GHG-Reducing Transit Strategies: Cap & Trade

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Webinar overview

• Summary of major transit funding programs
• Technical assistance on 2014-15 programs
• Update on efforts to influence 2015-16 and beyond
  – Obtain your feedback
• Feature work of ICF International
## Cap and Trade Program Development Matrix

<table>
<thead>
<tr>
<th>Program</th>
<th>Responsible Agencies</th>
<th>Initial Public Workshops</th>
<th>Draft Guidelines Released</th>
<th>Draft Guidelines Workshops</th>
<th>Final Guidelines Approved</th>
<th>Project Solicitation Released</th>
<th>Application Deadline</th>
<th>Projects Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disadvantaged Communities</td>
<td>California Environmental Protection Agency Air Resources Board</td>
<td>N/A</td>
<td>August 2014</td>
<td>August 2014 September 2014</td>
<td>September 2014</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Prepared by California Transit Association staff:
This document reflects official/published dates

**Activity Occurred Already**
N/A = Not Applicable to this program or guidelines
LCTOP

- Program is underway:
  - Similar to PTMISEA
  - SCO released STA shares in late November
  - Two funding cycles in 2014-15 (February 2 and April 15)

- Eligible project types:
  - Expand transit service
  - Low-carbon transportation projects that support new/expanded transit service
  - Active transportation projects that support new/expanded transit service
  - Enhancement projects

- GHG emission reductions determined to occur if project falls into one of the eligible project categories
TIRCP

• Program is in the works:
  – Draft guidelines out until end of January
  – Workshops on January 20 (LA) and 21 (Sacramento)
  – Likely to be two-year program at first ($125 million)

• Eligible projects types:
  – Rail capital projects (including rolling stock)
  – Rail operational improvements
  – Rail integration
  – Bus rapid transit and bus transit?
    • Objectives and Evaluation Criteria seem to preclude bus

• GHG reduction quantification method still in development at ARB
TIRCP

http://www.dot.ca.gov/hq/MassTrans/tircp.html
AHSC

• Program finalized next week:
  – Final draft guidelines out for 6 more days
  – SGC votes on January 20

• Eligible project types:
  – Transit Oriented Development
    • Affordable Housing + Capital Use (Transportation)
    • ½ - mile of transit station/stop served by HQTS
    • HQTS = high-quality transit service (15-minutes/ROW)
  – Integrated Connectivity Project
    • No HQTS serving area
    • Capital Use + Program/Planning Use
    • Include transit station/stop

• GHG reductions quantified using CalEEMod/CMAQ models
http://sgc.ca.gov/s_ahscprogram.php
Questions?

- Any questions about the 2014-15 programs?
  - AHSC
  - LCTOP
  - TIRCP
2014-15 vs. 2015-16+++

- That was program’s as they ARE developing
- 2014-15 program guidelines are “interim”
- We will CONTINUE to advocate for improvements, for 2015-16+
- Association engaged ICF International to provide technical guidance
Assessing Greenhouse Gas Impacts of Transit

Webinar for California Transit Association Members

January 14, 2014
Introduction
Project overview

**Goal**: to recommend a method for assessing the GHG impacts of transit projects when applying for and awarding Cap and Trade Funds.

**Deliverables**:  
- Task 1: Identify transit agency GHG reduction strategies  
- Task 2: Recommend GHG quantification methodologies  
- Task 3: Recommend overall quantification approach  

**Today’s webinar** will summarize our work to date.
How is the state going to assess GHG reductions?

<table>
<thead>
<tr>
<th>Program</th>
<th>Lead Agency</th>
<th>Amount</th>
<th>GHG Guidance Issued to Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Carbon Transit Operations Program</td>
<td>CalSTA</td>
<td>$25m</td>
<td>Interim list of GHG-reducing projects</td>
</tr>
<tr>
<td>Transit and Intercity Rail Capital Program</td>
<td>Caltrans / CTC</td>
<td>$25m</td>
<td>None</td>
</tr>
<tr>
<td>Affordable Housing and Sustainable Communities Program</td>
<td>SGC</td>
<td>$130m</td>
<td>Interim guidance draws on recommended quantification tools (CalEEMod and CMAQ project assessment criteria)</td>
</tr>
</tbody>
</table>

