www.MAGELLAN-ADVISORS.com

Transportation Broadband Strategies to Reduce VMT and GHG Emissions

Southern California Association of Governments

Magellan Advisors, LLC
DKS Associates

Agenda

Introductions
Project Objectives
Demographics
Environmental Impacts of Broadband
Transportation System Performance
Analysis of Broadband Impacts on VMT and GHG
Broadband in Transportation Projects
Conclusions
Next Steps

Introductions

Magellan Advisors, LLC

Jory Wolf
VP Digital Innovation

Greg Laudeman, Ed.D.
Senior Consultant

Melanie Downing
Consultant

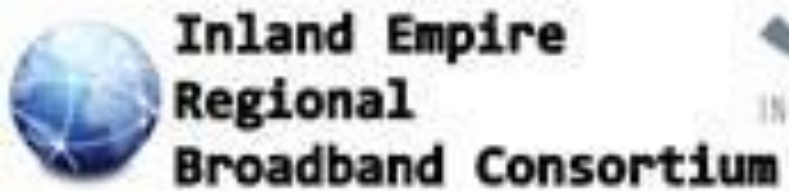
DKS Associates

Alan Clelland
ITS/CV Leader

Randy Johnson
Senior Transportation Engineer

Jim Damkowitch
Managing Director DKS Sacramento

Introductions



Magellan ADVISORS DKS

Project Objectives

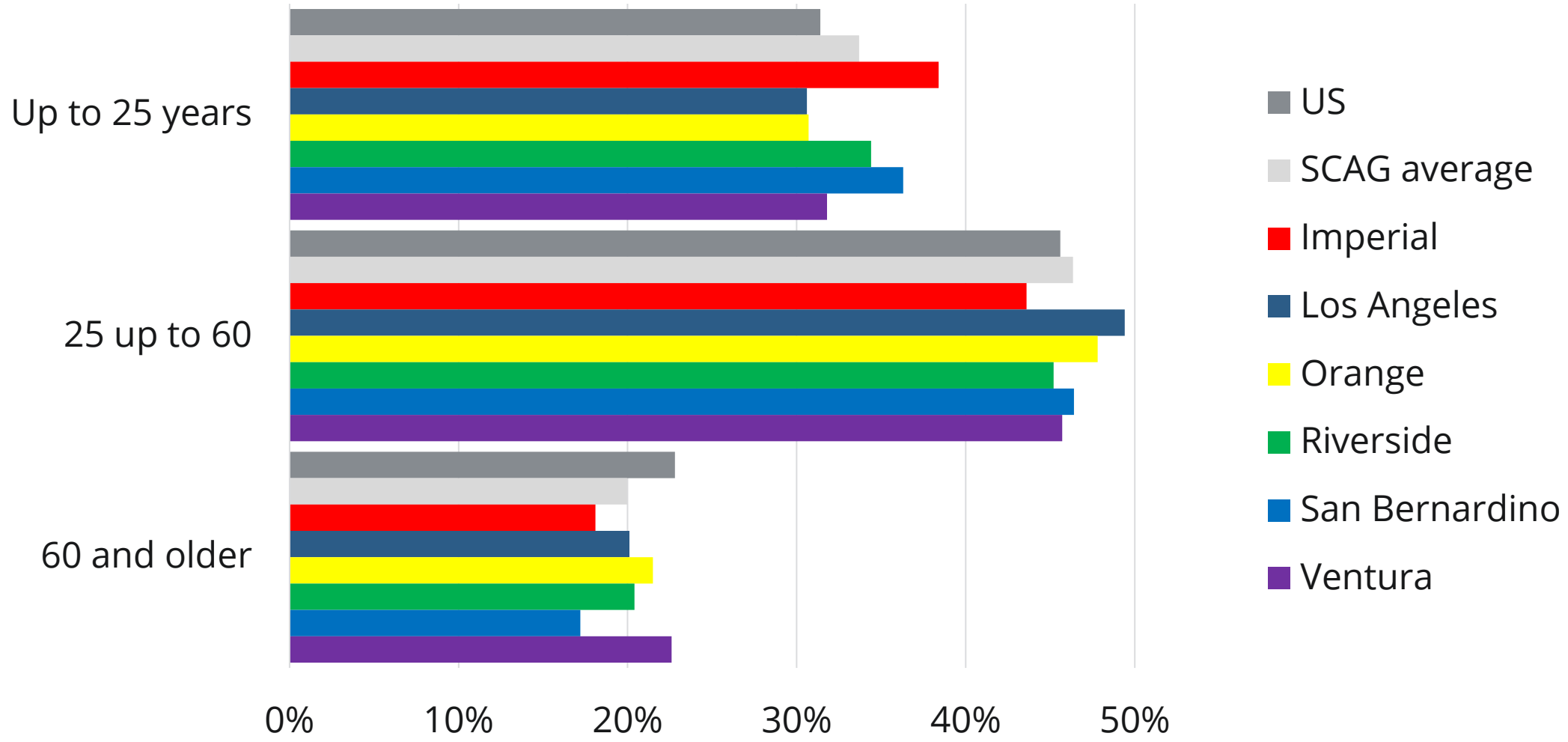
Determine how broadband availability impacts VMT and GHG emissions.

- Estimate how VMT and GHG emissions may be reduced as broadband is used as a substitute for travel.

