Wireframe Document

US Pollution Analysis

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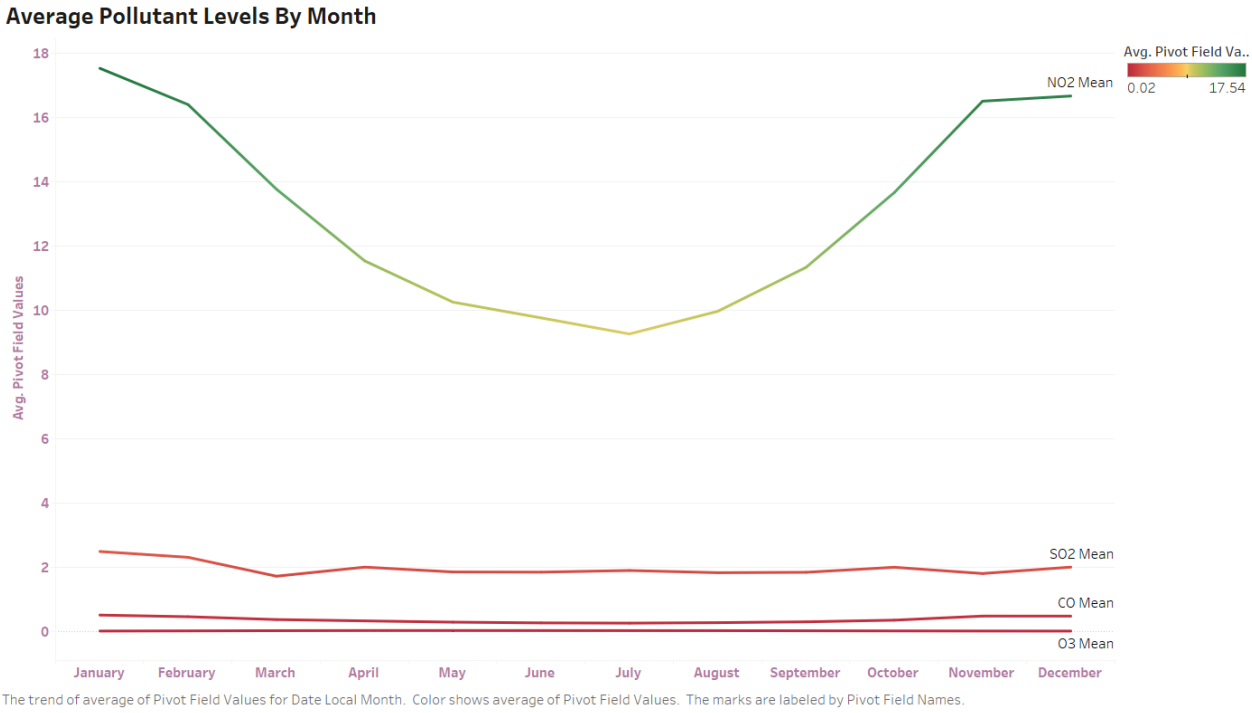
Document Control

Date	Version	Description	Author
15/05/2025	1.0	Introduction, Problem Statement	Shubham tembhurne
15/05/2025	1.1	Dataset Information, Vi Architecture Description	Shubham tembhurne
15/05/2025	1.2	Final Revision	Shubham tembhurne

