Economic Analysis

BBVA U.S. 2020 MSA Sustainability Index

Adrian Casillas
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America's urban centers were once ecosystems in and of themselves. Existing as an independent system agnostic of events beyond the city limits meant that a sustainable metropolitan area was something more akin to subsistent. The criteria for sustainability were mostly defined by public sanitation, traffic congestion, access to clean air and potable water and anticipated room for growth while maintaining wellbeing. Although these standards remain and have grown in complexity along with their metropolis, the object of modern sustainability is no longer just the city but its relationship to neighboring urban and rural areas and a global environmental system. Warnings from the majority of ecologists and climate scientists, both a perceived and realized increase in the size and frequency of natural disasters and changing consumer preferences have redefined the object of sustainability. First and foremost, sustainability in the twenty-first century is an act of prevention focused on an amorphous future threat, and, secondly, it is defensive in response to these threats manifesting against the city's citizens and ecosystems.

At face-value, the climate crisis is the threat of resource stress. Governments and the private sector will have to invest in addressing existing and potential risks to wellbeing and access to goods and services. For example, the increased frequency and severity of natural disasters puts arid or coastal cities in danger of property damage. According to the South Texas Economic Development Center, Hurricane Harvey, which hit the Texas Gulf Coast during the summer of 2017, resulted in the destruction of 23,650 business establishments in Harris County alone or 15% of its businesses[1]. The cost of climate change extends beyond realized damages.

In April 2017, BBVA Research released, *Risks and Opportunities in Climate Change: Financing the green economy*, in which holistic effects of a climate catastrophe were considered. In this paper, the threat of holding stranded assets was highlighted which consists of two factors: depreciation from the threat of physical damage to assets; and depreciation from the inevitable implementation of regulation. A business strategy which considers sustainability must care about preventative measures taken against the threat of climate change in addition to individual exposure which result from the threat of changing conditions.

Growing interest in the field of sustainability follows not just from the existential threats implied by climate collapse but also from an opportunity to invest in the restructuring of affected industries and regions. Research and development of sustainable goods and services represent investments into both the public and private sectors. It is for this reason that a quantifiable estimate of the U.S.'s most sustainable metropolitan areas would be of interest. It is estimated[2] that in order to meet the sustainability standards in the UN's SDG 11, U.S. cities will require around $12tn in total financing across all sectors for which the gap between public financing and necessity can be picked up by private ventures. Of particular interest, $3.3tn is needed for energy, which currently sits at a $100bn investment gap; $469bn is needed for rail transit which has a $116bn gap; $6.8tn is needed for roads which has a $3.4tn gap; and $198bn is needed for

1: https://stedc.atavist.com/harvey-economic-aftermath
2: AIDDATA. 2019. *"Counting the Costs: Supporting Sustainable Urbanization to Achieve SDG 11."* http://docs.aiddata.org/ad4/pdfs/UN_HABITAT_2019_Discussion_Paper.pdf

water systems which currently has a $1.7bn investment gap. Moreover, sustainability is coincident with attractive features. Improvements in mobility and citizen health and welfare pressures companies which employ specialists to consider these cities for office locations and operations.

Table 1. **Top 10 and Bottom 10 Large MSAs by Sustainability Ranking** (Population greater than 500,000)

Overall	MSA	Overall	MSA
1	Sacramento--Roseville--Arden-Arcade, CA	101	Fayetteville-Springdale-Rogers, AR-MO
2	Modesto, CA	102	St. Louis, MO-IL
3	Boise City, ID	103	Indianapolis-Carmel-Anderson, IN
4	Stockton-Lodi, CA	104	Worcester, MA-CT
5	Denver-Aurora-Lakewood, CO	105	Scranton-Wilkes-Barre-Hazleton, PA
6	Fresno, CA	106	Cape Coral-Fort Myers, FL
7	San Francisco-Oakland-Hayward, CA	107	Atlanta-Sandy Springs-Roswell, GA
8	Austin-Round Rock, TX	108	Cincinnati, OH-KY-IN
9	San Jose-Sunnyvale-Santa Clara, CA	109	Providence-Warwick, RI-MA
10	Akron, OH	110	Pittsburgh, PA

Source: BBVA Research

Table 2. **Top 10 and Bottom 10 Small MSAs by Sustainability Ranking** (Population less than 500,000)

Overall	MSA	Overall	MSA
1	Madera, CA	261	Amarillo, TX
2	Chico, CA	262	Altoona, PA
3	Visalia-Porterville, CA	263	Beckley, WV
4	Green Bay, WI	264	Kingsport-Bristol-Bristol, TN-VA
5	Yuba City, CA	265	Flint, MI
6	Carson City, NV	266	Fairbanks, AK
7	Merced, CA	267	Lubbock, TX
8	Santa Cruz-Watsonville, CA	268	Texarkana, TX-AR
9	San Luis Obispo-Paso Robles-Arroyo Grande, CA	269	Odessa, TX
10	Boulder, CO	270	Midland, TX

Source: BBVA Research

The BBVA U.S. MSA Sustainability Index evaluates a metropolitan area's relative sustainability according to two hundred and twenty factors which are condensed into five categories: greenhouse gas emissions; ecological risks to capital and labor; energy production and consumption; air quality; and use of water and land. These factors were chosen as to describe an area's current position, its unique vulnerabilities, and its realized effort in achieving sustainability standards. As the topic of sustainability is a reciprocal system, the index was populated and calculated in such a way as to avoid the issues of double-jeopardy and collinearity across its variables. In the relative ranking of 380 U.S. Metropolitan Areas, the Madera, Sacramento and Chico, CA metropolitan statistical areas are identified as the three most sustainable, whereas Pittsburgh, PA and Odessa and Midland, TX are the least sustainable MSAs.

1. Defining and Quantifying Sustainability

Researchers who have taken up the task of quantifying sustainability recognize that it is only ever understood when it describes a field of study. “Sustainability” is a reference to features in economics, politics, ecology or culture. Each of these and their intersections are valid frameworks for understanding citizen wellbeing. This in-house index mostly focuses on the intersection of economic and ecological wellbeing, as they are most relevant to understanding investment into a city’s resources and are the most quantifiable.