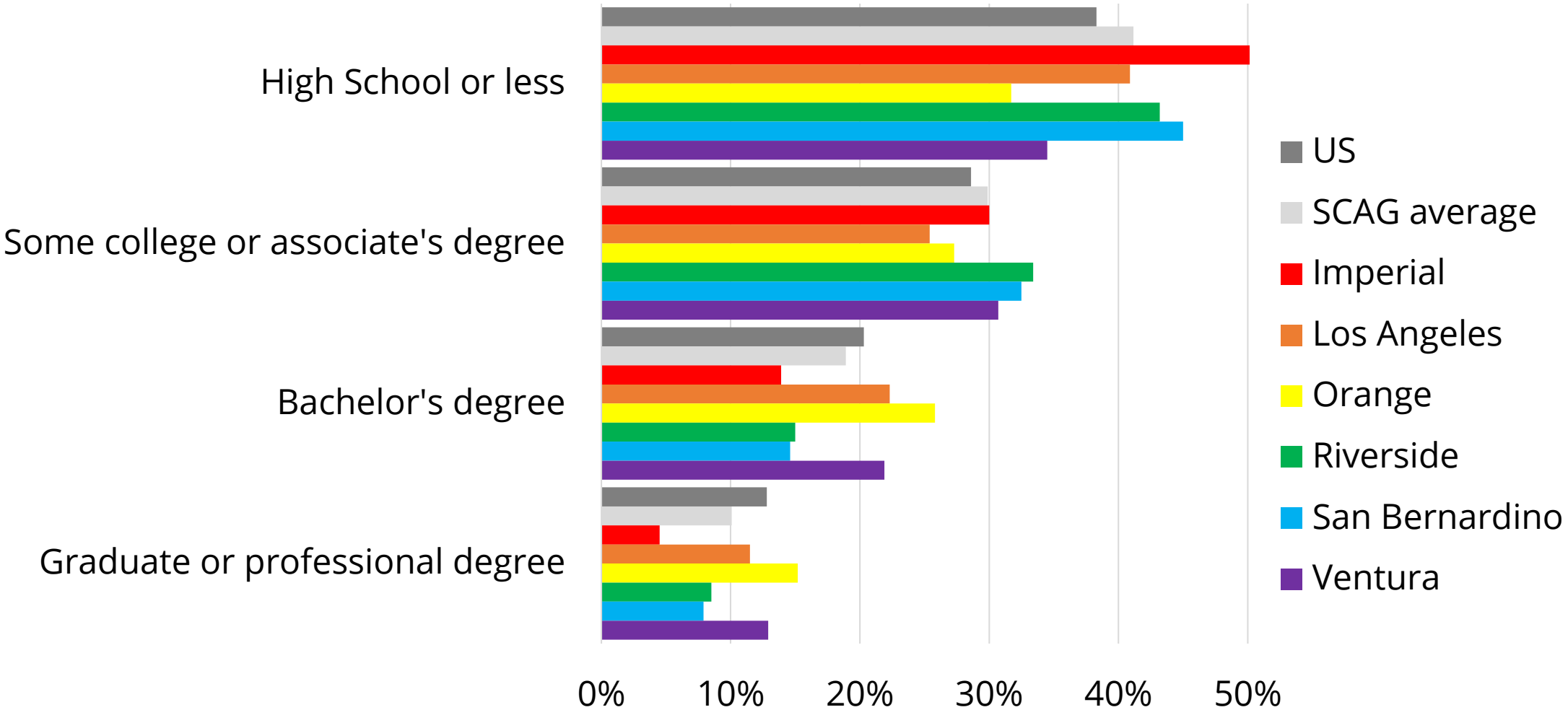
Determine how integrated broadband and transportation planning can increase broadband availability.

- Identify cost and funding strategies for including broadband in transportation projects.

Age


Up to 25 years
25 up to 60
60 and older
0%
10%
20%
30%
40%
50%
US
SCAG average
Imperial
Los Angeles
Orange
Riverside
San Bernardino
Ventura

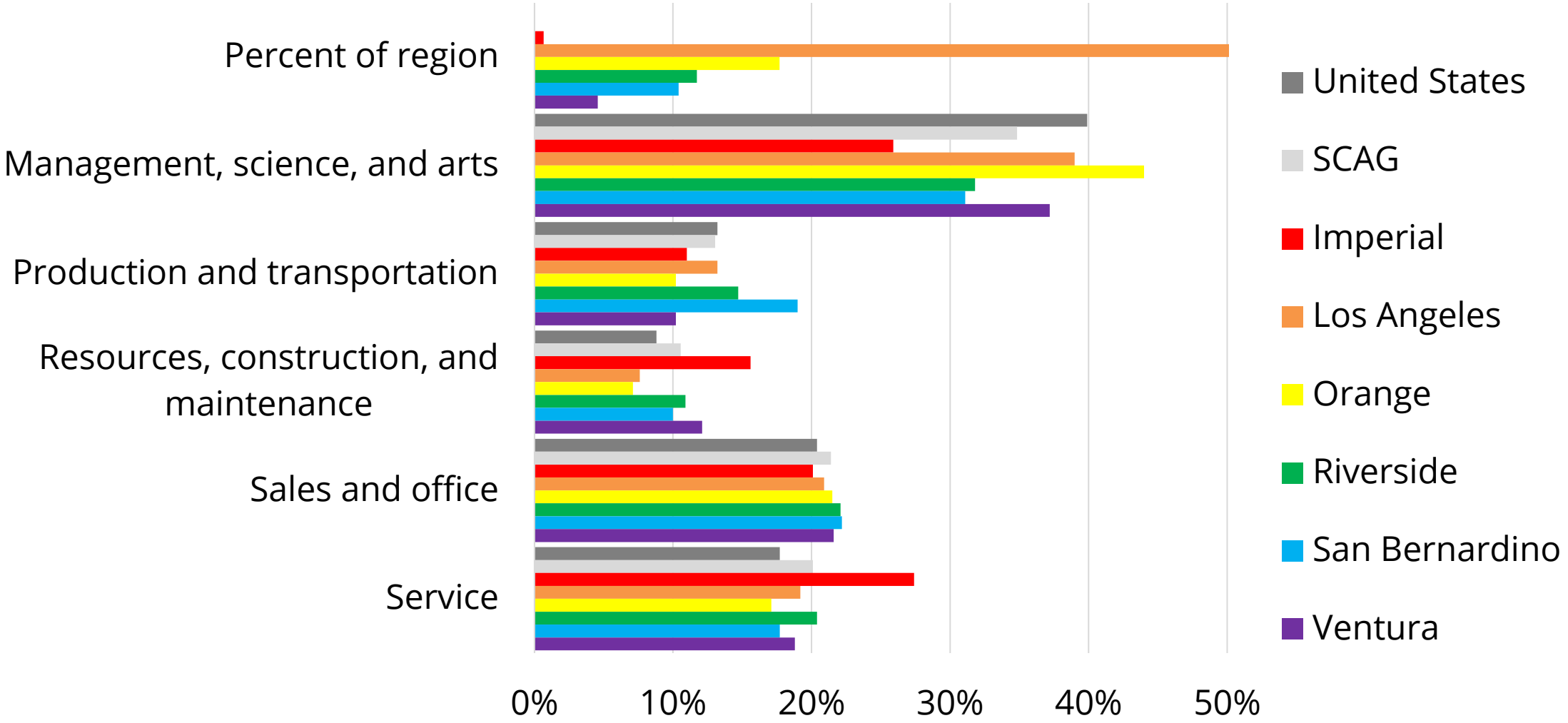
Education


High School or less
Some college or associate's degree
Bachelor's degree
Graduate or professional degree
0%
10%
20%
30%
40%
50%
US
SCAG average
Imperial
Los Angeles
Orange
Riverside
San Bernardino
Ventura