- Everyone is waiting on ARB to issue final guidance for 2015-16
- ARB understands challenges with creating quantitative guidance and is interested in transit agency feedback
The LCTOP guidelines include four categories of projects

- Expand transit service (BRT, increase service and capacity)
- Low carbon transportation projects that support new/expanded transit services (zero-emission vehicles, renewable energy at facilities)
- Active transportation projects that support new/expanded transit services (bike/ped paths, bicycle racks and storage, covered benches)
- Enhancement projects (vehicle fuel efficiency, free or reduced fare passes and vouchers)
The LCTOP guidelines don’t address all projects

There are several GHG-reducing projects that we looked at that are not explicitly named under the LCTOP guidelines or do not fit neatly into the four categories:

- Projects that improve travel speeds or reliability (other than BRT)
- Demand management, incentive, and outreach programs
- Carsharing at transit stations
- Transit-oriented development (this is a focus of the AHSC)
- Efficiency improvements to non-transit vehicles or equipment
- Energy-efficient maintenance or administrative facilities
Tools recommended by AHSC have their pros / cons

<table>
<thead>
<tr>
<th>Tool</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>CalEEMod</td>
<td>- Relatively easy to use</td>
<td>- Focused on land use projects, not transit projects</td>
</tr>
<tr>
<td></td>
<td>- Aligns with what we recommend for TOD projects</td>
<td>- Assesses a lot of other impacts in addition to GHGs; challenging to navigate</td>
</tr>
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<td></td>
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<tr>
<td>CMAQ Criteria</td>
<td>- Focused on transportation projects</td>
<td>- Word document; not as easy to use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Captures a limited group of transit projects (new service, vanpools/shuttles, ped facilities)</td>
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<tr>
<td></td>
<td></td>
<td>- Dated (May 2005)</td>
</tr>
</tbody>
</table>

We’d like to see a tool that combines the ease of use of CalEEMod with the transit focus of the CMAQ criteria.
APTA GHG Protocol answers the easy questions

Once you estimate the impact of your project on travel behavior or fuel use, APTA can help you convert the results to GHG emissions… but the first step is the more challenging one.
## Four categories of GHG reduction strategies

<table>
<thead>
<tr>
<th>Category</th>
<th>Project types</th>
</tr>
</thead>
</table>
| **Expanding or Improving Transit Capacity**   | ▪ Increase capacity of existing service  
▪ Increase service frequency  
▪ Enhance travel speeds and reliability  
▪ Extend operating hours  
▪ Route expansion |
| **Transit Rider Outreach and Incentives**     | ▪ Transportation demand management programs  
▪ Improvements to transit customer experience  
▪ Network/fare integration |
| **Active Transportation and Land Use**        | ▪ Transit oriented development  
▪ Bicycle and pedestrian connections to transit  
▪ Carshare at transit stations |
| **Improving the Efficiency of Transit Energy Use** | ▪ Bus and railcar retrofits  
▪ Rail electrification  
▪ Non-transit vehicle improvements  
▪ Deploy more efficient transit vehicles  
▪ Renewable energy projects  
▪ Facility energy efficiency improvements |
3 approaches for demonstrating GHG reductions

- **Simple calculation**: For strategies that are well-covered by existing research and tools, we outline a simple, straightforward method to quantify GHG reductions.

- **Qualitative criteria**: For strategies where there is insufficient research to quantify GHG reductions, or where research shows a small impact on emissions, we list criteria for qualitatively demonstrating GHG reductions.

- **Complex analysis**: For strategies that require more complex analysis, we recommend tools and methods to assess GHG benefits.

There are simple ways to quantify the GHG reductions from many of the strategies that we’ve looked at. But:

- How likely are agencies to pursue the strategies that are more complex to quantify, and do they need more help?

- Are qualitative criteria going to be enough to make the case for a project?
What we’d like to see

- State and transit agencies collaborate to create quantification guidance, following our recommendations.

- State issues guidance and associated spreadsheet tool

- Transit agencies can quantify strategies:
  - Using state guidance/tool—low LOE.
  - Using advanced methods—higher LOE to analyze/document.