Within the scope of economic-ecological sustainability, five classes of variables were drawn out: greenhouse gas emissions; ecological risks to capital and labor; energy production and consumption; air quality; and use of water and land. These variables were chosen not only because of their association with ecology, but because of their stand-in for underlying features of city sustainability and their ability to be quantified with little bias[3]. Analysis at the country-level is well covered, yet the amount of analysis trails off at smaller disaggregations. In recent years, The Economist’s Intelligence Unit has coupled its resources with the Siemens Institute to create Green City Indexes by major geographies whose components this analysis considered in the variable selection[4]. Yet, this and similar indexes rely on experts to grade more complex inputs like local government policies; which, our index seeks to quantify in terms of change in emissions, energy sources and quality of air and water.

As with existing models, our index begins with straight-forward inputs such as emission weights or concentrations and transforms them in order to describe features of a sustainable city which may otherwise be buried in the variables themselves. Take greenhouse gas emissions as an example. This category summarizes emissions by emitter type. A distinction is made between carbon dioxide released by personal vehicles and public transit. Thus, by normalizing these two variables against the same denominator, say per capita or emitter, we can describe how much less utilized a city’s public transit system is than its reliance on personal vehicles and compare this feature between cities. The variance between MSAs will likely capture information about funding and availability of public transit along with other features such as income distribution, how spread out the population is and ease of mobility. Transforming and layering factors within these classes will result in rankings which describe sustainability more thoroughly than as a summary of greenhouse gas emissions[5].

2. Methodology

Data on carbon dioxide emissions was gathered from the University of Arizona’s Vulcan Project[6], and non-carbon dioxide greenhouse gas data was gathered from the U.S. Environmental Protection Agency (EPA)[7]. Carbon dioxide emission data is partitioned between emissions originating from airports, cement, commercial marine vessels, commercial activity, electricity production, industrial activity, non-road vehicles, on-road transit and personal vehicles, railroads, and residencies. Variables which originated from a vehicle were normalized against the count of said

3: FEEM. 2013. *“Quantifying Sustainability: A New Approach and World Ranking.”* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2200903
4: The Economist. 2009. *“European Green City Index.”* https://assets.new.siemens.com/siemens/assets/api/uuid:fddc99e7-5907-49aa-92c4-610c0801659e/version:1561969692/european-green-city-index.pdf
5: Handbook of Sustainable Management. 2012. *“Sustainability Indicators and Indices: An Overview.”* http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.660.2820&rep=rep1&type=pdf
6: http://vulcan.rc.nau.edu/Data.html
7: https://aqs.epa.gov/aqsweb/documents/data_api.html

vehicles or vehicle capacity in the MSA provided by the Bureau of Transportation Statistics[8]. All other variables were normalized against the number of commercial, industrial or residential buildings in an MSA or per capita from figures provided by the U.S. Census Bureau[9].

Estimates of capital and labor damage caused by climate change and resource stress was aggregated by the Global Policy Lab[10]. This initiative describes the impact of climate change on production by sector, the size of the labor force, the cost in human lives and the expected cost of income per decile of earners in each area. Production data is combined with in-house expected long-run output growth of each MSA.

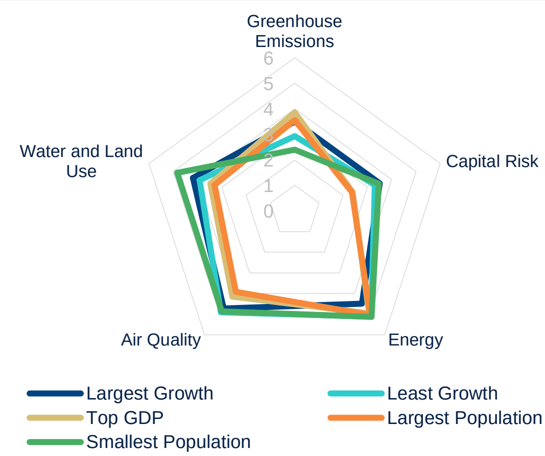
Energy generation and consumption was gathered from the U.S. Energy Information Administration[11]. Based on annual power plant production and MSA energy consumption data, each MSA's ratio of renewable to non-renewable energy consumed is estimated. Special consideration is given to the direction of this ratio annually over the past five years and whether it can reliably describe a shift towards consuming more renewable energy.

Information on air quality, water and land use are gathered from the EPA[12]. In order to reduce collinearity between greenhouse gas emissions and air quality, only non-greenhouse gas pollutants are considered under air quality. Moreover, their concentrations are regressed against all greenhouse gases in order to retrieve the variance in the concentration of pollutants independent of greenhouse gas emissions that could come from industrial production or individual energy consumption. Water and land use track the toxicity of each within an MSA. This class of factors also considers how land and water sites are classified and how they are available for use by citizens.

Figure 1.1. **MSA Sustainability Scorecard**

Source: BBVA Research

Figure 1.2. **Scorecard by Major Category**



Source: BBVA Research

8: https://www.bts.gov/browse-statistical-products-and-data
9: https://www.census.gov/programs-surveys/metro-micro.html
10: http://www.globalpolicy.science/research
11: https://www.eia.gov/electricity/data.php
12: https://www.waterqualitydata.us/portal/

Once the factors are normalized, transformed and layered, they are reduced into their principal components via PCA. In essence, the variables are described as the independent underlying features which describe the variance within and between each other. Each observation's loadings are weighted by the eigenvalues (roughly, a scalar corresponding to importance) of the decomposition and summed to create a category's score. An MSA's average score between all variables is used in order to determine its final ranking.

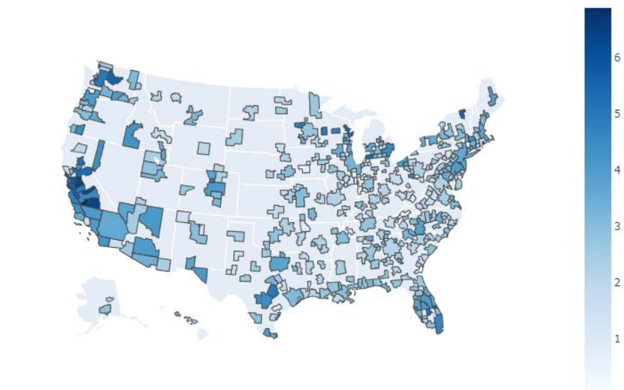
3. Results

The final scoring describes the following features of each category and how patterns can be interpreted in the context of geography, demographics and the structure of industry and governance.

