Summary of Project Performance Assessment Working Group

This document summarizes the activities of the Project Performance Assessment working group. It begins with an introduction to the working group and its purpose. It then introduces the two methodologies within the group’s charge. The third section delves into the first of these methodologies, the Benefit-Cost Analysis, documenting the methodology, test projects and best practice, and reporting major working group comments, feedback and revisions. Following the summary of the BCA, the document describes the working group’s parallel approach in the review of the Performance Outcomes Analysis. Finally, the document lists the consensus next steps staff has proposed for working group endorsement.

I. Introduction: Working Group Summary

The Project Performance Assessment working group is a voluntary collection of local agency staff, industry experts, advocates and other stakeholders who agreed to serve for nine months in a review of technical methods for further implementing transportation project performance assessment at SACOG. The working group met monthly between February and September 2017.

SACOG charged the working group to focus on two new methodologies that analyze the performance of individual transportation projects:

1. Benefit Cost Analysis (BCA), and
2. Performance Outcomes Analysis (Outcomes).

The working group engaged in a variety of actions in its review of these methodologies, including:

- Commenting on the framework, data and use of the two methodologies
- Identifying, analyzing, and evaluating these methodologies through test cases
- Providing direction on draft measurable indicators to be considered in each methodology
- Providing relevant subject matter expertise on performance indicators
- Reviewing the technical application of both the Benefit Cost Analysis and Performance Outcomes Analysis for reasonableness in measuring the potential of transportation projects in the SACOG region.

The Project Performance Assessment working group and the outcomes of this process was not used as a filtering mechanism to pick projects included or excluded from the region’s long range transportation plan. Instead, the working group lent expertise and provided comments to two new technical project performance analyses that will help to inform board discussions regarding regional priorities for transportation investments.
II. Project Level Performance Assessment: Dual Methodologies

In 2016, the SACOG Board of Directors tasked staff to improve performance-based planning within the agency. A performance-based approach examines information about roads, transit systems and other transportation infrastructure, the form and function of neighborhoods and communities, and the people living in those communities to try to make sound investment decisions with limited public resources. To date SACOG has used tools including travel models, traffic studies and other analyses in performance-based planning and programming. Yet many of these tools are best suited for the regional-scale, while federal, state and other resources are increasingly tied to project-level analyses. In response, SACOG convened the Project Performance Assessment working group to assist in a review of methods analyzing the performance of individual transportation projects.

SACOG identified two feasible methods to augment project performance assessment at the agency: benefit-cost and performance outcomes analysis. A benefit-cost analysis (BCA) places a dollar value on the various benefits of a transportation project, for example, improved travel time, decreased accidents, or fewer emissions. The BCA compares these benefits to the project’s costs to determine cost effectiveness. The BCA is a highly robust and technical methodology, drawing on the agency’s travel demand model to simulate a build/no build comparison of the project.

While the BCA provides detailed information about the estimated cost effectiveness of an investment decision, it only reports those benefit measures that can be estimated in a travel model and then monetized into a dollar value. As such, the measure is best suited for major investment projects large enough to run through the region’s travel model. Recognizing these constraints, staff has also advanced the development of a complementary methodology that provides analysis across all types of transportation projects. This Performance Outcomes Analysis translates a vision of desired future conditions into key performance outcomes. The method then draws on data, project scope, existing infrastructure and neighborhood characteristics to estimate how a transportation investment affects these benchmark performance outcomes. The performance outcomes analysis gives a general assessment (such as high/medium/low) of a project’s potential performance, compared to a BCA’s specific estimate of benefits.

Both BCA and Performance Outcomes Analysis provide valuable additions to SACOG’s ability to assess the performance of individual transportation projects. Neither is proposed in isolation as the sole criterion in agency performance assessment activities. Instead, staff sees value in bringing in these methodologies as additional information to inform the Board’s decision making in transportation investment priorities.

The below describes how the working group engaged each methodology, including topics, measures and major feedback. The project website, [https://www.sacog.org/project-performance-assessment](https://www.sacog.org/project-performance-assessment), also has the materials and notes from each working group meeting.
III. Overview of Benefit Cost Analysis

SACOG’s Benefit-Cost Analysis provides a quantitative means to estimate and then compare the effectiveness of individual transportation investments. In short, the analysis helps answer the following question: is the proposed transportation project a cost-effective investment, where user and societal benefits outweigh construction and operating costs? To answer this question, SACOG’s BCA draws on best practices for benefit-cost assessment in transportation planning, in particular, the benefit-cost analyses at the Metropolitan Transportation Commission (MTC) and the San Diego Association of Governments (SANDAG). SACOG has worked for multiple years to adopt best practice BCA methods, as well as contribute to the state of practice through improvements to technical and modeling techniques and benefit measures.