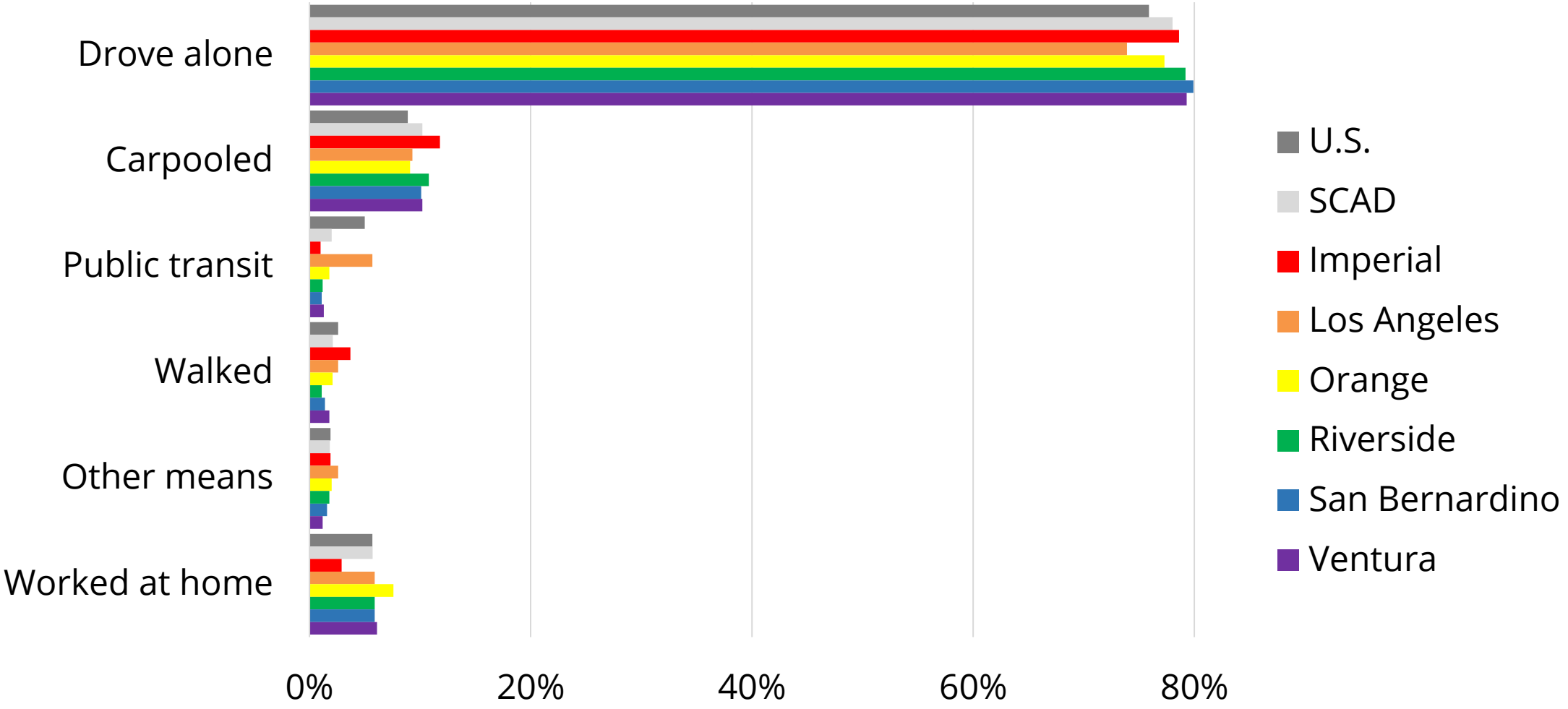
Income by Education

Educational Attainment	Median Income U.S.	SCAG
All levels	$41,801	$41,211
Less than high school graduate	$25,876	$24,639
High school graduate (includes equivalency)	$31,956	$33,135
Some college or associate's degree	$38,125	$39,928
Bachelor's degree	$56,344	$56,780
Graduate or professional degree	$75,495	$81,048

Occupation


Percent of region
Management, science, and arts
Production and transportation
Resources, construction, and maintenance
Sales and office
Service
0%
10%
20%
30%
40%
50%
United States
SCAG
Imperial
Los Angeles
Orange
Riverside
San Bernardino
Ventura

Commuting


Drove alone
Carpooled
Public transit
Walked
Other means
Worked at home
0%
20%
40%
60%
80%
U.S.
SCAD
Imperial
Los Angeles
Orange
Riverside
San Bernardino
Ventura

Demographics

Highlights for the SCAG Region Compared to the Nation

- Includes both the U.S.'s largest and most populous counties
- Highly economically and socially diverse
- Generally younger and less educated
- Comparable incomes but more likely to be in sales and service occupations
- More likely to commute by car and for longer durations

Environmental Impacts of Broadband

42 Professional and Academic Publications, 1990's – Present

Confirm VMT and Air Quality Benefits

Scale a Key Differentiator for Applicability

- Majority of empirically-based publications were Facility-Based (Single/Small sample of Employers and not representative of the wider workforce)
- No Differentiation of Essential vs. Non-Essential Workers
- Majority were survey-based – again typically Facility-Based

Eleven of "most-relevant" sources cited in Report

- Regional Benefits of Telecommuting
- Regional Emission Reduction Benefit Range: 1 - 15% Reduction

Magellan ADVISORS DKS

Transportation System Performance

Baseline Performance Assessment

Level of Congestion (VMT; VHT; VHD)

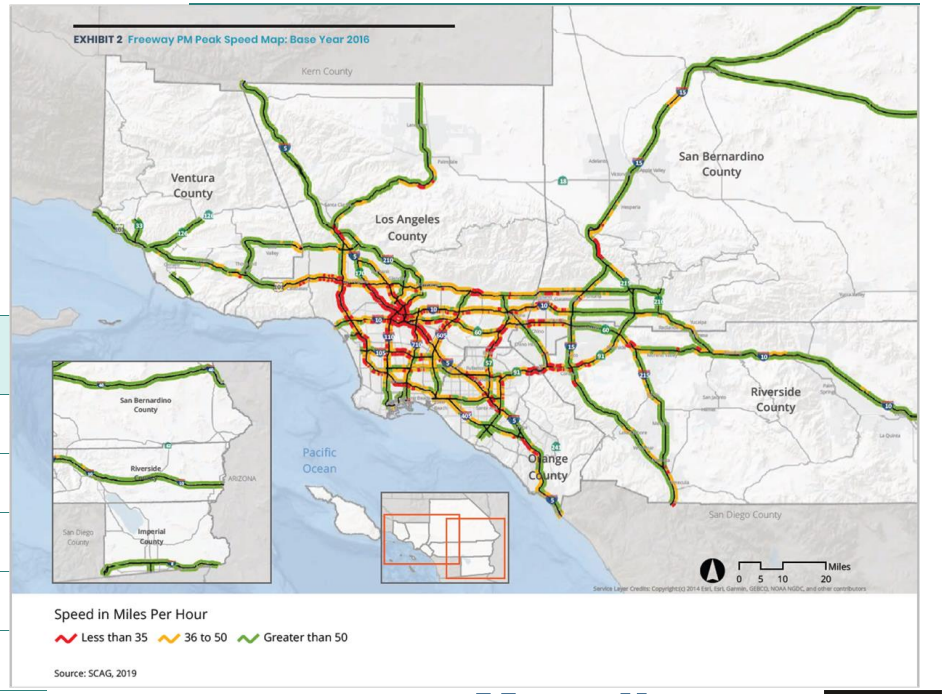
- Volume/Capacity Plots
- Speed Plots

	VMT	VHT	VHD
PASSENGER VEHICLES	427,205,797	12,170,601	2,484,014
LIGHT TRUCKS	5,877,749	134,496	25,694
MEDIUM TRUCKS	4,345,778	100,475	18,443
HEAVY TRUCKS	20,960,500	409,955	68,076
TOTAL	**458,389,824**	**12,815,527**	**2,596,227**

Identified Non-Broadband Areas (TAZs)

Origin-Destination of Trips from Non-Broadband TAZs

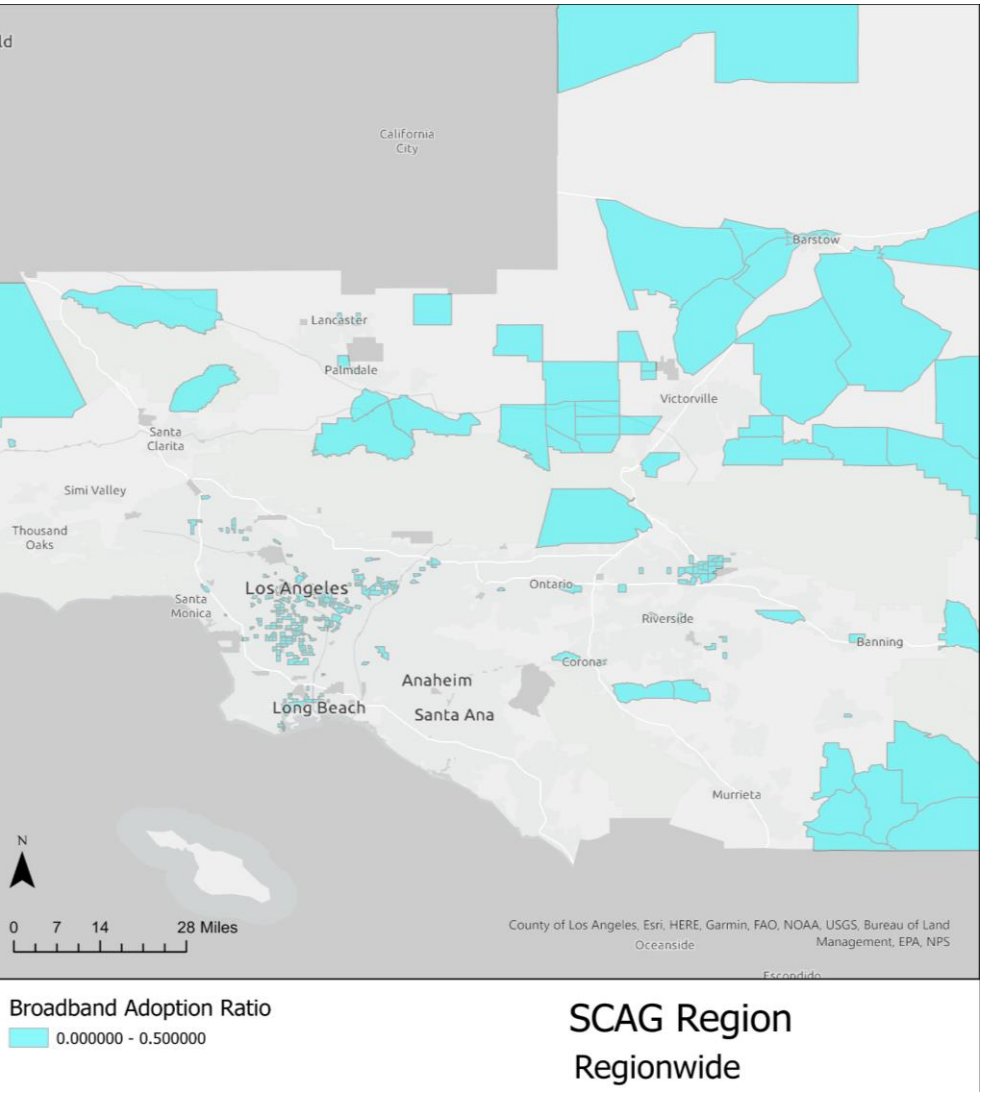
- Streetlight Data from SCAG
- Home-Based Work Trips (19% of total trips)
- Average Trip Length – Approximately 6 miles



Safety

- Federal PMs

PERFORMANCE MEASURE	2016 BASELIINE 5-YEAR ROLLING AVERAGE	2017 SINGLE YEAR	2021 SCAG REGIONAL TARGET[1]
NUMBER OF FATALITIES	1,403	1,505	1,622
FATALITY RATE (PER 100 MILLION VMT)	0.88	0.906	1.32
NUMBER OF SERIOUS INJURIES	5,044	6,386	6,672
SERIOUS INJURY RATE (PER 100 MILLION VMT)	3.162	3.843	5.45
TOTAL NUMBER OF NON-MOTORIZED FATALITIES + SERIOUS INJURIES	2,046	2,118	2,212