The **greenhouse gas emission** score rewards MSAs with better emitter efficiency. The highest scores are concentrated in the Western United States and the Pacific Coast. The Midwest fares poorly in terms of emissions. This is likely due to newer infrastructure or having the funding available to upgrade infrastructure. Newer cities seem to score well because they have access to infrastructure with more efficient standards. More productive cities on the East Coast seem to also score well, perhaps as a result of a focus on upgrading older technologies. It is less likely that a stagnant Midwestern MSA, struggling with the pressures from globalization and technological change would have had the political will to invest in infrastructure in the last three decades as the political incentives focus on the very short-term. This short-sightedness from policymakers and other stakeholders has led to a more pronounced carbon footprint, making the adjustment cost more urgent and probably more expensive. Additionally, as these variables track emissions from energy consumption, MSAs which rely on cleaner energy sources will see an improved score. Appalachia and West Texas fare poorly in this category likely due to their concentrated production and consumption of coal and oil respectively.

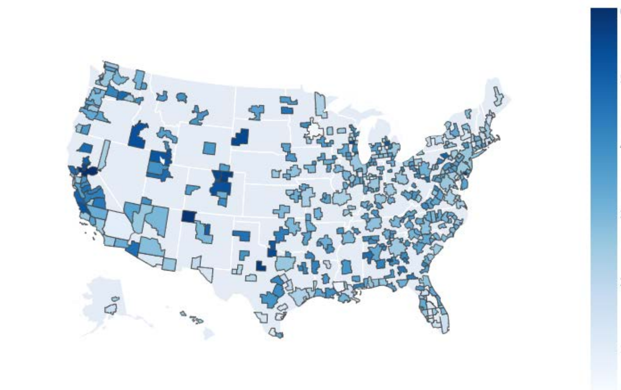
Risks to capital and labor increase relative to industry exposure and geography. Unsurprisingly, MSAs along the Atlantic and Gulf Coasts tend to suffer in this category, as tropical storms and hurricanes are expected to increase in frequency and severity as global temperatures rise. For the most part, the Pacific Coast ranks well, as it is not exposed to the threat of tropical storms due to water temperature and the convection and direction of storms which are generated off the Pacific Coast. Yet, Southern California and its adjacent arid areas rank lower in terms of capital and labor risk due to the realized threat of wildfires in the region. In terms of extreme weather phenomena, regions with a prior exposure to natural disasters resulting from heat or moisture will feel the brunt of climate change. The jury is divided on other events like the frequency and intensity of tornadoes, but climate change's effect on moisture can lead to greater damage from blizzards in the winter. MSAs with higher crime rates and civil unrest are also docked, as they have less capacity for an increase in resource stress caused by environmental conditions or a growing population caused by emigrants from neighboring affected areas.

Figure 2. **Greenhouse Gas Emission Score**



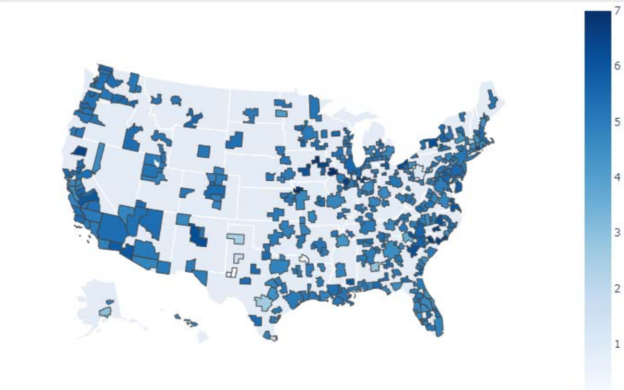
Source: BBVA Research

Figure 3. **Capital and Labor Risk Score**



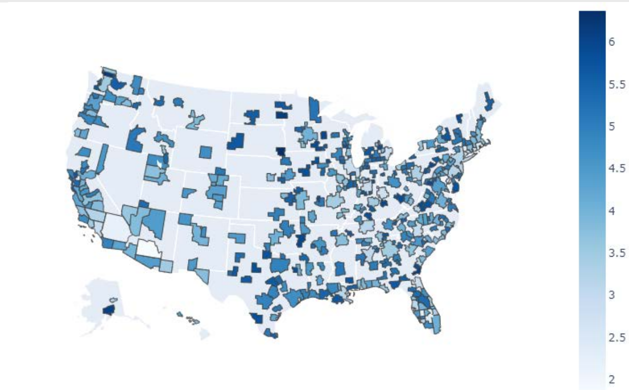
Source: BBVA Research

Figure 4. **Energy Score**



Source: BBVA Research

Figure 5. **Combined Air, Water and Land Score**



Source: BBVA Research

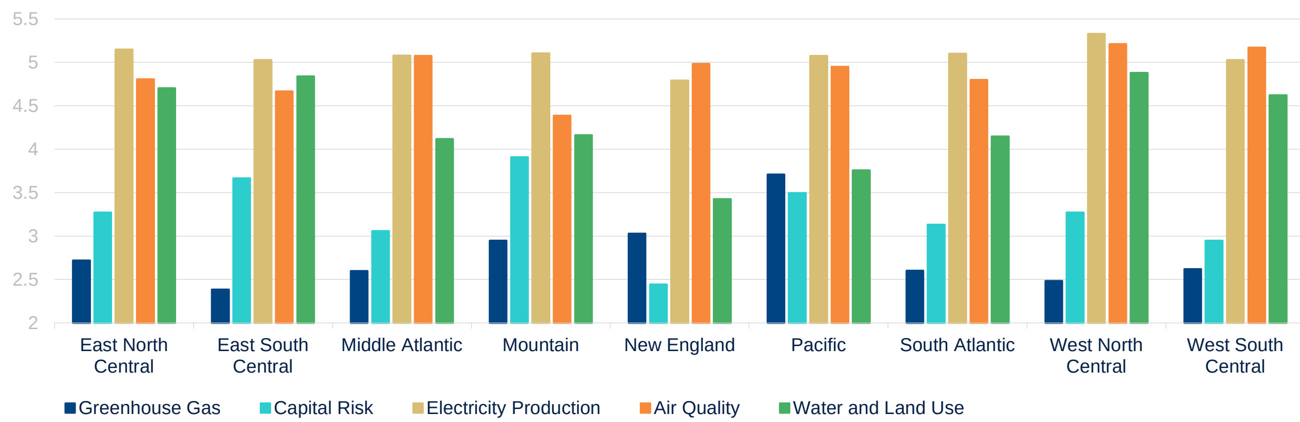
The **Energy** variable has the lowest variance among the index's components. Access to renewable or non-fossil fuel energy is available across the country; though the type of energy and its capacity depends greatly on geography. Large hydroelectric projects are concentrated in the Pacific Coast along with geothermal and solar farms. The majority of wind farms are located in the central region, and the most common form of non-fossil fuel electricity generation in the eastern part of the country is nuclear energy. Once again, the cradles of the United States' fossil fuel production, West Texas, Appalachia, and the Bakken formation, are docked in this category. Variance between MSAs mostly comes from implied consumption figures of sustainable energy for which no region in particular stands out.