To measure the various benefits of individual transportation projects, SACOG’s BCA relies primarily on the Sacramento Activity-Based Travel Simulation Model (SACSIM), the regional travel demand model maintained by SACOG. The method next monetizes these impacts based on existing economic valuations drawn from technical literature and other BCAs implemented across the country. Finally, the BCA compares these monetized benefits to the cost of building, maintaining and operating the transportation investment to produce a benefit to cost ratio.

The table below reports the benefits measures in SACOG’s BCA, as well as how each measure is monetized. Project construction and operating costs are provided by the project sponsor; in proof of concept testing, SACOG used general per mile operating cost assumptions.

In early working group meetings staff presented the BCA methodology. Key working group comments on the BCA methodology include:

- The region has not competed well for state grants (such as the Affordable Housing and Sustainable Communities program). The working group recommended SACOG develop its BCA so that it can support local grant applications when requested, in addition to its function in SACOG’s internal project performance assessment. SACOG will work with partner agency staff on BCA grant applications when requested.
- The working group noted that local agencies do not have time/resources to run the BCA for SACOG’s plan or funding round. As such, SACOG has put together a method that does not add to local agency workloads. SACOG will perform analyses on projects as part of the MTP/SCS plan update. Partner agencies will remain responsible for setting parameters for projects including scope, schedule and cost. SACOG’s travel model and BCA tool will be made publically available.
- The working group noted that the BCA methodology does not cover all types of transportation projects, and is most effective in analyzing larger regionally significant projects. The group recommend that SACOG build out the complementary Outcomes analysis to provide a more comprehensive assessment. The work SACOG has completed in these area is covered in section IV on the Outcomes.
- The working group explored the feasibility of adding new benefit measures to the methodology. The section below on best practice summarizes the takeaways of these discussions.
Table 1. Benefit Measures and Monetized Values Used in SACOG's Proof of Concept

<table>
<thead>
<tr>
<th>BCA Benefit Measures and Monetization Proof of Concept</th>
<th>Unit</th>
<th>Monetized</th>
<th>Explanation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travel Time Savings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passenger Travel Time</td>
<td>hours</td>
<td>$ 16.03</td>
<td>1/2 mean wage</td>
<td>Caltrans</td>
</tr>
<tr>
<td>Walk &amp; Bike Travel Time</td>
<td>hours</td>
<td>$ 16.03</td>
<td></td>
<td>Caltrans</td>
</tr>
<tr>
<td>Transit Travel Time</td>
<td>hours</td>
<td>$ 16.03</td>
<td></td>
<td>Caltrans</td>
</tr>
<tr>
<td>Freight Travel Time</td>
<td>hours</td>
<td>$ 26.24</td>
<td>truck driver wage + cargo carrying value</td>
<td>FHWA</td>
</tr>
<tr>
<td><strong>Travel Cost Savings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto Operating Costs</td>
<td>VMT</td>
<td>$ 0.2518</td>
<td>fuel, maintenance</td>
<td>Caltrans</td>
</tr>
<tr>
<td>Truck Operating Costs</td>
<td>VMT</td>
<td>$ 0.370</td>
<td></td>
<td>Caltrans</td>
</tr>
<tr>
<td>Auto Ownership Costs</td>
<td>number of cars</td>
<td>$ 6,290</td>
<td>Lease, insurance</td>
<td>MTC</td>
</tr>
<tr>
<td><strong>Reliability Improvement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto</td>
<td>Buffer hour</td>
<td>$ 16.03</td>
<td>set to travel time valuation</td>
<td>SHRP2</td>
</tr>
<tr>
<td>Truck</td>
<td>Buffer hour</td>
<td>$ 26.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Emissions Reduction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO$_2$</td>
<td>Metric ton</td>
<td>$ 55.35</td>
<td>societal cost</td>
<td></td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>ton</td>
<td>$ 490,000</td>
<td></td>
<td>BAAQMD</td>
</tr>
<tr>
<td>Nox</td>
<td>ton</td>
<td>$ 7,800</td>
<td>negative health costs</td>
<td></td>
</tr>
<tr>
<td>ROG</td>
<td>ton</td>
<td>varies (~$10,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO$_2$</td>
<td>ton</td>
<td>$ 40,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury + Fatality Collisions</td>
<td>incident</td>
<td>$ 82,036</td>
<td>medical costs, lost productivity</td>
<td>Caltrans (blended)</td>
</tr>
<tr>
<td>Property Damage Collisions</td>
<td>incident</td>
<td>$ 2,455</td>
<td></td>
<td>Caltrans</td>
</tr>
<tr>
<td><strong>Public Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 Minutes Physical Activity</td>
<td>number of people</td>
<td>$ 1,330</td>
<td>health care, productivity</td>
<td>CA Center for Public Health Advocacy</td>
</tr>
</tbody>
</table>

