Quantifying Greenhouse Gas Emissions From Transit

DRAFT APTA Recommended Practice

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APTA Guidance

- Provide standardized way for transit agencies to quantify GHG impacts
- Accessible to all types of agencies
- Collective effort by APTA working group
- Public review version available soon
Why Quantify Emissions?

- Reporting to The Climate Registry
- Support internal efforts
- Communicate transit’s benefits
- Potential funding

Image: California Climate Action Registry
Emissions Produced by Transit

Emissions from Transit
- Tailpipe emissions from transit vehicles
- Electricity use for traction
- Maintenance yards, stations, offices and other stationary sources

Mode Shift
- Avoided car trips from private autos

Congestion Relief
- Improved fuel efficiency from reduced congestion

Land-Use Multiplier
- Compact land-use -> shorter trips, more walk/bike trips
- Trip chaining
- Lower/no car ownership

Debit

Credit

Greenhouse Gas Impacts of Transit
Debit Side:
How to quantify emissions from transit
Emissions from Transit

- Consistent with existing guidance
  - Climate Registry General Reporting Protocol
  - Local government protocol
- Give guidance on transit-specific issues
  - What emissions are covered
  - Data sources (mainly NTD)
Emission Scopes

Source: The Climate Registry General Reporting Protocol
What to Include?

- **Emissions from:**
  - Directly operated and contract services reported to NTD
  - Includes paratransit and vanpools
  - Non-revenue vehicles
  - Stationary and fugitive sources

- Most capital projects are Scope 3
## Sources of Emissions

<table>
<thead>
<tr>
<th>Source</th>
<th>Scope</th>
<th>Santa Barbara MTD</th>
<th>AC Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Tons CO2-e</td>
<td>%</td>
</tr>
<tr>
<td>Mobile Combustion</td>
<td>1</td>
<td>5,687</td>
<td>95%</td>
</tr>
<tr>
<td>Stationary Combustion</td>
<td>1</td>
<td>27</td>
<td>0.5%</td>
</tr>
<tr>
<td>Process Emissions</td>
<td>1</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Fugitive Emissions</td>
<td>1</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td>Purchased Electricity</td>
<td>2</td>
<td>264</td>
<td>4%</td>
</tr>
<tr>
<td>Purchased Steam</td>
<td>2</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Purchased Heat/Cooling</td>
<td>2</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>5,979</td>
<td>100%</td>
</tr>
</tbody>
</table>
Credit Side: How to quantify emissions saved
Mode Shift to Transit

- Apply mode shift factor to transit passenger miles
- Tiered options
  A. Model based
  B. Survey based
  C. Defaults by agency type

Source: Met Council, Minneapolis
**Mode Shift Factor**

**Q1.** If transit service were not available, how would you make this kind of trip?

- Drive alone
- Taxi
- Someone would drive me
- Carpool
- Walk
- Bicycle
- I would not make the trip

**Q2.** If transit service were to stop permanently, would your household change the number of vehicles it owns?

- Yes - purchase a vehicle
- Yes - give up a vehicle
- No

**Q3.** Do you have a car or other personal vehicle that you could have used to make this trip?

- No
- Yes

+ average carpool occupancy
Congestion Relief

- Mode shift to transit reduces congestion
- Improves efficiency of remaining vehicles

Approaches
- Extrapolate from TTI
- Regional models

Source: Ewing et al. 2008
Congestion Relief

Thanks to Justin Antos
Land-Use Multiplier

- Accounts for:
  - Reduced trip length
  - Bike, ped trips
  - Trip chaining
  - Lower car ownership

- Challenge: chicken and egg

<table>
<thead>
<tr>
<th>Study</th>
<th>Cities</th>
<th>Land-Use Multiplier</th>
<th>Methodological Issues</th>
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</thead>
<tbody>
<tr>
<td>Pushkarev &amp; Zupan (1982)</td>
<td>Large U.S. metro areas</td>
<td>4</td>
<td>Correlation only</td>
</tr>
<tr>
<td>Newman &amp; Kenworthy (1999)</td>
<td>32 global cities</td>
<td>5 to 7</td>
<td>Correlation only</td>
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<tr>
<td>Holtzclaw (2000)</td>
<td>SF Bay Area</td>
<td>1.4 to 9</td>
<td>Correlation only</td>
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<tr>
<td>Neff (1996)</td>
<td>U.S. urban areas</td>
<td>5.4 to 7.5</td>
<td>Assumes fixed travel-time budgets</td>
</tr>
<tr>
<td>ICF (2008)</td>
<td>Entire U.S.</td>
<td>1.9</td>
<td>Accounts only for LU effects caused by transit</td>
</tr>
</tbody>
</table>
Recommended Approach

- Preferred approach: regional study
- Alternative: default multiplier of 1.9
  - Multiply mode shift benefit by 1.9
  - Conservative approach for many regions
Summary

- Standardized way to quantify GHG impacts
- Based on accepted protocols
- Gives credit for the credit side - emissions reduced
- Simple calculations understate the benefits
For More Information

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This presentation: