Environmental Justice Analysis of Goods Movement in Southern California

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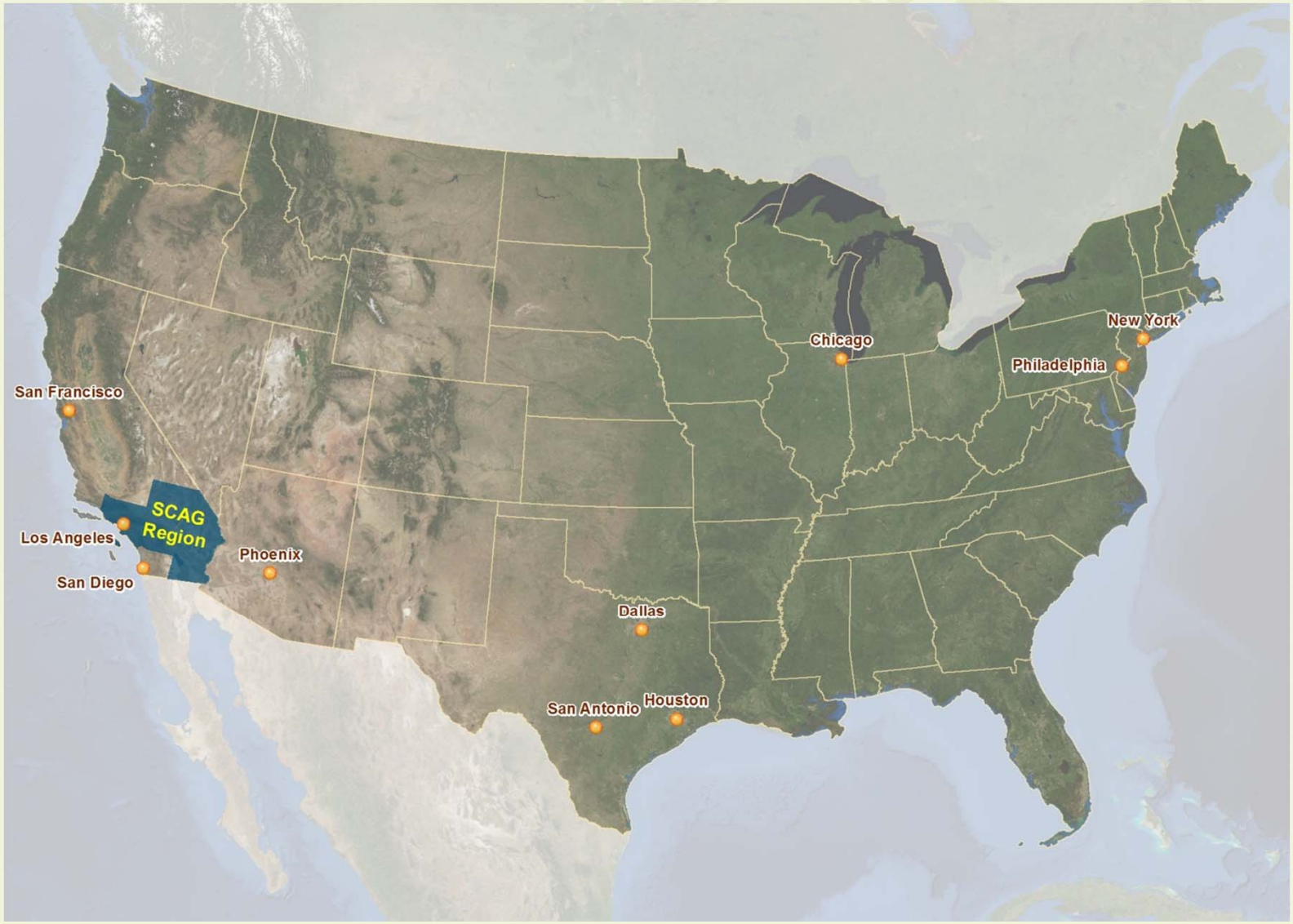
Southern California Association of Governments (SCAG)



SCAG Quick Facts

Nation’s largest Metropolitan Planning Organization (MPO)