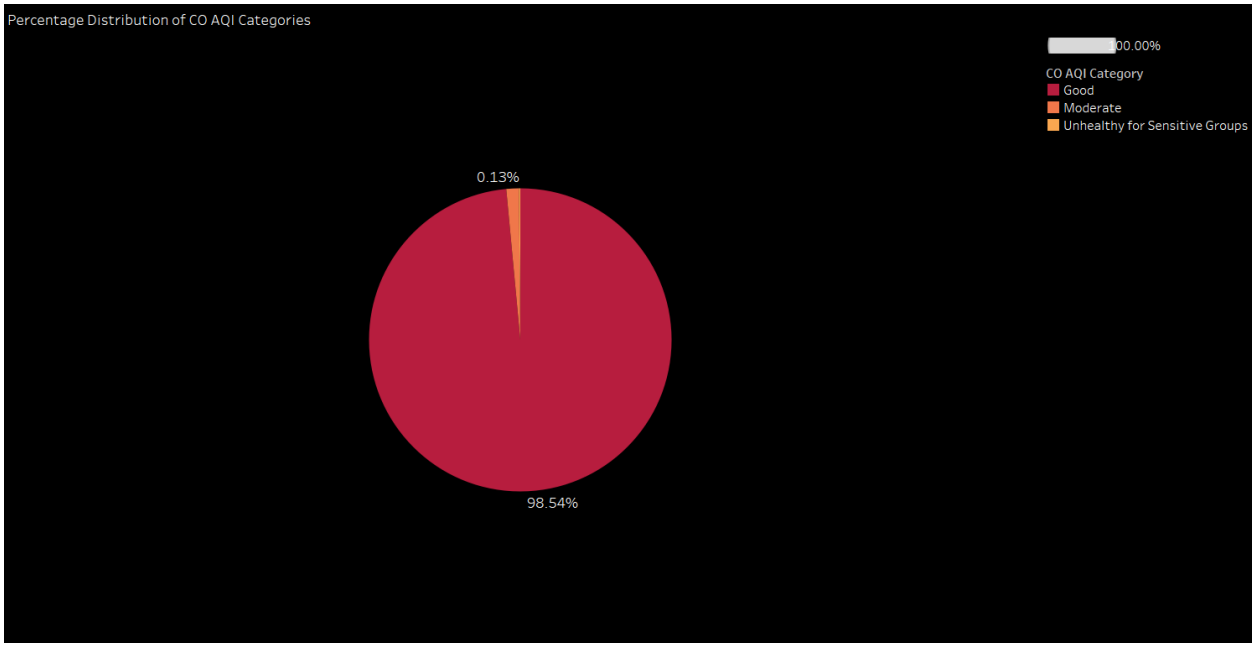
We Performed Exploratory Data Analysis on Jupyter Notebook and then created a Tableau Desktop Dashboard.

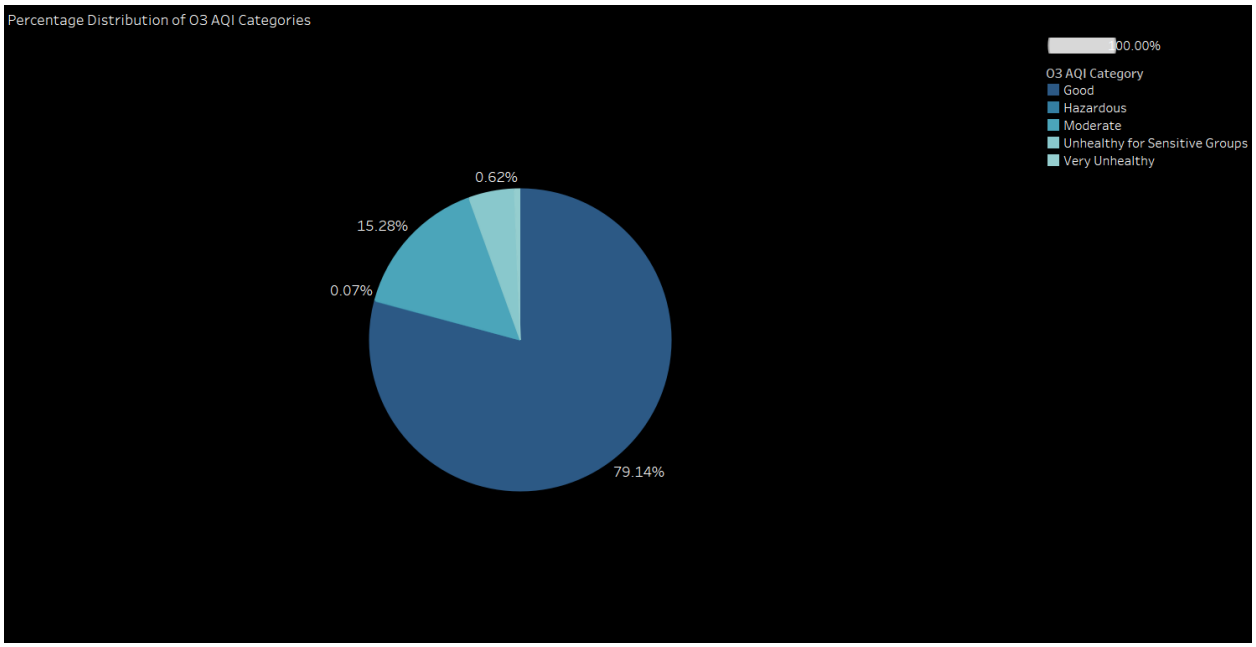
1. What are the Average Pollutants by Month?