- State reviews results

...But we intend for the work that we’ve done to be useful to transit agencies in quantifying GHG reductions as long as the state lands on an approach that allows any flexibility.
Presentation outline

- For each of the four categories of strategies, we will discuss:
  - Example projects
  - *Our recommended method* for analyzing GHG reductions (simple quantification, qualitative criteria, or complex analysis)
  - What data, tools, or criteria are applicable under our recommended method (more detail is available in memos)
  - Whether project is considered GHG-reducing by draft LCTOP guidelines
  - Opportunities and challenges

- I will pause frequently for questions.
Questions?
Expanding or Improving Transit Capacity
# Expanding or improving transit capacity: Project types

<table>
<thead>
<tr>
<th>Project Category</th>
<th>Example Project Types</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increase capacity of existing service</strong></td>
<td>- Purchase higher capacity/longer vehicles</td>
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<tr>
<td></td>
<td>- Expand vehicle fleet and maintenance facilities</td>
</tr>
<tr>
<td></td>
<td>- Expand vertical circulation elements at stations/station expansion to increase passenger throughput capacity</td>
</tr>
<tr>
<td></td>
<td>- 2nd or 3rd track</td>
</tr>
<tr>
<td><strong>Increase service frequency</strong></td>
<td>- Additional buses or trains put into service</td>
</tr>
<tr>
<td></td>
<td>- Modernize train control system</td>
</tr>
<tr>
<td></td>
<td>- Expand vehicle fleet and maintenance facilities</td>
</tr>
<tr>
<td><strong>Enhance travel speeds and reliability</strong></td>
<td>- Upgrades to right of way</td>
</tr>
<tr>
<td></td>
<td>- Exclusive bus right of way</td>
</tr>
<tr>
<td></td>
<td>- Bus rapid transit (BRT)</td>
</tr>
<tr>
<td></td>
<td>- Level boarding for buses</td>
</tr>
<tr>
<td></td>
<td>- Bus signal priority system</td>
</tr>
<tr>
<td><strong>Extend operating hours</strong></td>
<td>- Late night or early morning transit service</td>
</tr>
<tr>
<td><strong>Route expansion</strong></td>
<td>- Extend bus or train lines into unserved areas</td>
</tr>
</tbody>
</table>


## Transit capacity: Analyzing GHG reductions

<table>
<thead>
<tr>
<th>Project category</th>
<th>Recommended approach</th>
<th>Applicable data, tools, or criteria</th>
<th>Meets LCTOP Criteria?</th>
</tr>
</thead>
</table>
| Increase capacity of existing service | Qualitative criteria | ▪ Project serves SCS high-growth areas  
▪ The service is or will soon be at capacity  
▪ Project uses low emissions vehicles | Yes |
| Increase service frequency            | Simple calculation   | ▪ % change in headways  
▪ Current ridership  
▪ Mode shift factor | Yes |
| Enhance travel speeds and reliability | Simple calculation (speeds)  
Simple calculation (reliability) | ▪ % change in travel times  
▪ Current ridership  
▪ Mode shift factor | Only for BRT projects |
| Extend operating hours                | Qualitative criteria | ▪ Project serves SCS high-growth areas  
▪ Project uses low emissions vehicles | Yes |
| Route expansion                       | Complex analysis     | ▪ Travel model, ridership forecasts, or EIR | Yes |
Transit capacity: Opportunities and challenges

Opportunities

- There is a rich body of research on how speed and frequency affect transit

- New and extended routes are challenging to quantify, but agencies are likely to already have done some analysis

Challenges

- How can agencies analyze projects that increase speed, frequency, and capacity simultaneously?

- Can we rely on MPOs to quantify the GHG impacts of capital projects through the SCS?