6 counties and 191 cities

18 million people within 38,000+ square miles

GDP in 2012: $890 Billion, 16th largest economy in the world

Overview

- Background
- Objectives
- Methodology
- Results
- Conclusions

SCAG's 2012-2035 RTP/SCS

- Regional Transportation Plan (RTP)
- SB 375 - Nation's first law to control greenhouse gas (GHG)
- Sustainable Communities Strategy (SCS)
- 2012-2035 RTP/SCS adopted on April 4, 2012

SCAG and Environmental Justice

- Title VI of the Civil Right Act of 1964

"No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

SCAG and Environmental Justice

- Title VI of the Civil Right Act of 1964
- Executive Order 12898
- DOT and FHWA Orders on EJ
- Other nondiscrimination requirements and guidance in support of Title VI

2012-2035 RTP/SCS and Environmental Justice

- Integration of the principles of Title VI into RTPs to address EJ
- EJ analysis to assess the impacts of RTP programs and projects on minority and low-income populations

Goods Movement in the SCAG Region

- Goods movement system development ➔ one of the key RTP strategies
- Largest international trade gateway in U.S.
- Domestic, regional and local goods movement activity
- Economic growth and expansion of international trade ➔ GM to serve market demand and to facilitate economic growth

Environmental Concerns and Strategies

- Continuing increases in truck volumes ➔ Increasing environmental concerns in the region
- Strategies to reduce the impacts of the regional goods movement system on the environment and public health
- Strategies to improve or mitigate any disproportionate impacts to minority and low-income populations

Research Objectives

- Spatial distributions of the minority and low-income populations (“EJ population groups”) adjacent to major truck corridors
- Estimate of truck emission intensity for areas near major truck corridors
- EJ concerns and issues from the goods movement system in the SCAG Region

Methodology

Methodology

Identifying EJ Population Group

Determining Buffer Distance Criteria

Spatial Distribution of EJ Population Groups & Emission Intensity Estimates

Identifying EJ Population Groups

Minority:

- *A person who is Black, Hispanic or Latino, Asian American, American Indian, Alaskan Native, Native Hawaiian and Other Pacific Islander*

Low-Income:

- *A person whose median household income is at or below the Department of Health and Human Services (HHS) poverty guidelines*

Socioeconomic Indicators of EJ Population Groups

Ethnic/Racial/Other Indicators:

- White (NH), Hispanic (Latino), African-American, American Indian, Asian/Pacific Islander, Others
- Disabled, Age 65 and Above, Age 5 and Below

Income Indicators:

- Below Poverty Level
- Income Quintile

Concentration of EJ Population Groups

- Minority and low-income population is *concentrated* if the percentage of minority and low-income population of the affected area is *"meaningfully greater"* than the percentage of minority and low-income population in the general population. (EPA EJ Guidance)
- Comparative analysis between the share of EJ population groups near major truck corridors and the share in the regional level.

Determining Distance Criteria

- Buffer distance criteria
- Guidance and recommendations from various organizations
- 500 ft vs. 1,000 ft
- No significant difference between the two buffers

Residential Area-Weighted Interpolation

- Population estimates based on ratio of res. area in 500ft buffer to res. area in entire TAZ

$$P_{t_{2008}}^{buffer} = P_{t_{2008}}^{TAZ} X \left(RA_{t_{2008}}^{buffer} / RA_{t_{2008}}^{TAZ} \right)$$