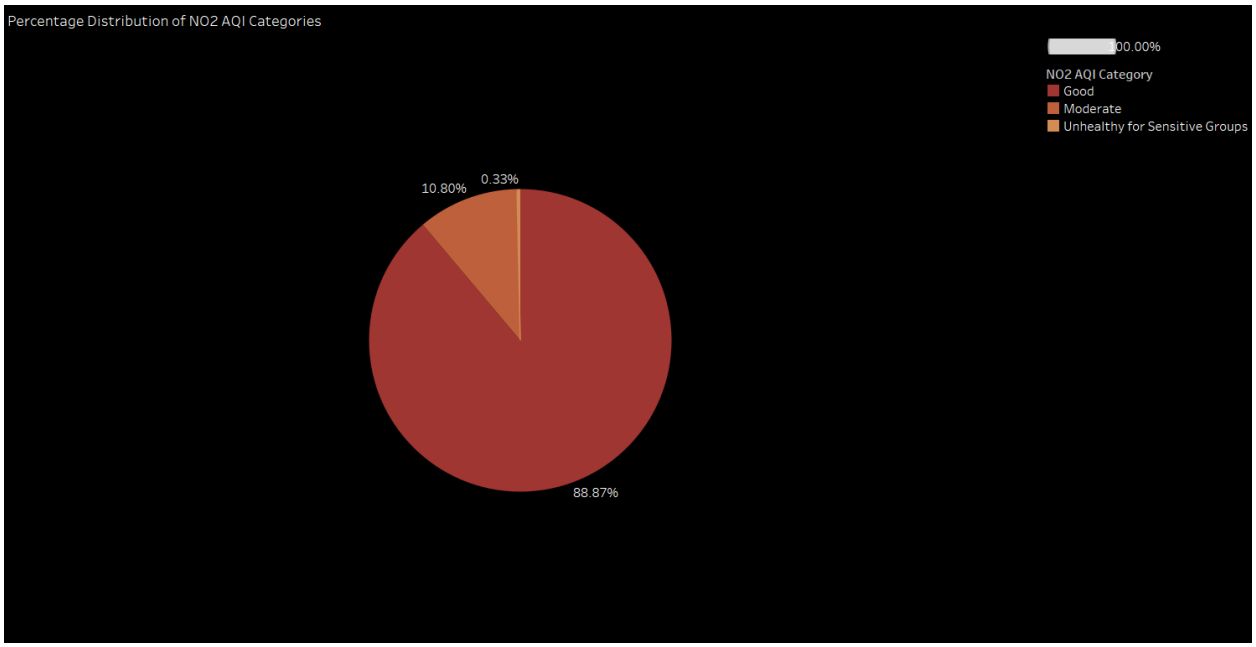


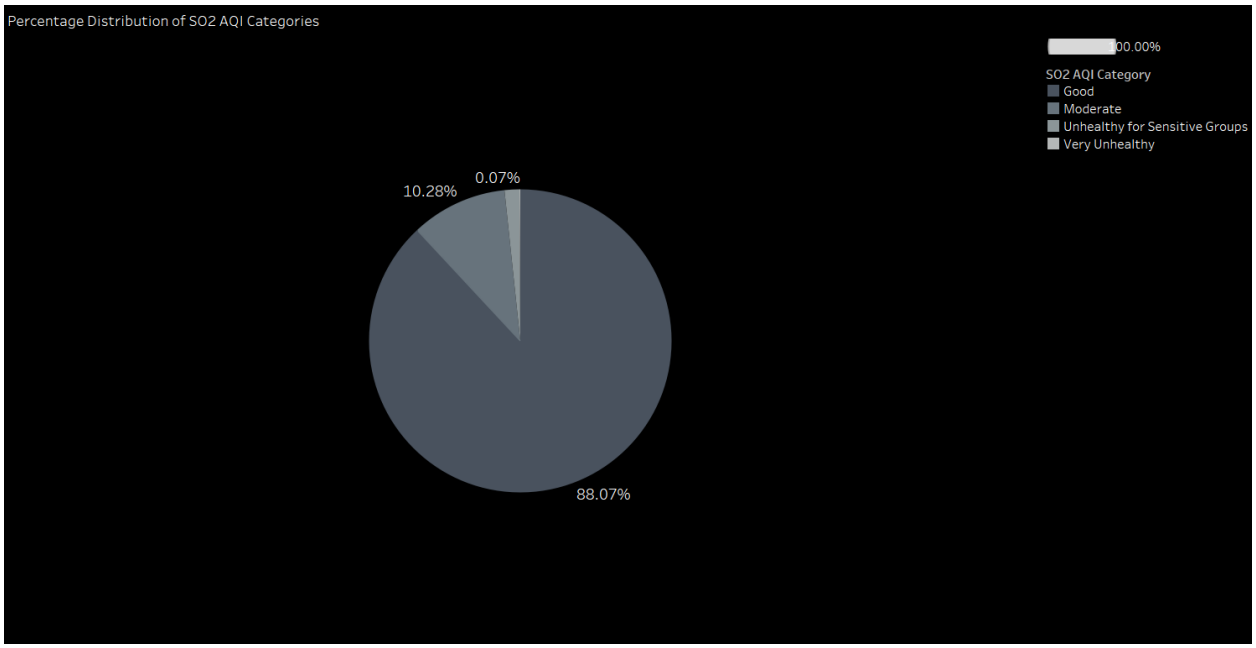
- NO2 and CO are highest in winter months and lowest in summer
- Ozone (O3) peaks in late spring and early summer, then drops in winter
- SO2 is slightly higher in winter and early spring.

