

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

Climate Action Registry Reporting Online Tool (CARROT)

Log Out Comments

April 19, 2004

Status Summary Entity Info Users Emissions Data Reports Help

Submit Report

Reporting Year: 2003
Revision Number: 000
Entity Reporting Status: Initiated
Reporting Scope: CA
Reporting Level: Entity

Tips:

- Click the 'Submit' button to submit the emissions data to the registry, or the 'Cancel' button to continue working on the emissions data.
- Click the 'Help' hyperlink on the menu bar to bring up the user manual.

Orange Oil

Please verify that your emissions data is accurate and complete before submitting it for certification:

Emissions Summary (California)

GH Gas	Stationary	Mobile	Process	Fugitive	Indirect	Total	Unit
CO2	100.49	175.62			15.03684	291.14684	metric ton
Total (CO2e)	100.49	175.62			15.03684	291.14684	metric ton

Emissions Summary (US)

GH Gas	Stationary	Mobile	Process	Fugitive	Indirect	Total	Unit
CO2	100.49	175.62			15.03684	291.14684	metric ton
Total (CO2e)	100.49	175.62			15.03684	291.14684	metric ton

Submit Cancel

Image: California Climate Action Registry

Emissions Produced by Transit

Emissions Displaced 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

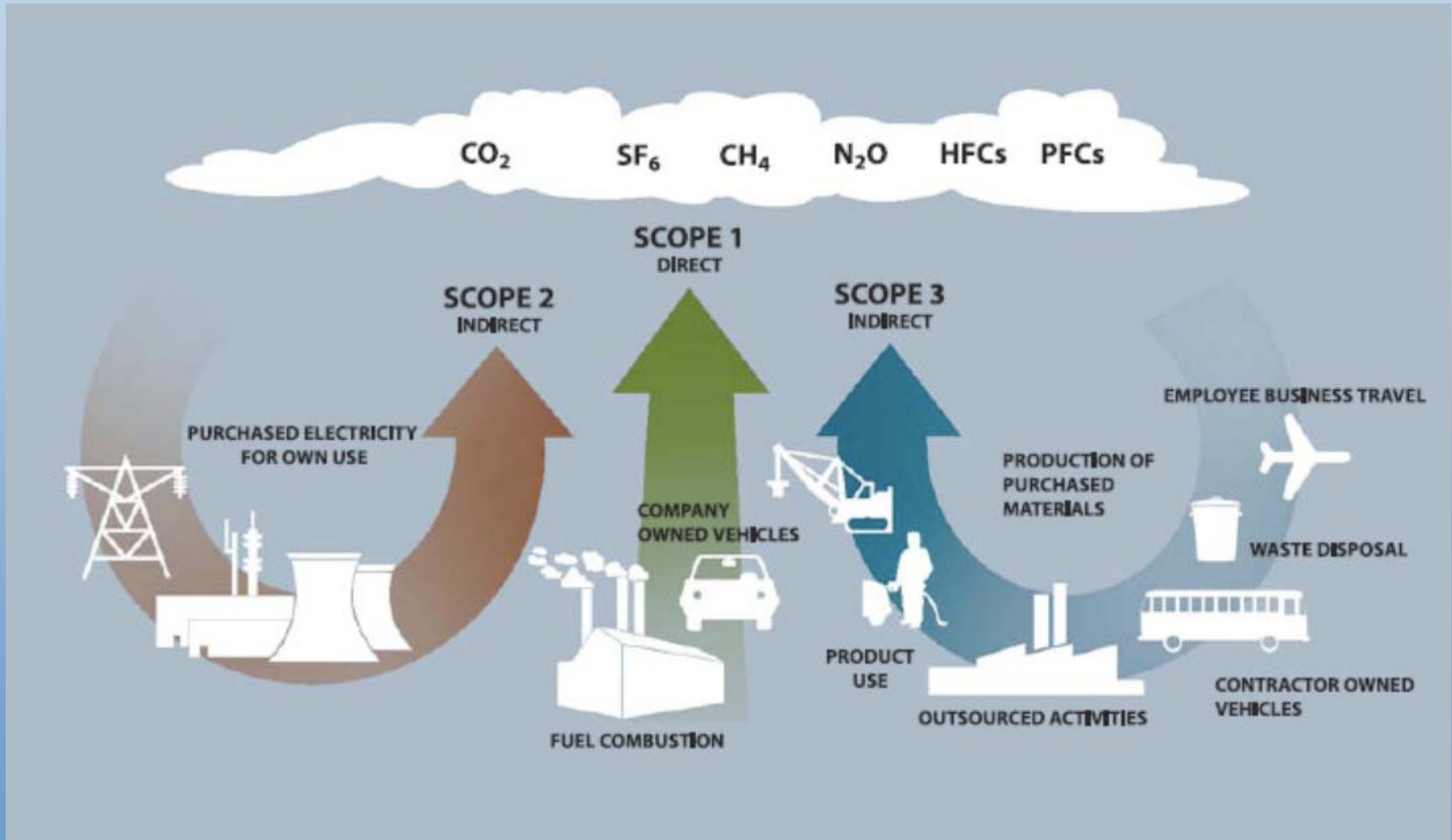
Debit Side:

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

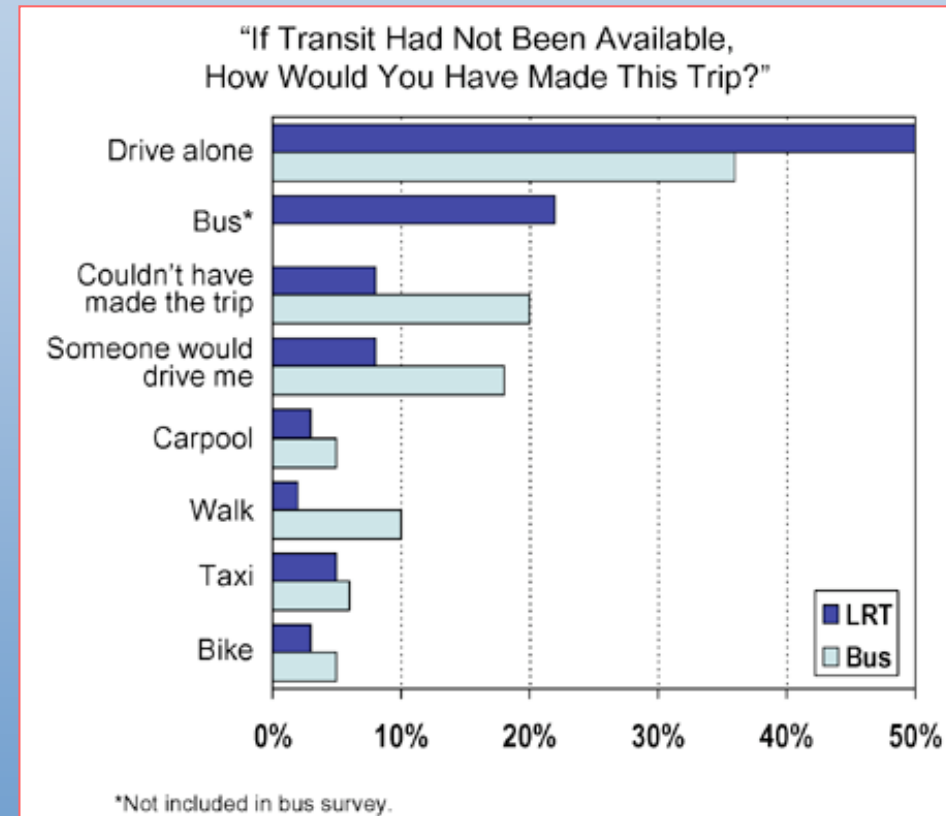
Sources of Emissions

Source	Scope	Santa Barbara MTD		AC Transit	
		Tons CO ₂ -e	%	Tons CO ₂ -e	%
Mobile Combustion	1	5,687	95%	64,379	93%
Stationary Combustion	1	27	0.5%	1,965	3%
Process Emissions	1	0	0%	0	0%
Fugitive Emissions	1	1	0%	0	0%
Purchased Electricity	2	264	4%	2,568	4%
Purchased Steam	2	0	0%	0	0%
Purchased Heat/Cooling	2	0	0%	0	0%
Total		5,979	100%	68,912	100%

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

\div average carpool occupancy

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

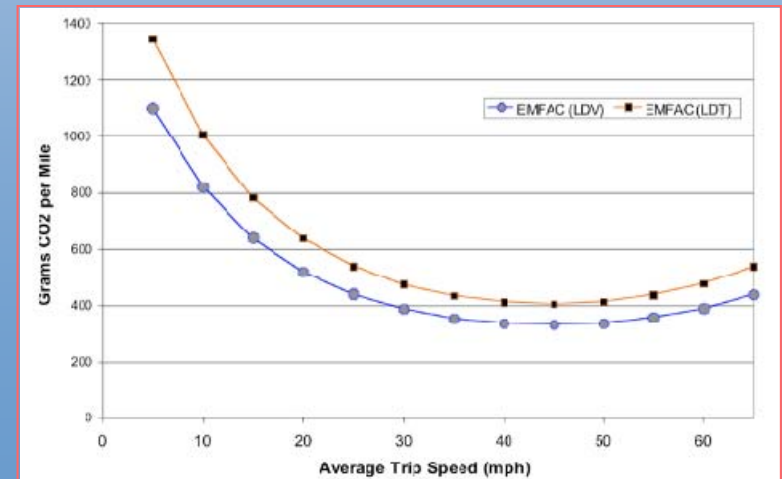
Q3. Do you have a car or other personal vehicle that you could have used to make this trip?