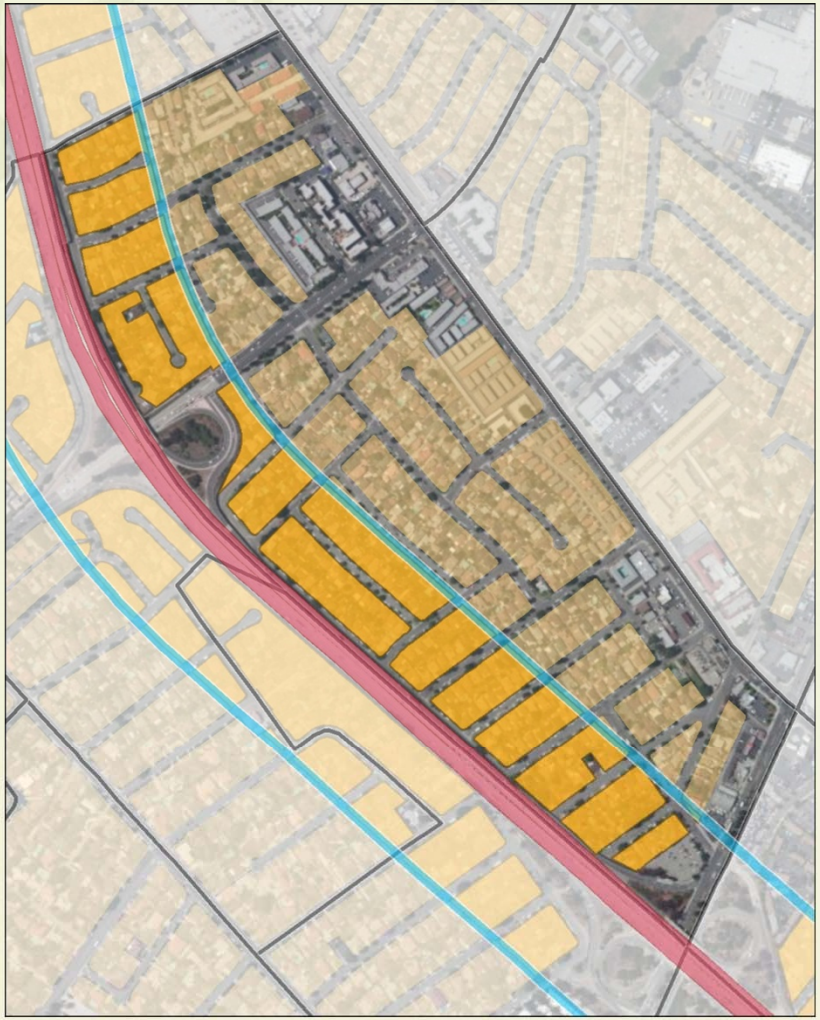
where:

$P_{t_{2008}}^{buffer}$ *= total population in buffer (2008)*

$P_{t_{2008}}^{TAZ}$ *= total population in TAZ (2008)*

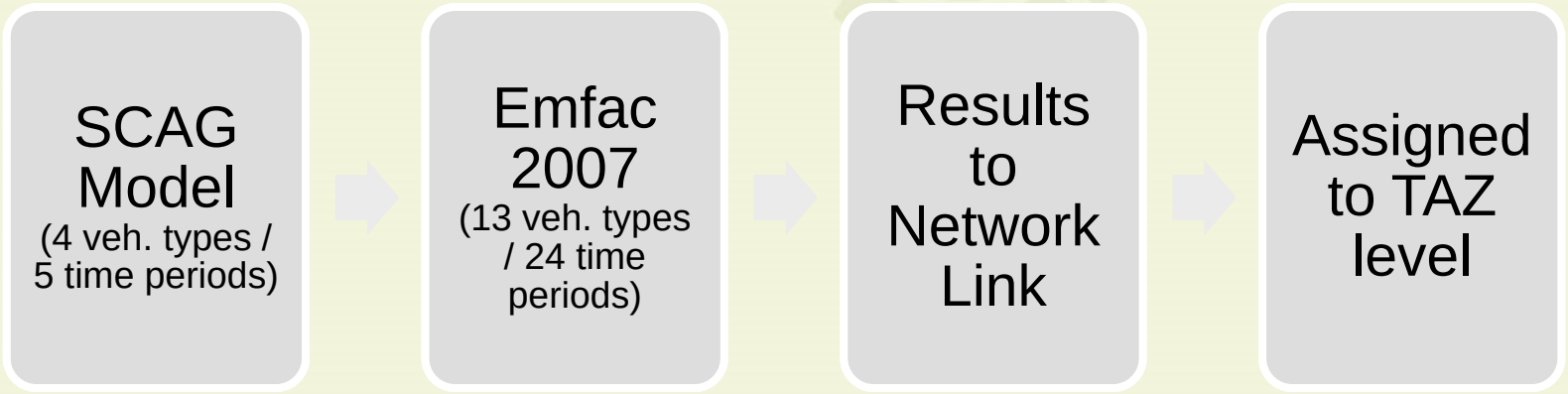
$RA_{t_{2008}}^{buffer}$ *= total residential area in buffer (2008)*

$RA_{t_{2008}}^{TAZ}$ *= total residential area in TAZ (2008)*



Emission Intensity Estimates

- SCAG Emission Impact Study



- Running emission estimates for air pollutants (ROG, CO, CO_2, NO_X, SO_2, $PM_{2.5}$) for the year 2008 at TAZ level

Emission Intensity Estimates (cont.)