2.What is the Percentage distribution of AQI Categories?






Percentage Distribution of NO2 AQI Categories
00.00%
NO2 AQI Category
Good
Moderate
Unhealthy for Sensitive Groups
10.80%
0.33%
88.87%


Percentage Distribution of SO2 AQI Categories
00.00%
SO2 AQI Category
Good
Moderate
Unhealthy for Sensitive Groups
Very Unhealthy
10.28%
0.07%
88.07%

- NO2 (Nitrogen Dioxide):95.59% of readings fall in the "Good" category
  Only about 4.34% reach "Moderate" levels
  Very few instances (0.08%) of "Unhealthy for Sensitive Groups"

- O3 (Ozone): Most diverse distribution among all pollutants
  90.61% “Good" reading
  7.76% 'Moderate' Levels
  1.48% "Unhealthy for sensitive Groups"
  Small but notable occurrences of "Unhealthy" (0.13%) and "Very Unhealthy" conditions

- SO2 (Sulfur Dioxide): About 99.37% "Good" readings values
  Very few instances (0.58%) of "Moderate" levels
  Minimal occurrences of higher categories

- CO (Carbon Monoxide): Similar to SO2 with nearly equal between "Good"
  No recorded instances in higher AQI categories

- This analysis suggests that while most readings fall within safe levels, Ozone (O3) shows the most concerning pattern with more frequent occurrences of unhealthy conditions compared to other pollutants

3.What are the Yearly Statistics for CO, NO2, SO2 and O3?

Yearly CO Statistics

	2006	2007	2008	2009	2010
Avg. CO Mean	0.41	0.37	0.33	0.32	0.34
Avg. Co Aqi	3.48	3.00	2.67	2.58	2.69
Max. CO Mean	6.53	6.50	3.82	4.05	3.56
Max. Co Aqi	150.00	81.00	90.00	81.00	51.00
Min. CO Mean	0.00	0.00	0.00	0.00	0.00
Min. Co Aqi	0.00	0.00	0.00	0.00	0.00

- Highest CO levels were recorded in 2006 (max 6.53 ppm)
- There's a general declining trend in average CO levels from 2006 to 2010
- The highest AQI value of 150 ppm was recorded in 2006
- Recent years show lower maximum values, suggesting improved air quality.

