rwjf.org/en/research-publications/find-rwjf-research/2009/03/connecting-active-living-research-and-public-policy/transit-and-health-mode-of-transport-employer-sponsored-public-t.html

Walking and Biking

The empirical literature on the GHG reducing potential of walking and biking is very limited. It goes without saying that these modes do not emit greenhouse gases in their operations. It's difficult to attach a number because of the limited data on usage of these modes and the extent to which infrastructure provision influences people to change to these modes. Recent, initial explorations by Matute and Chester of the life-cycle GHG find that bicycle facilities perform better than transit capital investments in terms of GHG reduced.

Co-Benefits

On the other hand, the co-benefits from walking and biking are well-documented. These are extensive in terms of physical activity and roadway safety. There is an extensive literature and data on both of these, and on the importance of walking and biking as transit access modes.

Pricing Auto Use

VMT

In a 2009 study, Nicholas Lutsey and Daniel Sperling describe that "the difficulties in the transportation sector are largely the result of market failures, whereby vehicle users do not bear or act on the full cost of their travel activity and its impacts. These barriers are largely surmountable. The use of incentives and forcing mechanisms can accelerate the development and commercialization of low-carbon fuels and aggressive new standards for vehicle fuel economy and tailpipe GHG emissions can accelerate innovation on the vehicle side and compel consumers to internalize the fuel and GHG implications of their vehicle purchases.

Parking

Parking spaces, especially at the home, are associated with increases in VMT and auto travel. "Moreover, the type of parking provision plays a strong role in determining mode share. Accessory parking that is adjacent to a home, in a garage or driveway, seems more likely to generate auto commutes than does parking in commercial centralized lots."

http://trb.metapress.com/content/cj78h8m43p63235q/

Travel Behavior: Mode Split, Vehicle Miles Traveled, Income

All analyses of the GHG-reducing potential of various interventions depend on a calculation of a reduction in vehicle travel. It is thus worthwhile to consider some of the major takeaways from the broader literature on how people choose modes, and what drives vehicle miles-traveled:

- Mode choice is a function of travel time and generalized travel cost, at the margin. Generalized costs include money spent on the trip, as well as perceived costs in terms of exposure to danger or discomfort.
- Reliability is an important and often overlooked aspect of mode choice. This is especially consequential for transit, where reliability is often very poor, and where service improvements have the potential to improve reliability quite a bit.
- The choice set is important. People need to think of a mode as an option in order for them to choose that mode.
- The phenomenon of induced demand means that providing new options or capacity generally results in a counterbalancing increase in vehicle travel, particularly in congested areas.
- Behavior change can occur in the short-term or the long-term, as people changes jobs and locations of residence.
- Travel behavior is heavily influenced by demographics. Several important variables are income, gender, and recent immigrant status.

- Most urban planning scholars and economists agree that the most direct and effective way to reduce demand for auto trips would be to price automobile traffic directly (Giuliano 1995, Cervero and Landis 1995).
- Attitudes of travelers: time is important to travelers, but out-of-vehicle travel time is viewed as more onerous; reliability of performance is increasingly important; out-of-pocket costs are important, but hidden costs are not; comfort and amenity are important, as is safety
- Captive vs. choice riders – captives cannot drive or do not have access to a car; choice riders have access to a car, but choose to use transit anyway because it is more attractive for the given trip.

Disadvantaged Communities

Some notes focusing on travel behavior of the poor:

How do most poor people get around?

- Most low-income adults travel in cars-76 percent of all trips of those with incomes less than $20,000 (Blumenberg 2003)
- The poor use cars 17 times more than transit for their urban trips (Pucher and Renne 2003)
- In 2001, on average, poor households spent $3,200 on transportation including only $405 on public transit (Blumenberg 2003)
- Only 10.3 percent of households do not have access to a private vehicle (Hess 2004)
- The lowest-income households make only 5 percent of their trips by transit (Pucher and Renne 2003)
- The poor, blacks and Hispanics are far more likely to use transit than other groups
- Minorities and low-income households account for 63 percent of nation's transit riders (Pucher and Renne 2003)

What are the arguments for and against increasing investments in public transit systems to help low-income households?

For:

- The poor, blacks and Hispanics are far more likely to use transit than other groups
- Minorities and low-income households account for 63 percent of nation's transit riders (Pucher and Renne 2003)
- Lower income neighborhoods suffer inferior service, excessively high fares, overcrowding, and routes that do not match their desired trip patterns (Pucher and Renne 2003)
- The poor are 8 times as likely as the affluent to take the bus
- Households earning less than $20,000 account for 47.1 percent of bus riders, 19.7 percent of metro rail riders and 6.3 percent of suburban rail riders

- Lower income individuals have greater constraints when it comes to mobility and accessibility
- Poor households account for 24.9 percent of peak hour transit trips and 39.4 percent of off-peak trips- much more off-peak travel which is usually when service is more limited
- Continued decentralization of population and employment has exacerbated the isolation of many low-income families that lack auto access
- Access to reliable transportation can improve employment outcomes for inner-city residents as well as low-income rural and suburban residents

Against:

- Most low-income adults travel in cars-76 percent of all trips of those with incomes less than $20,000 (Blumenberg 2003)
- The poor use cars 17 times more than transit for their urban trips (Pucher and Renne 2003)
- The lowest-income households make only 5 percent of their trips by transit (Pucher and Renne 2003)
- Most households abandon public transportation as soon as they own their first car- transit use drops from 19.1percent of trips by households with no car to only 2.7 percent of trips by households with one car (Pucher and Renne 2003)
- Considerable auto use even among households with no cars (as passengers or borrowing or renting cars)- 34.1 percent of all trips in 2001 (Pucher and Renne 2003)

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