- Can agencies make a case for maintaining current capacity?
Transit Rider Outreach and Incentives
## Transit rider outreach and incentives: Project types

<table>
<thead>
<tr>
<th>Project Category</th>
<th>Example Project Types</th>
</tr>
</thead>
</table>
| Transportation demand management programs             |  ■ Discounted transit passes  
  ■ Transit vouchers  
  ■ Bike to transit incentives  
  ■ Vanpool subsidies  
  ■ Transit encouragement programs                      |
| Improvements to transit customer experience           |  ■ Traveler information system/real time arrival information  
  ■ New/upgraded bus shelters                           |
| Network/fare integration                              |  ■ Integrated ticketing across systems                                                |
### Transit rider outreach: Analyzing GHG reductions

<table>
<thead>
<tr>
<th>Project category</th>
<th>Recommended approach</th>
<th>Applicable data, tools, or criteria</th>
<th>Meets LCTOP Criteria?</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDM programs that involve discounted fares or vouchers</td>
<td>Simple calculation</td>
<td>▪ % change in fares&lt;br&gt;▪ % of population eligible for incentives&lt;br&gt;▪ Total system PMT&lt;br&gt;▪ Mode shift factor</td>
<td>No</td>
</tr>
<tr>
<td>Other TDM programs</td>
<td>Qualitative criteria</td>
<td>▪ Project serves SCS high-growth areas&lt;br&gt;▪ Project implemented alongside capacity-increasing projects</td>
<td>No</td>
</tr>
<tr>
<td>Improvements to transit customer experience</td>
<td>Qualitative criteria</td>
<td>▪ Project serves SCS high-growth areas&lt;br&gt;▪ Project implemented alongside capacity-increasing projects</td>
<td>No</td>
</tr>
<tr>
<td>Network/fare integration</td>
<td>Qualitative criteria</td>
<td>▪ Project serves SCS high-growth areas&lt;br&gt;▪ Project implemented alongside capacity-increasing projects</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Transit rider outreach: Opportunities and challenges

Opportunities

- There is a rich body of research on the price of transit and its impact on ridership

Challenges

- Other projects in this category are challenging to quantify, and comparison projects are challenging to find
- What research there is often shows little impact
Questions?
# Active transportation and land use: Project types

<table>
<thead>
<tr>
<th>Project Category</th>
<th>Example Project Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transit oriented development</td>
<td>- Joint development project on transit-agency owned property</td>
</tr>
<tr>
<td>Bicycle and pedestrian connections to transit</td>
<td>- Bike/ped paths</td>
</tr>
<tr>
<td></td>
<td>- Bike share at transit stations</td>
</tr>
<tr>
<td></td>
<td>- Bicycle parking at transit stations</td>
</tr>
<tr>
<td></td>
<td>- Bike racks on buses/trains</td>
</tr>
<tr>
<td>Carshare at transit stations</td>
<td>- Provide carshare parking at transit stations or other incentives</td>
</tr>
<tr>
<td>Project category</td>
<td>Recommended approach</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------------------------</td>
</tr>
</tbody>
</table>
| Transit oriented development                | Simple quantification         | ▪ Density, land use diversity distance to downtown, and/or distance to nearest transit station for proposed development  
▪ See CAPCOA Handbook for additional guidance | No (but it is a focus of the AHSC)             |
| Bicycle and pedestrian connections to transit | Qualitative criteria         | ▪ Project is located at a station area where service will be improved  
▪ Project is located in an area with high levels of walking/biking  
▪ Project connects new development called for in the SCS to transit | Yes                  |
| Carshare at transit stations                | Qualitative criteria         | ▪ Any carshare pod at a high-quality transit station is likely to contribute to reducing GHG emissions | No                   |
Bike/ped and TOD: Opportunities and challenges

Opportunities

- There is an extensive body of research on the GHG impact of TOD projects, and state/regional governments have made quantification tools available (CalEEMod, BAAQMD TDM tool).

- Emerging research on bike/ped facilities at stations may make it easier to quantify some active transportation strategies in the future.

Challenges

- It may be challenging for transit agencies to claim responsibility for GHG reductions due to TOD projects.