- Total emissions of TAZ located within 500 feet from major truck corridors, normalized by total acreage of TAZ
- The emission data includes emissions from heavy-duty vehicles (LHDT1, LHDT2, MHDT, HHDT).
- Estimation of truck VMT share to better assess the impacts of truck movement

Results

Distribution of EJ Population Groups (Major Truck Corridors vs. SCAG Region)

Ethnic/Racial /Other Indicators	500 ft from Major Truck Corridors		SCAG Region	
	2008	2035	2008	2035
Hispanic	**56.2%**	**64.8%**	**44.8%**	**55.4%**
NH White	**23.2%**	**15.5%**	**34.4%**	**23.5%**
NH Black	7.3%	6.3%	6.9%	6.1%
NH NA	0.5%	0.5%	0.4%	0.5%
NH Asian	11.2%	11.1%	11.6%	12.3%
NH Others	1.7%	1.7%	1.9%	2.1%
Age 65 & Above	9.2%	15.1%	10.4%	16.7%
Age 5 & Below	9.4%	8.9%	8.7%	8.2%
Disabled	9.2%	10.0%	8.6%	9.3%

Distribution of EJ Population Groups (Major Truck Corridors vs. SCAG Region)

Income Indicators	500 ft from Major Truck Corridors		SCAG Region	
	2008	2035	2008	2035
Poverty 1*	**15.7%**	**15.7%**	**13.8%**	**14.5%**
Poverty 2*	9.9%	10.0%	8.7%	9.0%
Poverty 3*	9.4%	9.4%	8.3%	8.5%
Quintile 1	21.5%	21.3%	20%	20%
Quintile 2	22.5%	22.0%	20%	20%
Quintile 3	21.8%	21.4%	20%	20%
Quintile 4	19.6%	20.0%	20%	20%
Quintile 5	14.7%	15.3%	20%	20%

Distribution of EJ Population Groups (Major Truck Corridors vs. SCAG Region)

- Higher share of most EJ population groups within 500 feet from major truck corridors than regional average
- High concentration of EJ population groups living nearby major truck corridors

Truck Emission Intensity (2008)

Emission Factors	Truck Emission Intensity (gram/year/acre)			Truck Emission Intensity Comp.
	Major Truck Corridors	Other Freeways	Entire Freeways	
ROG	1.70 (34%)	0.66 (24%)	1.11 (30%)	52.9%
CO	11.29 (12%)	5.17 (9%)	7.82 (11%)	44.3%
CO_2	2,808.29 (24%)	1,187.55 (16%)	1,890.11 (20%)	48.6%
NO_X	**22.49 (75%)**	**8.52 (64%)**	**14.58 (71%)**	54.3%
SO_2	0.03 (23%)	0.01 (16%)	0.02 (20%)	48.2%
$PM_{2.5}$	**0.84 (75%)**	**0.29 (61%)**	**0.53 (70%)**	59.8%

(Numbers in parenthesis indicate percentage out of total emission intensity.)

Share of Truck VMT (2008)

	Length (mi.)	Total VMT (thousands)	Truck VMT (thousands)	Share of Truck VMT
Major Truck Corridors	1,810	124,940	**15,693**	**12.6%**
	(26%)	(49%)	**(63%)**	
Other Freeways	5,210	131,240	9,207	**7.0%**
	(74%)	(51%)	(37%)	
Entire Freeways	7,020	256,180	24,901	9.7%

Truck Emission Intensity
(Major Truck Corridors vs. Region)

- Higher emission intensity within 500ft buffer from major truck corridors than regional level
- High truck movements on major truck corridors than regional level
- More adverse truck-related environmental impacts on areas adjacent to truck corridors

Conclusions

Conclusions

- High concentration of the EJ pop. groups living near major truck corridors
- High truck emission intensity within areas adjacent to major truck corridors
- EJ population groups highly exposed to high and adverse human health/environmental effects from goods movement system
- Potential disproportionately high and adverse human health or environmental effects on the EJ population groups from the goods movement system
- Further analysis is needed.

Areas for Future Research

- Racial/ethnic majority in the SCAG Region
- Additional data and analysis is needed to understand the future environmental justice impacts of other goods movement system such as rail and ports
- EJ impacts on policy, e.g. shifting portions of truck traffic to rail

Thank you!

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