Next, the working group evaluated how the BCA methodology worked through a series of test projects. Major working group input on the test projects include:

- The working group asked to see how the BCA worked on a variety of projects and situations. The working group noted they could not assess the efficacy of the tool without this broader deployment. As such, team put together four rounds of test projects for working group review.
- The working group explored if the tool—as it is currently specified—adequately measures rural transportation projects. In response, the team ran rural-specific test projects and tasked DKS to review other approaches to rural BCAs.
- Some working group members were concerned that the way the scoring system is created and monetized could influence the results of the tool. This point was weighed against the state of practice in BCA, and how other tools draw on the same types of performance metrics and similar monetization values.
- The working group identified an improvement to how the various costs and benefits are aggregated, which will be incorporated into the method.
Finally, the working group considered how SACOG’s BCA fit within best practice, and the feasibility of additional benefit measures. Working group comments focused on:

- SACOG’s activity based model allows for much more detailed analysis in a BCA, including a triple bottom line approach that looks at economic, environmental and equity indicators. An independent review conducted by the working group contractor found SACOG’s proposed tool to be among best practice nationally: Only four other MPOs have a BCA with a similar triple bottom line approach (SACOG’s proposed BCA tool would be the 5\textsuperscript{th} with this degree of sophistication).
- SACOG presented its BCA method at a national conference. The tool has made contributions especially in safety and reliability evaluations. The agency is also on the leading edge of conducting statistical testing to isolate project impacts in a BCA.
- The working group asked to explore the feasibility of adding four additional benefit measures to the BCA. These include growth inducement, agriculture and ecosystem services, equity, and rural issues. For growth inducement and agriculture/ecosystem services, the review found these issues would be best addressed not in the BCA, but in an outcomes assessment. For equity, the group noted that the San Francisco Bay Area is beginning to employ more robust equity indicators and members of the working group encouraged SACOG to further build out equity indicators in its project performance assessment. Finally, for rural issues the group discussed rural accidents and rural seasonality. The project team responded to working group feedback by incorporating rural specific safety data. The working group did not reach a consensus on how to account for seasonality on rural facilities, and if this was solely a rural issue.

Summary working group comments on the BCA:

- The working group noted that there is no one tool that can comprehensively measure all projects and project types. Best practice suggests bringing in a variety of tools, but that a BCA is an essential component of these broader assessment.
- The working group recommended several additions they would hope to see added through time. However, the group also discussed the need for implementation, in other words, to not let the perfect get in the way of the good. Examples from peer regions show how regional agencies have successfully rolled out an initial project-level performance assessment, and then added to this framework through time.
IV. Performance Outcomes Analysis

The Performance Outcomes Analysis is a qualitative approach to examining a transportation investment’s potential for affecting specific policy outcomes. Specifically, the initial analysis framework examines the seven performance outcomes driven by the Metropolitan Transportation Plan/Sustainable Communities Strategy and developed for SACOG’s regional funding programs:

1) Reduce driving
2) Reduce congestion bottlenecks
3) Increase multi-modal travel & create transportation options
4) Create economic benefits
5) Improve goods movement and freight travel
6) Improve safety and security on the transportation system
7) Maintain or work toward maintaining a state of good repair on transportation assets

The analysis creates a buffered area around a transportation investment using GIS and examines both existing and forecasted future conditions to determine whether the project is likely to have a positive, neutral, or negative impact on the performance outcomes described above. The analysis relies on a combination of existing monitored data and future forecasts about land uses and travel patterns, such as intersection types and density, number of jobs and homes adjacent to a project, access and frequency of transit, presence and type of bicycle facilities, and average daily vehicle miles traveled per person in the buffered area. The table below describes the specific datasets examined for each of the performance outcomes to date. As more data become available or performance outcomes are modified or added, SACOG will incorporate those changes into the analytical framework.