Broadband Expansion Market Assessment

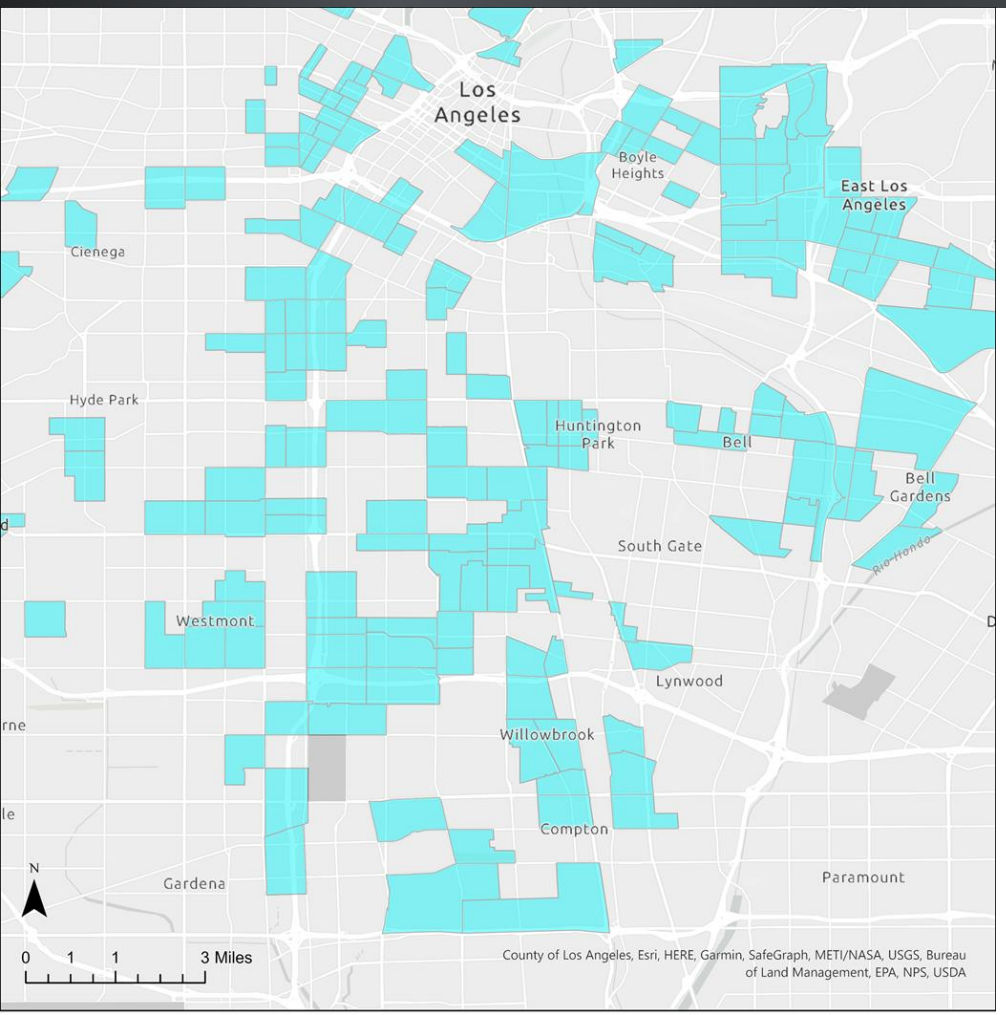
Pre-screening at the block group level

- Census table B28011 "Internet Subscriptions in Household"
- If Block Group < 50 percent of households: Non-Broadband-0
- If Block Group > 50 percent of households: Broadband-1
- Aggregate Block Groups to the TAZ level
- If TAZ < 50 percent of households: Non-Broadband-0
- If TAZ > 50 percent of households: Broadband-1

Total households: 441,712 (5.8% of Total HH in 2045)

Non-broadband TAZs have significantly higher proportion of low-income households.

Broadband Expansion Market Assessment



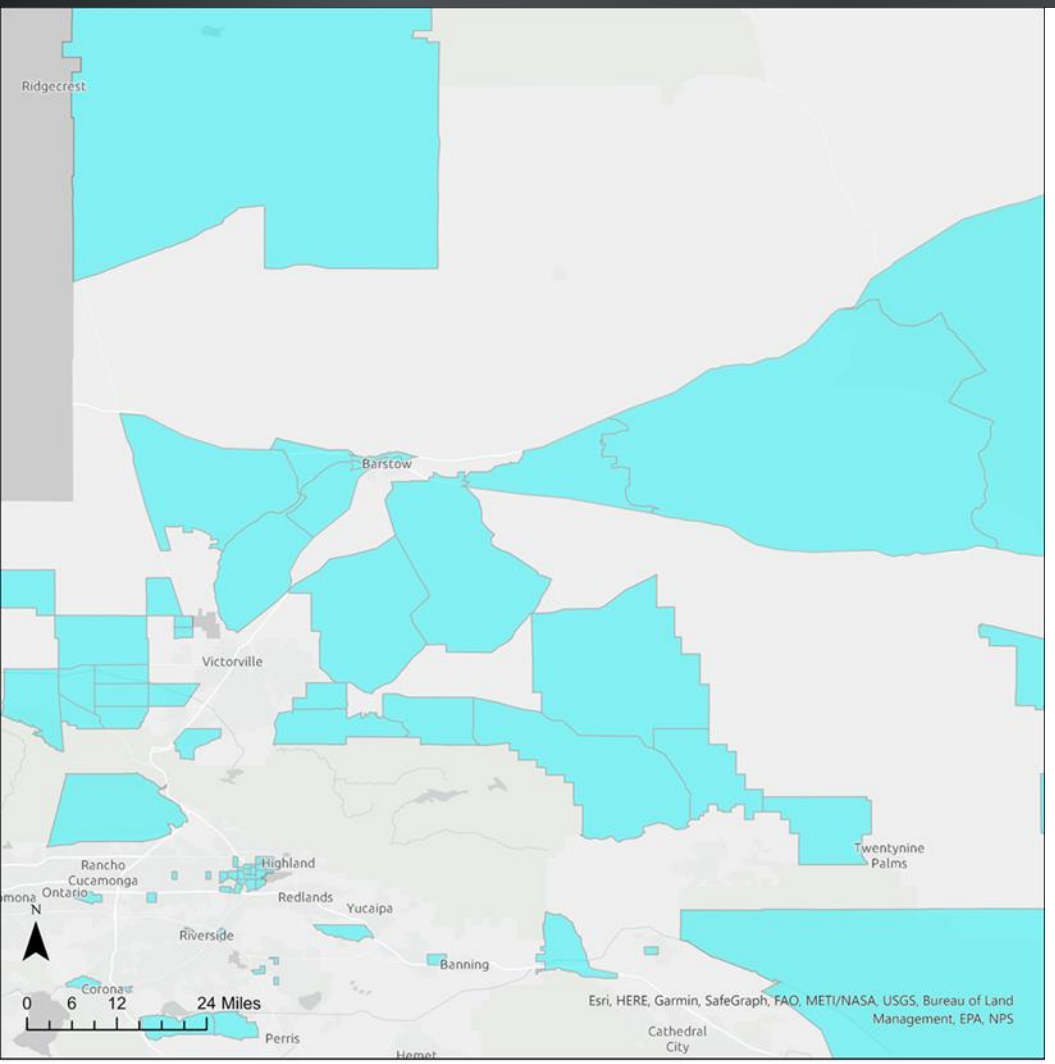
Broadband Adoption Ratio
0.000000 - 0.500000

SCAG Region
South LA/Long Beach

Essential verses Non-essential Workers

- NAICS Code
- 387 Sub-Sectors

Major Sector	Percent Essential
Agriculture	**100%**
Construction	**100%**
Manufacturing	**92%**
Wholesale Trade	**70%**
Retail Trade	**70%**
Transportation and Warehousing	**100%**
Information	**88%**
Finance Insurance Real Estate	**66%**
Professional Scientific and Technical	**52%**
Education	**83%**
Arts Entertainment Recreation	**59%**
Other Service	**57%**
Public Administration	**60%**



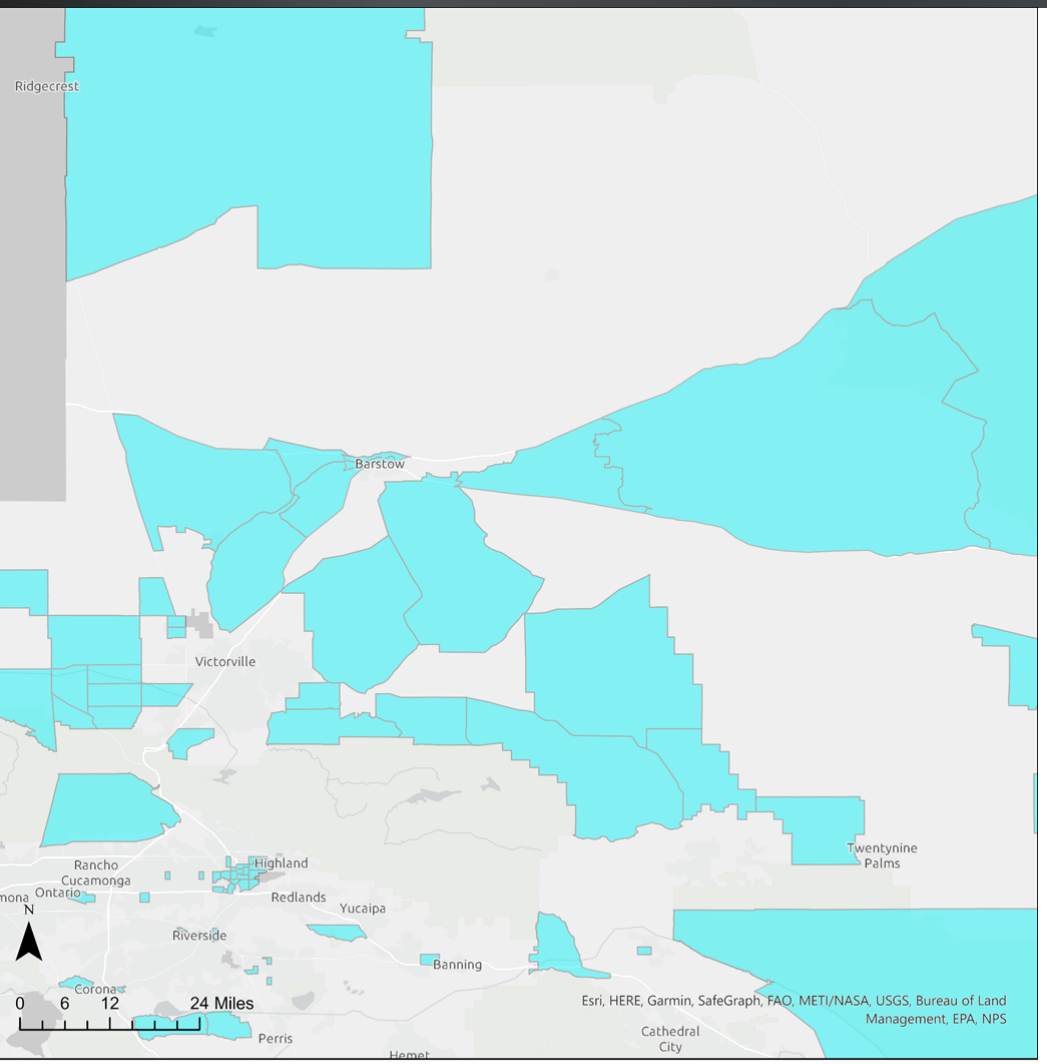
Broadband Scenarios

Shelter in Place Behavior

- StreetLight Data & PeMS Data.
- Shelter-In-Place Orders (closing and reopening periods) during the COVID-19 pandemic. AM / PM Peak Period.
- HBW origin-destination volumes between the Non-Broadband TAZs and all other zones.
- Passenger Vehicles Only

Upper Bound Behavior

- Non-Essential Workers (NAICS Analysis)
- Non-Broadband TAZs and Broadband TAZs
- Passenger Vehicles Only



Broadband Scenarios: 2045

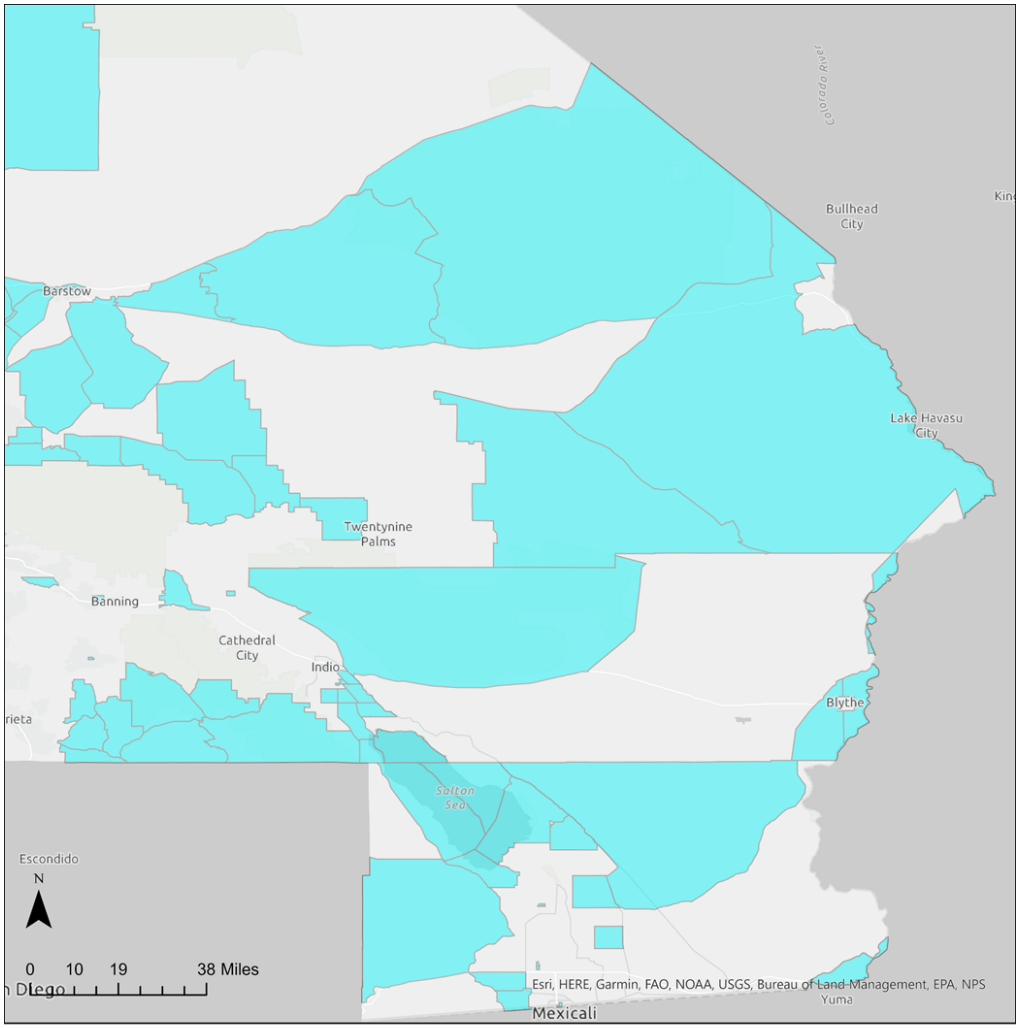
A. Future Baseline - Pre-Pandemic Travel Behavior – SCAG Connect SoCal (RTP/SCS) Preferred Scenario

B. Non-Broadband Expansion Increment – Shelter in Place Behavior: Modified SCAG O-D Trip Matrix

C. Non-Broadband Expansion Increment - Upper Bound Behavior: Modified SCAG O-D Trip Matrix

D. Total Broadband - Upper Bound Behavior (Regionwide): Modified SCAG O-D Trip Matrix
   - Vehicle Miles of Travel (Regionwide)
   - Vehicle Hours of Travel (Regionwide)
   - Volume Difference Plots of SCAG Network

Analysis of Broadband Impacts on VMT and GHG



Broadband Adoption Ratio
0.000000 - 0.500000

SCAG Region
Imperial/Riverside

SCENARIO	TOTAL VMT LDA/LDT	PERCENT CHANGE OF TOTAL VMT	CO2 (TONS PER DAY)	PERCENT CHANGE OF TOTAL CO2
A: 2045 BASELINE	459,090,327	-	164,369	-
B: 2045 NBEI-SIPB	454,523,915	-1.00%	163,009	-0.89%
C: 2045 NBEI-UBB	451,795,887	-1.61%	162,185	-1.43%
D: 2045 TB-UBB	400,444,110	-14.65%	148,397	-11.48%

Broadband Expansion (Scenario B and C): Isolates Increment

- Daily VMT reductions between **4.6** million to **7.3** million (**1 - 2** %) CO_2
- Reduction between **1,360 – 2,184** tons/day (**1 – 1.5**%)

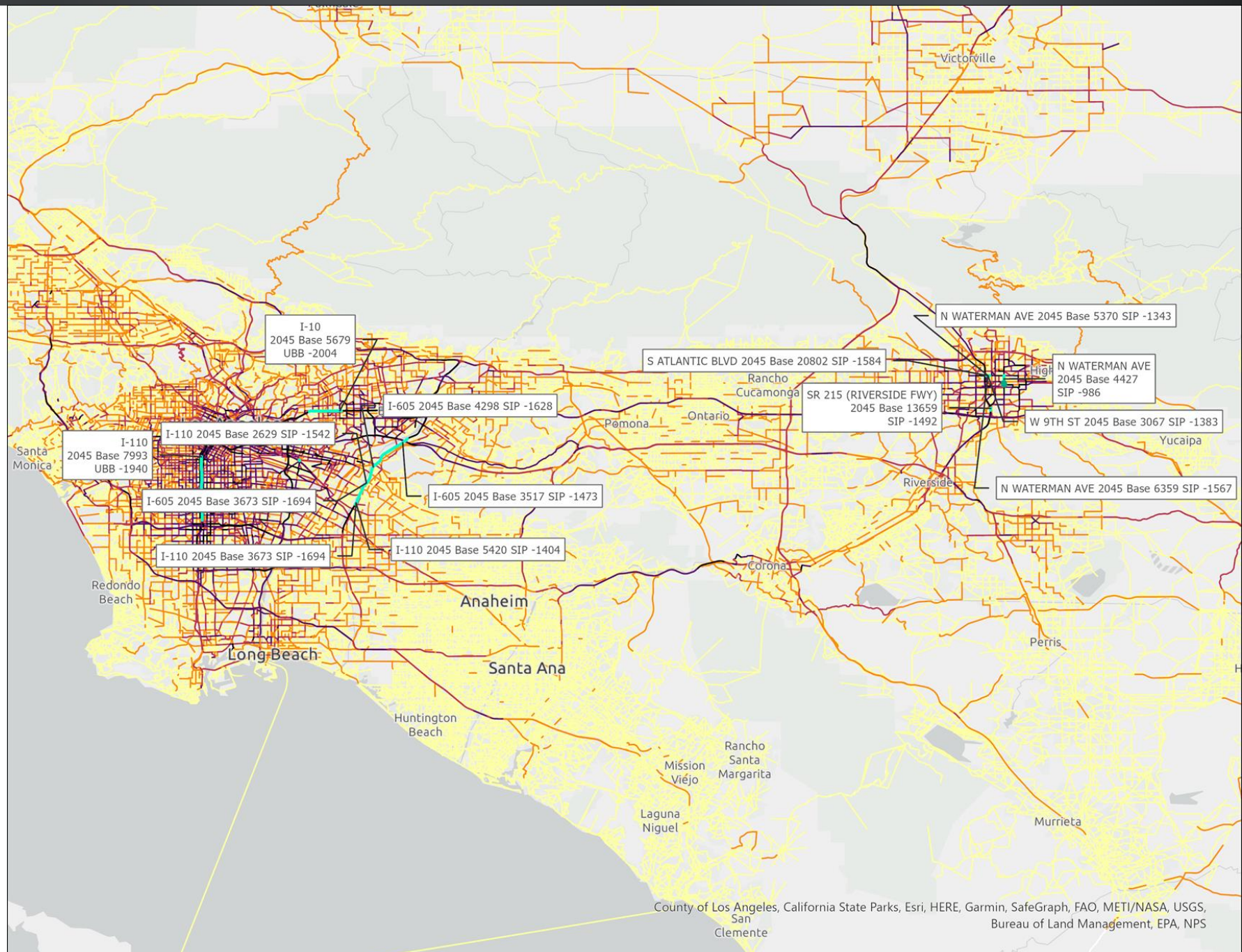
Total Region (Scenario D): All Non-Essential Workers Telecommute

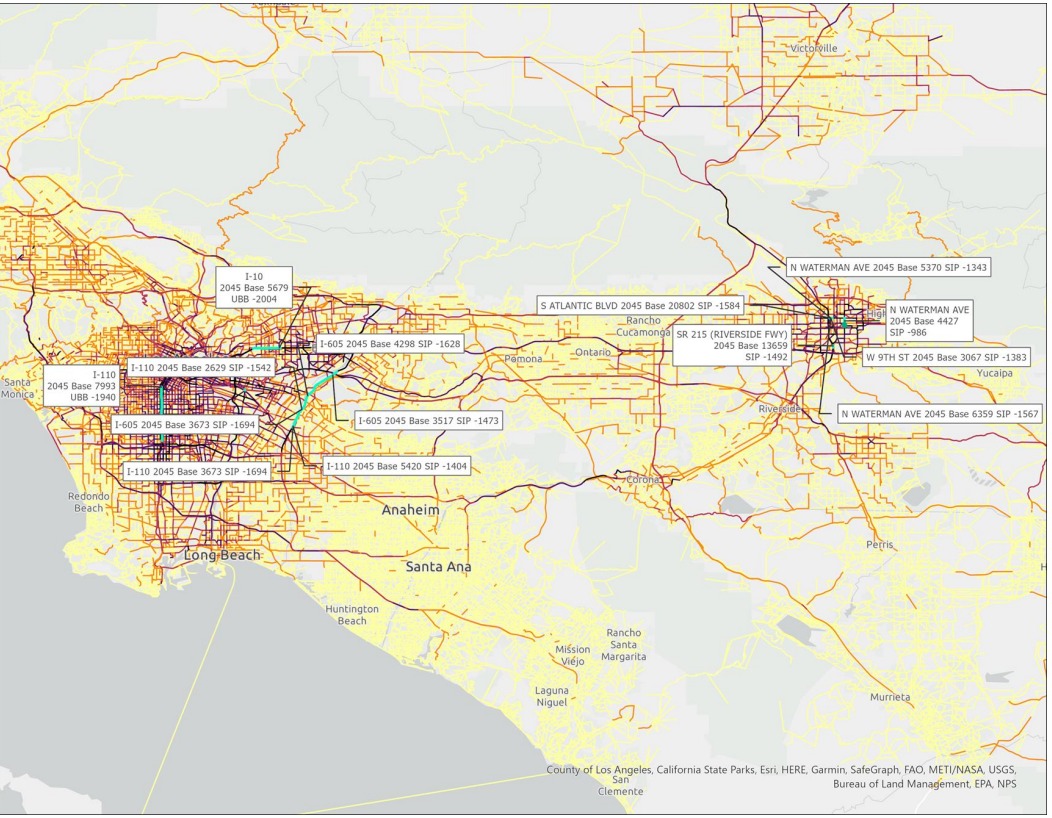
- Daily VMT reductions up to **59** million (**15** % reduction)
- CO2 Reduction of up to **15,972** tons/day (**11.5**% reduction)

Volume Difference Plots

AM/PM Peak Hour Roadway Volumes (Scenario B or C) relative to Connect SoCal RTP/SCS (Scenario A).

Most heavily utilized roadways (shown as green) that serve non-broadband areas (i.e., TAZs)





Analysis of Broadband Impacts on VMT and GHG

Most Benefiting Roadways from Broadband Expansion to Non-Broadband Areas:

- I-10
- I-110
- I-605
- I-710
- SR 215
- SR 91
- SR 72
- SR 42
- North Waterman
- South Atlantic Blvd
- Riverside Dr
- East 7th St
- Figueroa St
- West 120th St

Magellan ADVISORS DKS

For Further Study

Refine Definition of Non-Broadband Areas

- Access / Adoption / Speed
- Apply Continuous Scale vs. Binary
- Finer spatial granularity

Include Additional Trip Purposes and Other Time Periods (Non-Peak Periods)

- Tele-Shopping
- Tele-Health

Reflect Current Academic Research

- UC Davis Research
- USC Research

Analyze Additional Scenario (E) Total Broadband – Shelter-In-Place Behavior

- Anticipated Benefit: Between 2 – 15 % VMT and GHG Emission Reduction
- Connect SoCal (2024 RTP/SCS Update) - contribute to SCAG Region's GHG Emission Targets

Broadband in Transportation Projects

Conduit Installation in Road RoW, per mile

- Full cost: $317,522
- Open trench cost: $54,380
- *Open trench represents approximately 80% savings over full installation*
- Value engineering and other cost reduction tactics notwithstanding

Funding Options

- Capital improvements and other infrastructure
  - Conduit as a protected, standard line item in all projects
  - Means to manage and capitalize on assets
- Development conditioning, joint build, and partnerships
  - Close coordination and customer relations with service providers
- Grants and low-cost loans
- Revenue Generation

Magellan ADVISORS DKS

Conclusions 1

- Broadband use can substitute for travel to significantly impact GHG emissions.
- Including network infrastructure in transportation projects substantially decreases capital expenses and facilitates market entry by broadband providers.
- Non-Broadband Areas (as defined in this study) within the SCAG region have a higher proportion of disadvantage households and a higher percentage of essential workers. Household market of Non-Broadband Areas represent 6% of total households in the SCAG Region in 2045.
- Targeting Non-Broadband Areas (as defined in this study) will reduce VMT and GHG emissions associate with commuting by 1 - 2%. Upper bound benefit for entire region assuming employer telecommuting policies emulate policies during COVID-19 for non-essential workers is 15%.

Conclusions 2

- Close coordination and collaborative planning is necessary to ensure transportation broadband strategies are successful at increasing availability and reducing broadband service costs.
- Increased telecommuting and other uses of broadband to reduce transportation demand depend on public and private policies and programs.
- More complete and detailed data on assets and demand—particularly geo-data—are needed to effectively focus public investment for the greatest impact on VMT and GHG reductions.

Next Steps

Conduct additional research, per “Further Study”

Build on recent state policy changes to promote broadband in transportation planning

- Define the practice of including network infrastructure in planning
- Identify means to promulgate the practice

Establish forums for collaboration between network companies and public officials

- Focus on Development, Planning, and Public Works

Develop programs to increase telecommuting and transformation of essential jobs

- Engage major employers and real estate developers

Questions and Input

Thank you for you input!