In looking at a combined **air quality and water and land use** score, a few patterns crop up. MSAs in the eastern region largely benefit from water use and conservation. Arid cities like those adjacent to the Mojave and Sonoran Deserts and those with poor and outdated water infrastructure currently face resource stress from a lack of potable water. Denser MSAs also suffer from poor air quality and poor zoning laws, which restrict citizen access to resources and mobility[13].

An MSA's sustainability should be considered per category and between two or more categories. Special insights might be gleaned from seeing that a city excels in one category over another or that, with respect to one category, it compares a certain way with its neighbors. Moreover, grouping MSAs by certain features and comparing their performance may reveal relationships between those features and sustainability. These observations are more useful than the more arbitrary, "this MSA is the most sustainable according to this ranking."

Based on census geographic subdivisions, MSAs on the Atlantic coast underperform in almost every category as compared to other regions. These MSAs suffer from their exposure to natural disasters and the long-term consequences of climate change in tandem with poor urban planning and development which has resulted in poor air and water quality, and poor use of water and land.

Figure 6. **2020 MSA Sustainability Ranking by Geographic Subdivision**



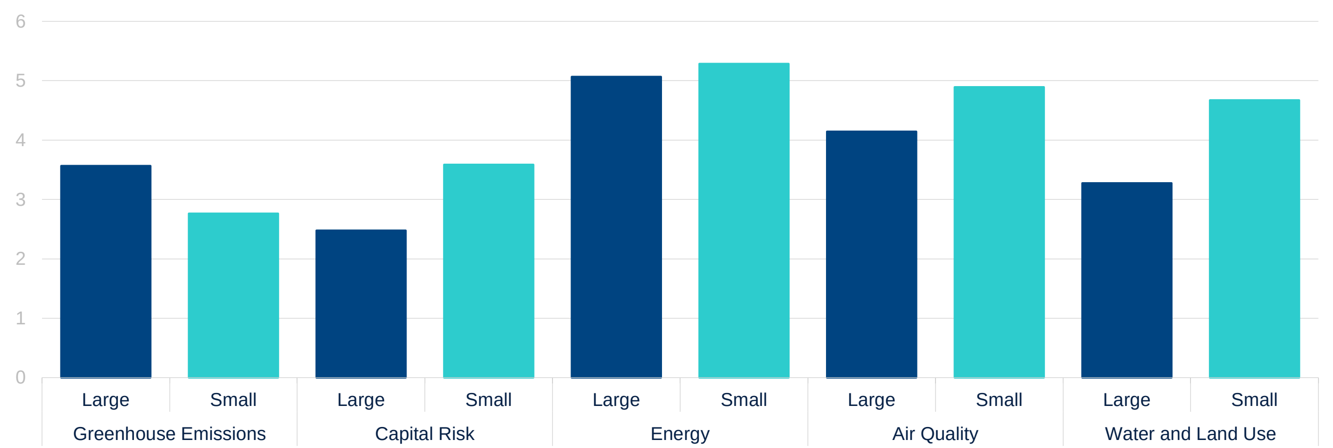
Source: BBVA Research

Grouping MSAs by economic and population patterns produces some unexpected results. MSAs with the highest GDP growth rate seem to outperform those with the least in almost every category. This may be the result of a few underlying relationships. Perhaps short-term economic growth does not come at the expense of sustainability. Perhaps economic development is not in complete contrast with features of sustainability, but, rather, economic growth may equally encourage development of sustainable systems like novel water and waste treatment and public transit. Alternatively, these cities may have built their economies based on more sustainable and faster growing industries rather than relying just on their endowment of natural resources, or the investments in sustainability have allowed them to attract talent and businesses that have led to faster economic growth.

The largest economies outperform in terms of greenhouse gas emissions. However, greenhouse gas emissions and efficiency do not always scale with population. For example, New York City has seen a decrease in greenhouse gas

13: CEP. 2019. *"Dirty Density: Air Quality and the Density of American Cities."* http://cep.lse.ac.uk/pubs/download/dp1635.pdf production since 2005 in contrast to growing economic activity and population[14]. The largest cities, both in terms of population and GDP, do severely underperform in terms of risks to capital and labor. Many of the largest cities are coastal which poses an obvious threat as compared to less compromised and smaller MSAs in the Great Plains, Midwest and Rocky Mountains. Moreover, larger MSAs may not be able to handle the strain on resources given migration of residents from affected areas.

Figure 7. **2020 MSA Sustainability Ranking by MSA Size**



Source: BBVA Research

Additional considerations

The index major caveat is on prospective sustainability. Since the object of sustainability is future wellbeing, we stand to place a greater amount of emphasis on the potential of an MSA to become more sustainable. The only category which is explicitly prospective is capital risk. Otherwise, trends in underlying variables are used as a proxy of future states in the absence of policy changes. One might improve this by including indicators of ongoing and planned developments in an MSA, including government policies and private sector participation; however, this comes at a relatively large risk of introducing more bias to the model, as these initiatives would have to be measured relative to their probability of being enacted and their expected contribution towards overall sustainability. Therefore, the ability to forecast an MSA's sustainability potential requires an understanding of its political context, the efficacy of policy or environmental innovation and the degree of private sector involvement.

14: City of New York. 2016. *"Inventory of New York City Greenhouse Gas Emissions in 2016."* https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/GHG%20Inventory%20Report%20Emission%20Year%202016.pdf

4. Summary

According to our results, the MSA sustainability index points to the Midwest as being the least sustainable. Old infrastructure and limited capacity means that public and private bodies will likely be in search of investors in order to maintain wellbeing. These factors also work conversely in highlighting promising prospects on the Pacific Coast. Existing infrastructure, resources and capacity and protection from climate collapse contribute in making this the most sustainable region in the U.S.

The goal of classifying and quantifying the sustainability conditions of any region should be to maintain an open dialogue between the community, businesses and policymakers, design smart incentives, and make efficient investment allocations. Areas which succeed in meeting the rising standards of sustainability in the twenty-first century likely represent the forbearers of resource management and governance in the near-future. With a current estimated financing gap of $3.8tn required between all U.S. cities to meet the UN's SDG 11 sustainability standards, most MSAs stand to receive private funding in order to maintain citizen wellbeing. Investments in MSAs are also more likely to attract cutting-edge industries and top talent, thereby increasing their potential growth and the living standards of their population. Likewise, those which have fallen behind do not necessarily represent risky ventures but an opportunity to meet pressing issues, which communities will have to address sooner rather than later if they are to avoid ecological, infrastructure and financial stress, as well as business and population outflows.

Table 3 **Overall MSA Ranking**

Overall	MSA	Greenhouse Gases	Capital Risk	Energy	Air Quality	Water and Land Use
1	Madera, CA	5	46	73	242	153
2	Sacramento--Roseville--Arden-Arcade, CA	14	1	95	131	294
3	Chico, CA	16	22	55	157	192
4	Modesto, CA	2	70	279	271	269
5	Visalia-Porterville, CA	3	39	106	358	228
6	Green Bay, WI	12	61	83	54	241
7	Yuba City, CA	39	6	31	249	116
8	Boise City, ID	37	12	63	26	211
9	Carson City, NV	22	15	126	297	19
10	Merced, CA	20	32	35	156	219
11	Santa Cruz-Watsonville, CA	4	342	198	45	104
12	San Luis Obispo-Paso Robles-Arroyo Grande, CA	34	14	86	5	376
13	Boulder, CO	17	20	98	319	222
14	Hanford-Corcoran, CA	1	325	217	322	163
15	Burlington-South Burlington, VT	11	244	120	17	90
16	Stockton-Lodi, CA	6	87	301	243	296
17	Wenatchee, WA	10	230	59	112	60
18	St. Cloud, MN	23	72	52	57	128
19	Salinas, CA	24	24	289	6	364
20	Denver-Aurora-Lakewood, CO	44	13	46	150	255
21	Fresno, CA	29	43	23	338	291
22	Logan, UT-ID	67	17	115	94	94
23	Sebastian-Vero Beach, FL	8	269	66	102	318
24	Saginaw, MI	84	18	127	185	6
25	Fond du Lac, WI	123	7	125	97	34
26	Kalamazoo-Portage, MI	13	332	74	142	185
27	Kennewick-Richland, WA	53	27	85	281	246
28	San Francisco-Oakland-Hayward, CA	7	268	340	144	85
29	Eau Claire, WI	21	324	196	53	29
30	Wausau, WI	25	320	39	64	164
31	Austin-Round Rock, TX	19	66	355	161	168
32	San Jose-Sunnyvale-Santa Clara, CA	9	138	350	303	237
33	Waterloo-Cedar Falls, IA	218	146	3	109	27
34	Sebring, FL	15	270	50	92	317
35	Abilene, TX	215	4	57	175	5
36	Wheeling, WV-OH	27	73	229	334	135
37	Wichita Falls, TX	193	10	64	177	13
38	Akron, OH	50	140	94	108	154
39	Warner Robins, GA	54	40	281	229	65
40	Medford, OR	31	105	144	258	254
41	Davenport-Moline-Rock Island, IA-IL	178	237	2	40	275
42	Fayetteville, NC	117	242	6	143	155
43	Fort Collins, CO	58	9	309	320	233
44	Rapid City, SD	221	8	104	118	36
45	Redding, CA	308	26	11	117	212

Table 3 **Overall MSA Ranking (cont.)**

Overall	MSA	Greenhouse Gases	Capital Risk	Energy	Air Quality	Water and Land Use
46	St. Joseph, MO-KS	258	183	1	251	32
47	Dubuque, IA	76	81	111	182	9
48	Tyler, TX	126	59	133	16	88
49	State College, PA	213	41	82	14	79
50	Cleveland-Elyria, OH	48	257	13	332	354
51	Vineland-Bridgeton, NJ	207	3	248	276	110
52	Spartanburg, SC	90	184	18	341	138
53	Gainesville, GA	63	123	155	195	130
54	Napa, CA	189	37	130	21	115
55	York-Hanover, PA	92	154	28	135	273
56	Killeen-Temple, TX	102	55	316	30	105
57	Santa Maria-Santa Barbara, CA	74	278	65	2	310
58	Hattiesburg, MS	184	141	25	166	20
59	Lawton, OK	163	19	128	293	134
60	Raleigh, NC	94	235	15	241	292
61	Yuma, AZ	187	30	24	311	281
62	La Crosse-Onalaska, WI-MN	124	120	87	98	72
63	Madison, WI	81	174	105	49	220
64	Oshkosh-Neenah, WI	32	328	197	215	119
65	Flagstaff, AZ	40	234	60	325	190
66	Yakima, WA	100	50	131	186	201
67	Cedar Rapids, IA	224	207	10	93	225
68	Gadsden, AL	98	52	121	291	171
69	Gulfport-Biloxi-Pascagoula, MS	148	44	269	68	91
70	Anniston-Oxford-Jacksonville, AL	127	56	233	222	43
71	Portland-Vancouver-Hillsboro, OR-WA	49	250	107	124	268
72	Grand Rapids-Wyoming, MI	83	137	334	33	93
73	Bend-Redmond, OR	69	161	164	198	186
74	Huntsville, AL	72	108	89	296	290
75	Burlington, NC	89	136	159	197	107
76	Racine, WI	196	25	124	269	121
77	Sherman-Denison, TX	73	99	319	233	111
78	Rochester, NY	78	353	16	88	264
79	Salisbury, MD-DE	227	155	27	140	18
80	Seattle-Tacoma-Bellevue, WA	18	271	103	360	263
81	Hot Springs, AR	134	79	135	188	63
82	Milwaukee-Waukesha-West Allis, WI	65	75	273	116	366
83	Trenton, NJ	35	222	258	288	284
84	Salem, OR	129	169	81	37	266
85	Lewiston-Auburn, ME	77	345	68	42	95
86	Dothan, AL	197	83	90	65	165
87	Provo-Orem, UT	103	29	304	280	274
88	Valdosta, GA	259	38	51	172	37
89	Cleveland, TN	156	96	142	192	22
90	Virginia Beach-Norfolk-Newport News, VA-NC	132	334	21	67	188