- Most active transportation strategies are challenging to quantify and do not have a big impact on GHG emissions.
Improving the Efficiency of Transit Energy Use
## Transit energy efficiency: Project types

<table>
<thead>
<tr>
<th>Project Category</th>
<th>Example Project Types</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bus and railcar retrofits to improve fuel efficiency</strong></td>
<td>■ LED lighting on buses and trains</td>
</tr>
<tr>
<td></td>
<td>■ Anti-idling systems for diesel trains</td>
</tr>
<tr>
<td></td>
<td>■ Regenerative braking for trains</td>
</tr>
<tr>
<td><strong>Rail electrification</strong></td>
<td>■ Convert diesel trains to electricity</td>
</tr>
<tr>
<td><strong>Non-transit-vehicle improvements</strong></td>
<td>■ Charging stations for EVs at transit stations</td>
</tr>
<tr>
<td></td>
<td>■ Hybrid support vehicles</td>
</tr>
<tr>
<td><strong>Deploy hybrid, alternative fuel, or more efficient transit vehicles</strong></td>
<td>■ Conversion of on-demand shuttles to electric vehicles</td>
</tr>
<tr>
<td></td>
<td>■ Conversion of fixed-route fleet to CNG</td>
</tr>
<tr>
<td></td>
<td>■ CNG refueling stations</td>
</tr>
<tr>
<td></td>
<td>■ Hybrid / electric buses</td>
</tr>
<tr>
<td><strong>Renewable energy projects</strong></td>
<td>■ Solar power at facilities and stations</td>
</tr>
<tr>
<td></td>
<td>■ Wind power in right of way</td>
</tr>
<tr>
<td><strong>Facility energy efficiency improvements</strong></td>
<td>■ More efficient lighting / HVAC</td>
</tr>
<tr>
<td></td>
<td>■ Reduce energy use from computers and other electronics</td>
</tr>
<tr>
<td></td>
<td>■ Certify facility under LEED standard</td>
</tr>
</tbody>
</table>
## Transit energy efficiency: Analyzing GHG reductions

<table>
<thead>
<tr>
<th>Project category</th>
<th>Recommended approach</th>
<th>Applicable data, tools, or criteria</th>
<th>Meets LCTOP Criteria?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus and railcar retrofits to improve fuel efficiency</td>
<td>Simple calculation</td>
<td>▪ Annual VMT ▪ New fuel economy ▪ Baseline fuel economy</td>
<td>Yes</td>
</tr>
<tr>
<td>Rail electrification</td>
<td>Simple calculation</td>
<td>▪ Annual VMT ▪ New/baseline fuel economy ▪ New/baseline fuel emissions factor</td>
<td>Yes</td>
</tr>
<tr>
<td>Non-transit vehicle improvements</td>
<td>Simple calculation</td>
<td>▪ Annual VMT ▪ New/baseline fuel economy ▪ New/baseline fuel emissions factor</td>
<td>No</td>
</tr>
<tr>
<td>Deploy hybrid, alternative fuel, more efficient transit vehicles</td>
<td>Simple calculation</td>
<td>▪ Annual VMT ▪ New/baseline fuel economy ▪ New/baseline fuel emissions factor</td>
<td>Yes</td>
</tr>
<tr>
<td>Renewable energy projects</td>
<td>Simple calculation</td>
<td>▪ Annual energy generation ▪ Electricity emissions factor</td>
<td>Yes</td>
</tr>
<tr>
<td>Facility energy efficiency improvements</td>
<td>Complex analysis (for most strategies)</td>
<td>Strategies vary widely, and it requires custom analysis to estimate energy savings</td>
<td>No</td>
</tr>
</tbody>
</table>
Transit energy efficiency: Opportunities and challenges

Opportunities

- This is the area best covered by existing guidance and tools.
- It is generally easier to get the operational data that is needed to quantify these strategies than to estimate impacts on travel behavior.

Challenges

- Strategies are so varied that it’s hard to craft a uniform quantification approach.
- New technologies are always emerging.
Questions?
Outstanding questions

- Did we miss any important GHG-reducing projects that your agency is considering?

- How, if at all, should agencies quantify the GHG benefits of maintaining current service?

- How receptive is your agency likely to be to using a GHG quantification methodology recommended by the state?

- How likely is your agency to want to use more complex analytical tools and techniques to fully capture GHG reductions?

- What should be the process for reviewing projects where transit agencies estimate GHG reductions using their own data / methods?
GHG-Reducing Transit Strategies: Cap & Trade

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