No Yes

Mode Shift Factor

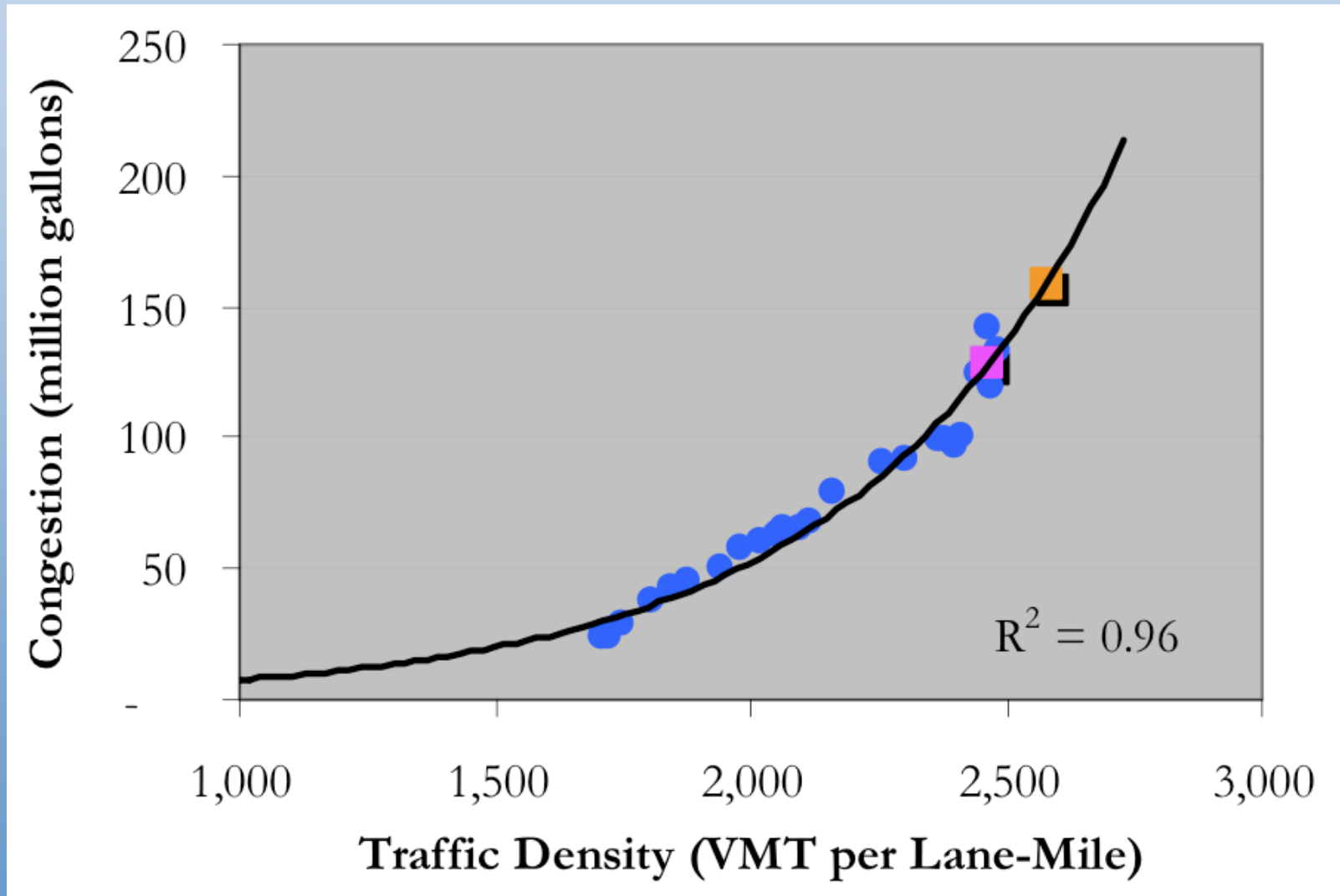
Congestion Relief

- ▶ 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

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

▶ Challenge: chicken and egg

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:

www.stanford.edu/~adammb/MillardBall_Railvolution2008.pdf