Table 3 **Overall MSA Ranking (cont.)**

Overall	MSA	Greenhouse Gases	Capital Risk	Energy	Air Quality	Water and Land Use
91	Greeley, CO	257	5	256	136	285
92	Muncie, IN	209	60	134	125	23
93	San Diego-Carlsbad, CA	36	326	282	145	174
94	Utica-Rome, NY	185	177	165	10	143
95	Santa Rosa, CA	347	28	58	4	286
96	Bangor, ME	57	352	116	61	100
97	Florence, SC	244	228	4	314	236
98	Mount Vernon-Anacortes, WA	271	145	207	3	101
99	Rome, GA	115	74	80	333	247
100	Monroe, MI	105	104	102	262	306
101	Ogden-Clearfield, UT	234	16	253	310	158
102	Hagerstown-Martinsburg, MD-WV	195	131	49	248	40
103	Toledo, OH	174	204	22	245	282
104	Ann Arbor, MI	116	168	251	128	97
105	Eugene, OR	147	180	167	25	242
106	Billings, MT	119	101	43	336	272
107	Lewiston, ID-WA	247	78	45	170	76
108	Hinesville, GA	242	51	132	187	3
109	Michigan City-La Porte, IN	138	100	228	220	161
110	St. George, UT	249	82	76	89	122
111	Lebanon, PA	142	48	308	266	127
112	Fargo, ND-MN	208	35	365	9	46
113	Lima, OH	204	80	136	127	75
114	Jonesboro, AR	165	95	141	191	118
115	Lafayette, LA	170	76	298	79	89
116	Albuquerque, NM	144	238	14	346	229
117	Rockford, IL	152	181	122	139	56
118	Fort Wayne, IN	120	194	170	264	73
119	Gainesville, FL	177	132	231	62	145
120	Deltona-Daytona Beach-Ormond Beach, FL	68	186	353	66	244
121	Charlotte-Concord-Gastonia, NC-SC	56	261	30	331	372
122	Ames, IA	369	103	9	165	21
123	Pueblo, CO	112	68	324	234	245
124	Battle Creek, MI	101	255	176	203	45
125	Columbia, SC	266	185	29	11	303
126	Reading, PA	109	157	337	82	173
127	Rochester, MN	278	114	96	100	15
128	Dallas-Fort Worth-Arlington, TX	61	313	292	114	181
129	Mankato-North Mankato, MN	87	281	33	167	321
130	Miami-Fort Lauderdale-West Palm Beach, FL	26	363	291	60	314
131	Oklahoma City, OK	160	42	243	306	267
132	Elizabethtown-Fort Knox, KY	203	124	156	277	17
133	Sioux City, IA-NE-SD	241	110	208	22	218
134	Springfield, OH	219	97	143	159	50
135	Bakersfield, CA	42	198	249	349	308

Table 3 **Overall MSA Ranking (cont.)**

Overall	MSA	Greenhouse Gases	Capital Risk	Energy	Air Quality	Water and Land Use
136	Boston-Cambridge-Newton, MA-NH	66	276	84	273	342
137	Tuscaloosa, AL	312	33	235	72	167
138	Tampa-St. Petersburg-Clearwater, FL	55	192	325	106	379
139	Rocky Mount, NC	205	195	69	265	71
140	Reno, NV	33	330	344	312	187
141	Johnson City, TN	166	139	280	228	47
142	Colorado Springs, CO	122	205	275	38	288
143	Spokane-Spokane Valley, WA	121	224	174	160	191
144	Las Vegas-Henderson-Paradise, NV	59	152	296	340	298
145	Columbus, GA-AL	292	69	97	138	98
146	Lawrence, KS	154	135	303	231	82
147	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	52	274	44	355	348
148	Fort Smith, AR-OK	301	150	161	19	54
149	Syracuse, NY	110	349	32	48	353
150	Albany, GA	302	36	215	218	109
151	Macon, GA	246	64	224	137	157
152	Iowa City, IA	256	176	40	169	64
153	Columbia, MO	251	170	109	122	14
154	Farmington, NM	357	2	332	91	240
155	The Villages, FL	114	286	181	205	86
156	Urban Honolulu, HI	85	279	318	13	312
157	Norwich-New London, CT	313	117	12	301	374
158	Lancaster, PA	131	147	114	267	363
159	Janesville-Beloit, WI	180	111	314	152	108
160	Jacksonville, NC	206	179	166	199	78
161	Walla Walla, WA	95	283	54	173	323
162	Lexington-Fayette, KY	240	219	123	75	16
163	Erie, PA	191	262	178	24	156
164	Bismarck, ND	273	149	225	39	103
165	Bremerton-Silverdale, WA	140	265	179	204	59
166	Missoula, MT	284	109	147	83	125
167	Dalton, GA	149	90	356	295	41
168	Bowling Green, KY	289	107	146	158	8
169	Sheboygan, WI	91	319	240	111	271
170	Midland, MI	64	275	270	226	336
171	Lansing-East Lansing, MI	128	346	100	76	184
172	North Port-Sarasota-Bradenton, FL	93	282	342	7	311
173	Shreveport-Bossier City, LA	277	49	259	73	259
174	Jackson, MS	223	102	305	78	162
175	Grand Junction, CO	190	122	154	313	178
176	Lincoln, NE	173	215	302	104	81
177	Williamsport, PA	346	23	335	107	44
178	Hickory-Lenoir-Morganton, NC	157	193	264	123	252
179	Port St. Lucie, FL	136	231	108	51	377
180	Panama City, FL	107	151	327	95	368

Table 3 **Overall MSA Ranking (cont.)**

Overall	MSA	Greenhouse Gases	Capital Risk	Energy	Air Quality	Water and Land Use
181	Pittsfield, MA	97	335	276	134	102
182	Florence-Muscle Shoals, AL	339	62	53	90	217
183	Kingston, NY	237	112	148	193	200
184	McAllen-Edinburg-Mission, TX	51	374	287	15	227
185	Sioux Falls, SD	355	153	162	12	12
186	Roanoke, VA	274	165	254	85	25
187	Coeur d'Alene, ID	248	130	158	196	159
188	Pine Bluff, AR	264	77	246	224	151
189	Tallahassee, FL	179	203	348	47	83
190	Prescott, AZ	86	280	180	253	339
191	Harrisburg-Carlisle, PA	233	121	153	163	221
192	Joplin, MO	164	164	306	257	144
193	Owensboro, KY	222	134	212	275	152
194	Salt Lake City, UT	162	85	112	350	256
195	Grand Forks, ND-MN	300	119	152	194	31
196	Mansfield, OH	319	54	267	225	53
197	Harrisonburg, VA	299	53	250	290	67
198	Manchester-Nashua, NH	155	337	72	87	249
199	Myrtle Beach-Conway-North Myrtle Beach, SC-NC	235	248	8	365	194
200	San Antonio-New Braunfels, TX	30	89	371	74	198
201	Laredo, TX	161	368	61	34	52
202	Olympia-Tumwater, WA	250	258	177	32	96
203	Las Cruces, NM	60	356	257	289	208
204	Glens Falls, NY	236	252	70	178	106
205	Duluth, MN-WI	186	341	117	31	196
206	Athens-Clarke County, GA	253	86	300	283	39
207	Charleston-North Charleston, SC	151	318	236	35	300
208	Omaha-Council Bluffs, NE-IA	146	264	247	103	257
209	Houston-The Woodlands-Sugar Land, TX	125	343	232	50	238
210	Springfield, MO	111	223	321	270	248
211	Niles-Benton Harbor, MI	261	126	88	244	299
212	Topeka, KS	262	209	171	146	48
213	Augusta-Richmond County, GA-SC	303	158	17	353	265
214	Pensacola-Ferry Pass-Brent, FL	104	259	294	148	262
215	Greenville, NC	255	216	67	292	112
216	Bloomington, IL	333	308	7	284	344
217	Buffalo-Cheektowaga-Niagara Falls, NY	75	355	78	278	359
218	Lafayette-West Lafayette, IN	340	309	5	261	341
219	Palm Bay-Melbourne-Titusville, FL	106	167	362	43	375
220	Great Falls, MT	322	84	137	189	142
221	Crestview-Fort Walton Beach-Destin, FL	182	290	71	86	316
222	San Angelo, TX	200	350	56	174	33
223	Kokomo, IN	337	93	139	272	11
224	Alexandria, LA	263	98	230	221	253
225	Grants Pass, OR	118	287	182	206	325

Table 3 **Overall MSA Ranking (cont.)**

Overall	MSA	Greenhouse Gases	Capital Risk	Energy	Air Quality	Water and Land Use
226	Jefferson City, MO	324	166	91	149	140
227	New Haven-Milford, CT	62	251	322	318	369
228	Orlando-Kissimmee-Sanford, FL	45	380	333	8	206
229	Detroit-Warren-Dearborn, MI	28	272	330	366	351
230	Houma-Thibodaux, LA	317	221	173	56	55
231	Decatur, IL	348	160	20	351	74
232	Ocean City, NJ	281	187	168	200	117
233	Ithaca, NY	297	249	48	52	207
234	Elkhart-Goshen, IN	344	128	157	105	66
235	Bay City, MI	176	256	222	219	215
236	Sumter, SC	293	191	169	201	68
237	Springfield, IL	202	199	210	247	293
238	Los Angeles-Long Beach-Anaheim, CA	46	273	241	362	349
239	Cheyenne, WY	294	129	293	70	169
240	Corvallis, OR	350	71	119	184	148
241	Des Moines-West Des Moines, IA	373	243	19	23	92
242	Morristown, TN	330	116	151	304	24
243	Lynchburg, VA	341	171	113	183	10
244	Binghamton, NY	212	323	195	214	84
245	Mobile, AL	175	190	278	252	358
246	Lake Charles, LA	309	172	205	71	224
247	El Centro, CA	356	201	26	120	280
248	Canton-Massillon, OH	239	118	329	302	113
249	Hammond, LA	145	288	183	207	326
250	Winchester, VA-WV	352	144	211	147	7
251	Casper, WY	298	106	145	323	150
252	New York-Newark-Jersey City, NY-NJ-PA	71	277	209	354	347
253	Jackson, MI	201	266	286	230	38
254	Columbus, IN	335	113	149	305	26
255	Auburn-Opelika, AL	133	11	370	236	124
256	Clarksville, TN-KY	276	163	238	250	199
257	Muskegon, MI	194	315	193	132	234
258	Santa Fe, NM	366	21	129	337	132
259	Goldsboro, NC	216	208	312	232	176
260	Atlantic City-Hammonton, NJ	323	217	172	80	136
261	Huntington-Ashland, WV-KY-OH	354	162	277	46	42
262	Charleston, WV	332	92	138	162	231
263	Daphne-Fairhope-Foley, AL	169	289	184	133	319
264	Homosassa Springs, FL	99	285	284	300	345
265	Hartford-West Hartford-East Hartford, CT	108	247	345	256	307
266	Johnstown, PA	270	229	336	69	57
267	Little Rock-North Little Rock-Conway, AR	265	214	202	268	205
268	Elmira, NY	321	232	175	202	30
269	Chicago-Naperville-Elgin, IL-IN-WI	96	284	38	363	350
270	Danville, IL	365	127	62	176	51

Table 3 **Overall MSA Ranking (cont.)**

Overall	MSA	Greenhouse Gases	Capital Risk	Energy	Air Quality	Water and Land Use
271	Winston-Salem, NC	238	202	268	164	276
272	Durham-Chapel Hill, NC	225	197	227	321	239
273	Appleton, WI	141	339	338	129	166
274	Naples-Immokalee-Marco Island, FL	159	361	199	58	223
275	Longview, TX	296	63	255	344	213
276	Evansville, IN-KY	198	213	216	348	180
277	Decatur, AL	342	65	285	282	133
278	El Paso, TX	41	370	261	356	235
279	Allentown-Bethlehem-Easton, PA-NJ	150	206	354	335	202
280	Tulsa, OK	268	246	283	96	183
281	Chattanooga, TN-GA	254	211	93	317	305
282	Lake Havasu City-Kingman, AZ	228	292	101	181	324
283	Wichita, KS	316	239	213	126	172
284	Lakeland-Winter Haven, FL	43	373	351	155	301
285	Idaho Falls, ID	334	143	160	307	170
286	Wilmington, NC	167	245	352	77	360
287	Waco, TX	230	357	266	28	160
288	Ocala, FL	211	365	200	63	147
289	Springfield, MA	38	196	373	55	197
290	Weirton-Steubenville, WV-OH	287	67	244	357	260
291	Parkersburg-Vienna, WV	306	115	150	352	177
292	Bridgeport-Stamford-Norwalk, CT	80	253	360	298	378
293	Pocatello, ID	130	88	272	378	99
294	Watertown-Fort Drum, NY	290	302	99	81	315
295	Tucson, AZ	88	371	299	119	258
296	Peoria, IL	226	236	220	328	295
297	Gettysburg, PA	252	295	326	18	313
298	Kankakee, IL	370	133	75	179	123
299	Cumberland, MD-WV	283	125	307	361	1
300	Memphis, TN-MS-AR	137	240	363	309	297
301	Greenville-Anderson-Mauldin, SC	113	225	366	279	146
302	Greensboro-High Point, NC	199	241	347	316	209
303	Baton Rouge, LA	171	378	92	36	230
304	Chambersburg-Waynesboro, PA	210	291	274	274	343
305	Portland-South Portland, ME	135	362	359	20	302
306	Brunswick, GA	378	142	41	110	2
307	Asheville, NC	320	189	201	329	261
308	Champaign-Urbana, IL	368	188	204	121	70
309	Phoenix-Mesa-Scottsdale, AZ	47	254	219	379	355
310	Baltimore-Columbia-Towson, MD	82	336	34	374	370
311	Bellingham, WA	214	316	37	368	210
312	Jacksonville, FL	188	263	226	315	373
313	California-Lexington Park, MD	272	297	185	208	327
314	Dover, DE	305	226	313	308	126
315	Kahului-Wailuku-Lahaina, HI	245	294	271	227	337

Table 3 **Overall MSA Ranking (cont.)**

Overall	MSA	Greenhouse Gases	Capital Risk	Energy	Air Quality	Water and Land Use
316	Grand Island, NE	279	299	187	209	328
317	Beaumont-Port Arthur, TX	318	347	218	59	203
318	East Stroudsburg, PA	291	303	190	141	320
319	Cape Girardeau, MO-IL	285	300	188	210	329
320	South Bend-Mishawaka, IN-MI	338	156	361	263	69
321	Dayton, OH	275	298	186	254	340
322	Kansas City, MO-KS	139	333	331	345	251
323	New Bern, NC	329	307	47	171	322
324	Birmingham-Hoover, AL	183	182	252	369	278
325	Charlottesville, VA	358	175	323	246	114
326	Albany, OR	288	301	189	211	330
327	Albany-Schenectady-Troy, NY	143	369	364	41	189
328	Monroe, LA	217	358	311	101	204
329	Montgomery, AL	192	47	369	151	149
330	Washington-Arlington-Alexandria, DC-VA-MD-WV	267	296	262	343	182
331	Richmond, VA	231	331	297	260	287
332	New Orleans-Metairie, LA	153	364	118	285	371
333	Punta Gorda, FL	232	377	77	180	137
334	Columbus, OH	331	317	194	299	175
335	Sierra Vista-Douglas, AZ	243	293	223	330	346
336	Staunton-Waynesboro, VA	315	304	191	212	331
337	Morgantown, WV	372	31	263	342	214
338	Carbondale-Marion, IL	325	305	203	216	333
339	Oxnard-Thousand Oaks-Ventura, CA	361	148	245	154	367
340	Nashville-Davidson-Murfreesboro-Franklin, TN	172	260	221	370	243
341	Knoxville, TN	345	233	328	287	195
342	Jackson, TN	379	94	140	190	35
343	Blacksburg-Christiansburg-Radford, VA	328	57	42	380	58
344	Manhattan, KS	351	310	206	217	334
345	Longview, WA	377	210	36	168	120
346	College Station-Bryan, TX	343	354	214	113	216
347	Anchorage, AK	158	360	367	1	129
348	Youngstown-Warren-Boardman, OH-PA	314	344	357	259	77
349	Bloomsburg-Berwick, PA	353	311	239	223	335
350	Minneapolis-St. Paul-Bloomington, MN-WI	181	379	242	99	304
351	Barnstable Town, MA	349	338	288	153	250
352	Louisville/Jefferson County, KY-IN	260	267	315	359	277
353	Bloomington, IN	380	159	163	286	4
354	Riverside-San Bernardino-Ontario, CA	70	376	79	376	356
355	Fayetteville-Springdale-Rogers, AR-MO	371	212	320	130	232
356	Hilton Head Island-Bluffton-Beaufort, SC	327	306	349	235	338
357	St. Louis, MO-IL	282	340	317	339	352
358	Corpus Christi, TX	326	375	237	27	309
359	Brownsville-Harlingen, TX	79	200	376	29	131
360	Indianapolis-Carmel-Anderson, IN	168	314	341	373	270

Table 3 **Overall MSA Ranking (cont.)**

Overall	MSA	Greenhouse Gases	Capital Risk	Energy	Air Quality	Water and Land Use
361	Worcester, MA-CT	220	359	358	324	283
362	Victoria, TX	367	366	234	44	193
363	Scranton-Wilkes-Barre-Hazleton, PA	363	327	290	255	279
364	Savannah, GA	364	218	265	347	357
365	Terre Haute, IN	376	173	260	326	226
366	Amarillo, TX	229	34	372	364	49
367	Altoona, PA	280	227	368	294	62
368	Cape Coral-Fort Myers, FL	310	372	295	84	380
369	Beckley, WV	375	312	192	213	332
370	Atlanta-Sandy Springs-Roswell, GA	286	321	346	375	179
371	Kingsport-Bristol-Bristol, TN-VA	374	178	110	372	139
372	Cincinnati, OH-KY-IN	295	322	339	371	289
373	Flint, MI	311	45	374	115	361
374	Fairbanks, AK	307	329	310	377	141
375	Providence-Warwick, RI-MA	304	367	343	367	365
376	Lubbock, TX	360	91	375	237	87
377	Texarkana, TX-AR	336	58	379	239	61
378	Pittsburgh, PA	269	220	377	327	362
379	Odessa, TX	362	351	378	238	80
380	Midland, TX	359	348	380	240	28

Source: BBVA Research