APPENDIX

INDICATOR DEFINITIONS AND DATA SOURCES

Daily Vehicle Miles Traveled Per Capita: Daily vehicle miles traveled at the county level is from the California Public Road Data derived from the Highway Performance Monitoring System (HPMS) Data.[1] Only VMT in cities, unincorporated county areas, and state highways are included in the tabulations. VMT occurring in U.S. Army, U.S. Fish and Wildlife, and U.S. Navy/Marines, U.S. Forest Service, State Park Service, National Park Service, U.S. Bureau of Land Management, U.S. Bureau of Reclamation, and Bureau of Indian Affairs are excluded. Per capita figures are obtained by dividing the daily VMT by population estimates from California Department of Finance.

Percentage of Commuters by Driving: The data is from American Community Survey 5-Year Estimates. This is calculated by percentage of commuters by car, truck, or van adjusted by workers per car, which is then added to the percentage of commuters by taxicab, motorcycles, or other means of driving.

Percentage of Commuters by Active Transportation: The data is from American Community Survey 5-Year Estimates. This is calculated by adding the percentage of commuters who walked to work, biked to work, or worked from home. Work from home is grouped under active transportation as work from home and active transportation (walking and biking) are emission-free modes of transportation.

Percentage of Commuters by Public Transit: The data is from American Community Survey 5-Year Estimates.

Public Transit Ridership per Capita: Unlinked passenger trips divided by population. Unlinked Passenger Trips Data is from the Federal Transit Administration's National Transit Database. Transit modes include: bus, trolleybus, vanpool, jitney, demand response service, heavy rail transit, light rail transit, commuter rail including Amtrak, automated gateway transit, inclined plane, cable car, monorail, aerial tramway, and ferryboat.

Density: Population divided by land area with inhabitants. For the purpose of this brief, density is calculated as population divided by the total area in square miles of census blocks in which population is at least one. The data is from the U.S. Census at the census block level.

Alternative Fuel Vehicle Adoption: Alternative fuel passenger vehicles not including medium and heavy duty vehicles classified as GVWR3-8. Alternative fuel passenger vehicles include:

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[1] California Department of Transportation. Highway Performance Monitoring System (HPMS) Data. Available at: https://dot.ca.gov/programs/research-innovation-system-information/highway-performance-monitoring-system

Battery electric vehicles, plug-in hybrid vehicles, hybrid electric vehicles, and natural gas vehicles. The adoption rate is obtained by dividing the number of alternative fuel passenger vehicles registered by total passenger vehicles registered. The data is from California Energy Commission.

Equity (Income): If driving is the default mode of transportation, this calculates the income difference between those who use active transportation relative to car commuters, and those who take public transit relative to car commuters. The raw score is the sum of the absolute value of each sub-category. To obtain specific transportation decision based on income, Beacon relies on the American Community Survey Public Use Microdata Samples, which allows for custom tabulations of data not otherwise available on the data tables published by the U.S. Census.

Equity (Race): For each mode of transportation (active, driving, public transit), take the ratio of racial minorities to non-minorities (whites) to form three raw ratios for each area. A score greater than 1 means racial minorities are more likely than whites to peruse a mode of transportation and vice versa. The indicator score is the standard deviation of the three raw ratios times the weight for the indicator. To obtain specific transportation decision based on income, Beacon relies on the American Community Survey Public Use Microdata Samples, which allows for custom tabulations of data not otherwise available on the data tables published by the U.S. Census.

GRADING RUBRIC

The Transportation Index consists of four categories, which are further divided into fifteen sub-indicators. These indicators and weights are as follows:

Table A1. Rubric for Indicators

Category	Indicator	Weight
Vehicle Miles Traveled	Vehicle miles traveled (VMT) per capita	30%
Vehicle Miles Traveled	VMT per capita improvement over time	5%
Vehicle Miles Traveled	Percentage of commuters by driving	5%
Active Transportation	Percentage of commuters by active transportation	10%
Active Transportation	Percentage of commuters by active transportation improvement over time	5%
Public Transit	Percentage of commuters by public transit	3.3%
Public Transit	Percentage of commuters by public transit improvement over time	1.7%
Public Transit	Public transit ridership per capita	5%
Alternative Fuel Vehicle (AFV)	Battery electric vehicle adoption	4%

Category	Indicator	Weight
Alternative Fuel Vehicle (AFV)	Plug-in hybrid vehicle adoption	2.5%
Alternative Fuel Vehicle (AFV)	Other AFV adoption (hydrogen and natural gas)	1%
Equity: Income	Difference in earnings among active transportation, public transit, and car commuters	12.5%
Equity: Race	Difference in race among active transportation, public transit, and car commuters	12.5%
Density		2%
TOTAL		**100%**

The sub-scores from the indicators are aggregated into one final score, which is then assigned a letter grade, as follows:

Table A2. Grading Rubric

Lower Bound	Upper Bound	Number of Counties
90	100	0
75	90	1
60	75	0
55	60	5
50	55	9
47	50	9
43	47	13
40	43	10
35	40	6
30	35	5
25	30	1
20	25	0
0	20	0

RANKING THE 58 COUNTIES ON TRANSPORTATION SUSTAINABILITY

Overall, dense, urbanized regions with robust infrastructures tend to perform best in transportation sustainability measures. Unsurprisingly, San Francisco County takes the top spot with a score of 81.6 out of 100 while Colusa County finishes at the bottom with just 29.6 points. However, there are a few counties that performed surprisingly well (or poor). For example, Santa Cruz (rank 3), a Central Coast county with a population of under 300,000, performed well across all metrics (except for Equity), especially in Vehicle Miles Traveled (rank 2). By comparison, other Central Coast counties–Monterey County (rank 25) and San Luis Obispo County (rank 36)–scored poorly in many of the same metrics where Santa Cruz County did well. Another county that performed very well is Nevada County (rank 5), a rural county[2] with fewer than 100,000 residents. Nevada County performed exceptionally well in Equity (rank 1) and VMT (rank 7), the two most heavily weighted categories, while also scored reasonably well in Active Transportation (rank 12).

Table A3. Ranking by Indicator for California's 58 Counties

County	VMT	Active Transportation	Public Transit	Alternative Fuel Vehicle	Equity	Density	Total
Alameda	17	21	3	3	6	4	4
Alpine	58	7	53	48	42	58	54
Amador	37	22	56	40	42	40	45
Butte	14	25	26	33	53	26	41
Calaveras	3	14	39	35	42	43	18
Colusa	55	48	51	49	55	49	58
Contra Costa	8	32	4	7	22	5	7
Del Norte	34	29	41	39	31	37	40
El Dorado	21	17	32	18	26	27	22
Fresno	27	50	20	29	51	20	42
Glenn	51	30	48	53	55	47	57
Humboldt	33	16	37	19	30	41	27
Imperial	49	44	33	55	54	35	55
Inyo	57	15	40	37	42	57	53
Kern	35	58	27	32	52	21	50

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[2] Based on the definition of the Rural County Representatives of California: https://www.rcrcnet.org/counties

County	VMT	Active Transportation	Public Transit	Alternative Fuel Vehicle	Equity	Density	Total
Kings	38	31	15	36	25	22	34
Lake	29	8	43	31	39	38	31
Lassen	50	38	52	58	31	52	52
Los Angeles	10	37	7	10	38	3	15
Madera	39	56	45	34	29	36	47
Marin	42	10	6	2	21	12	11
Mariposa	41	3	38	42	42	50	32
Mendocino	47	18	56	24	39	45	44
Merced	28	56	29	41	24	28	37
Modoc	53	5	58	57	31	55	48
Mono	52	6	5	47	42	54	39
Monterey	24	40	18	26	20	29	25
Napa	12	28	17	11	8	32	12
Nevada	7	11	42	25	1	31	5
Orange	9	36	14	6	50	2	16
Placer	11	23	34	15	16	16	14
Plumas	32	27	45	54	31	48	43
Riverside	25	49	25	23	19	11	26
Sacramento	18	35	13	20	3	7	10
San Benito	36	54	44	22	18	42	35
San Bernardino	19	46	21	27	17	17	23
San Diego	22	26	10	13	36	9	21
San Francisco	1	4	1	4	7	1	1
San Joaquin	16	52	24	28	9	15	20
San Luis Obispo	44	20	23	16	49	34	36
San Mateo	20	33	2	5	11	6	6
Santa Barbara	6	19	12	17	27	23	13
Santa Clara	4	34	8	1	5	8	2

County	VMT	Active Transportation	Public Transit	Alternative Fuel Vehicle	Equity	Density	Total
Santa Cruz	2	9	11	8	28	13	3
Shasta	40	39	35	38	41	39	46
Sierra	56	2	54	56	1	53	17
Siskiyou	54	13	49	52	31	51	51
Solano	45	52	16	21	12	10	28
Sonoma	23	24	19	9	4	19	9
Stanislaus	13	51	31	30	13	18	24
Sutter	30	43	30	44	14	24	30
Tehama	48	40	54	51	55	44	56
Trinity	43	1	49	50	55	56	38
Tulare	15	55	36	43	23	30	33
Tuolumne	46	45	47	45	42	46	49
Ventura	5	40	22	14	10	14	8
Yolo	31	12	9	12	37	25	19
Yuba	26	47	28	46	14	33	29

INDICATOR PERFORMANCE EVALUATION

With the exception of the equity indicators, scores are awarded based on a curve relative to the best performing county in each indicator, such that the best performing county receives a full score and so on. For indicators that do not measure changes over time, the score is equal to:

Indicator score$_{(county, indicator)}$ = (raw score$_{(county, indicator)}$/raw score of county with best performance$_{(indicator)}$)^0.5 * indicator weight

For indicators that measure changes over time, the score is pro-rated to the percentage change of the county with the best improvement over time. A county receives an automatic score of zero for an indicator if there is no improvement over time.

For equity indicators, the score is calculated as one minus the sum of the standard deviations of each sub-component by mode of transportation times the indicator weight. This means a full score is awarded if and only if the sum of standard deviations is equal to zero.