<table>
<thead>
<tr>
<th>PERFORMANCE OUTCOME</th>
<th>PROOF OF CONCEPT INDICATORS &amp; MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce driving</td>
<td>• Existing VMT per capita&lt;br&gt;• Future change in VMT per capita&lt;br&gt;• Change in employment and housing density&lt;br&gt;• Proximity to jobs (in development)</td>
</tr>
<tr>
<td>Reduce congestion bottlenecks</td>
<td>• Existing congestion on facility&lt;br&gt;• Existing congestion on adjacent facilities&lt;br&gt;• Change in future households and employment in project area</td>
</tr>
<tr>
<td>Increase multi-modal travel &amp; create transportation options</td>
<td>• Percent of bike/walk friendly intersections in project area&lt;br&gt;• Intersection density&lt;br&gt;• Bike lanes as percent of total road miles&lt;br&gt;• Car volumes and speed (in development)&lt;br&gt;• Transit vehicle stops&lt;br&gt;• Housing and employment density&lt;br&gt;• Existing transit, bike, walk mode share&lt;br&gt;• Future transit, walk, bike mode share</td>
</tr>
<tr>
<td>Create economic benefits</td>
<td>• Proximity to job centers&lt;br&gt;• Future employment growth in project area&lt;br&gt;• Reliability (in development)</td>
</tr>
</tbody>
</table>
Different project types will contribute to performance outcomes and the identified measures in different ways. The Performance Outcomes Analysis will consider project type (e.g., road maintenance, transit expansion, bike and pedestrian facilities, road widenings) and design elements (e.g., complete streets, transit elements, safety elements) when determining how and whether a project affects a particular outcome.

The Performance Outcomes Analysis will help to flag projects with a high likelihood of contributing positively or negatively to performance outcomes. Projects that are flagged to have a potential negative impact will not be excluded from further planning activities, but may be brought up for a deeper discussion with the sponsoring agency to better understand local priorities and the project’s purpose. SACOG is also exploring the possibility of incorporating a version of the Performance Outcomes Analysis into the next regional funding round.

During the development of the Performance Outcomes Analysis, the Project Performance Assessment working group provided many important comments:

- Grant riding and funding applications can create a strain on local agency staff resources. A successful Performance Outcomes Analysis would help streamline applications for regional funding programs and not create additional work.
- The Performance Outcomes Analysis could add value for local agencies if it provided access to data and information that could be used in federal and state funding programs beyond SACOG’s regional program.
- The working group emphasized the importance of an analytical framework that is useful for many project types and sizes across urban, suburban, and rural communities.
- Transparency was an important theme for the working group. The Performance Outcomes Analysis should be an open and transparent process that allows local agencies, stakeholders,}

Sacramento Area Council of Governments
and the public to better understand how SACOG sets priorities for the planning and programming activities.

- Not all projects are intended to address all policy outcomes. Projects should be evaluated based on the outcomes they are intended to affect.
- Project staff received a major working group comment on the applicability of the Performance Outcomes Analysis for transit projects, which often are system-wide investments. Staff will work with transit partners in how to address this comment, and will present the method for further review at the Transit Coordinating Committee.
- It is critical that the Performance Outcomes Analysis provide good documentation and guidance on interpreting results so that local agencies are able to understand in advance how SACOG is using the methodology.
V. Requested Working Group Next Steps

In the final working group meeting project staff is compiling working group comments into a final consensus document. Staff recognizes that though the PPA working group is ending, the process to implement and improve SACOG’s proposed project performance assessment is ongoing. Recognizing the ongoing nature of the process, staff is seeking working group endorsement on the following items to guide future work:

- The BCA methodology is a useful quantitative framework for analyzing large transportation investments for the MTP/SCS and future regional funding programs.
- The Outcomes Analysis methodology is a useful qualitative framework for analyzing transportation investments for the MTP/SCS and future regional funding programs.
- The working group process explaining and evaluating the BCA and Outcomes Analysis was transparent and understandable.
- Together, the BCA and Outcomes Analysis add value to SACOG’s existing practice, and should be included as additional information in the next MTP/SCS performance assessment and as part of the funding round framework.
- The BCA &/or Outcomes Analysis has value to local agencies and stakeholders for applications beyond SACOG’s planning and programming activities, provided full access to all the data is provided in a user-friendly format, well before applications are due for plan or funding rounds. Detailed documentation of technical methods and data sources should also be provided in advance of calls-for-projects.
- SACOG should continue to work on the BCA and Outcomes Analysis, to tailor them for ongoing planning and programming activities and incorporate new methods. In particular, SACOG should study methods for project assessment and prioritization utilized by member agencies, and where possible, support those efforts with any technical methods, data or tools developed. SACOG should also work to address three major working group comments, the link between the BCA and seasonality, how to incorporate further equity indicators in an activity-based model, and how transit investments fit within the Performance Outcomes Analysis.
- SACOG should engage the Project Performance Assessment working group when necessary to inform members on progress made, and to review and comment on changes to SACOG’s process over time.