Yearly NO2 Statistics

	2006	2007	2008	2009	2010
Avg. NO2 Mean	14.5	13.3	12.3	11.5	11.7
Avg. No2 Aqi	27.0	24.9	23.5	21.7	22.3
Max. NO2 Mean	70.6	92.0	76.5	60.6	56.9
Max. No2 Aqi	115	112	110	107	107
Min. NO2 Mean	0.0	0.0	0.0	0.0	0.0
Min. No2 Aqi	0.0	0.0	0.0	0.0	0.0

- Highest NO2 levels were recorded in 2007 (max 92 ppm)
- There's a general Decrease trend in average NO2 levels from 2006 to 2010.
- The highest AQI value of 115 ppb was recorded in 2006.
- Recent years show lower maximum values, suggesting improved air quality

Yearly SO2 Statistics

	2006	2007	2008	2009	2010
Avg. SO2 Mean	2.6	2.3	1.9	1.6	1.2
Avg. So2 Aqi	5.0	4.5	3.7	2.8	1.9
Max. SO2 Mean	321.6	32.0	31.0	33.0	25.9
Max. So2 Aqi	200	176	125	120	103
Min. SO2 Mean	0.0	0.0	0.0	0.0	-0.5
Min. So2 Aqi	0.0	0.0	0.0	0.0	0.0

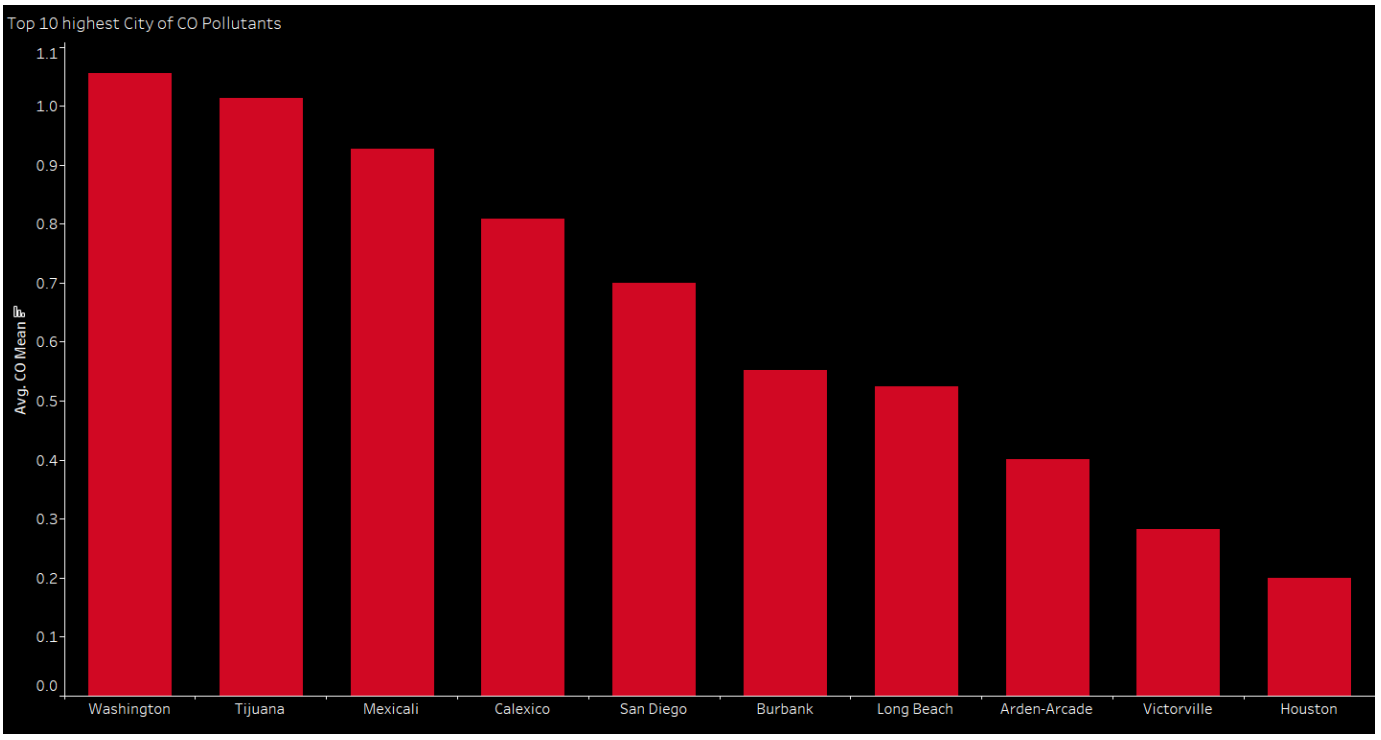
- Highest SO2 levels were recorded in 2006 (max 321.62 ppm)
- There's a general decrease trend in average SO2 levels from 2006 to 2010
- The highest AQI value of 200 ppb was recorded in 2006
- Recent years show lower maximum values, suggesting improved air.

Yearly O3 Statistics

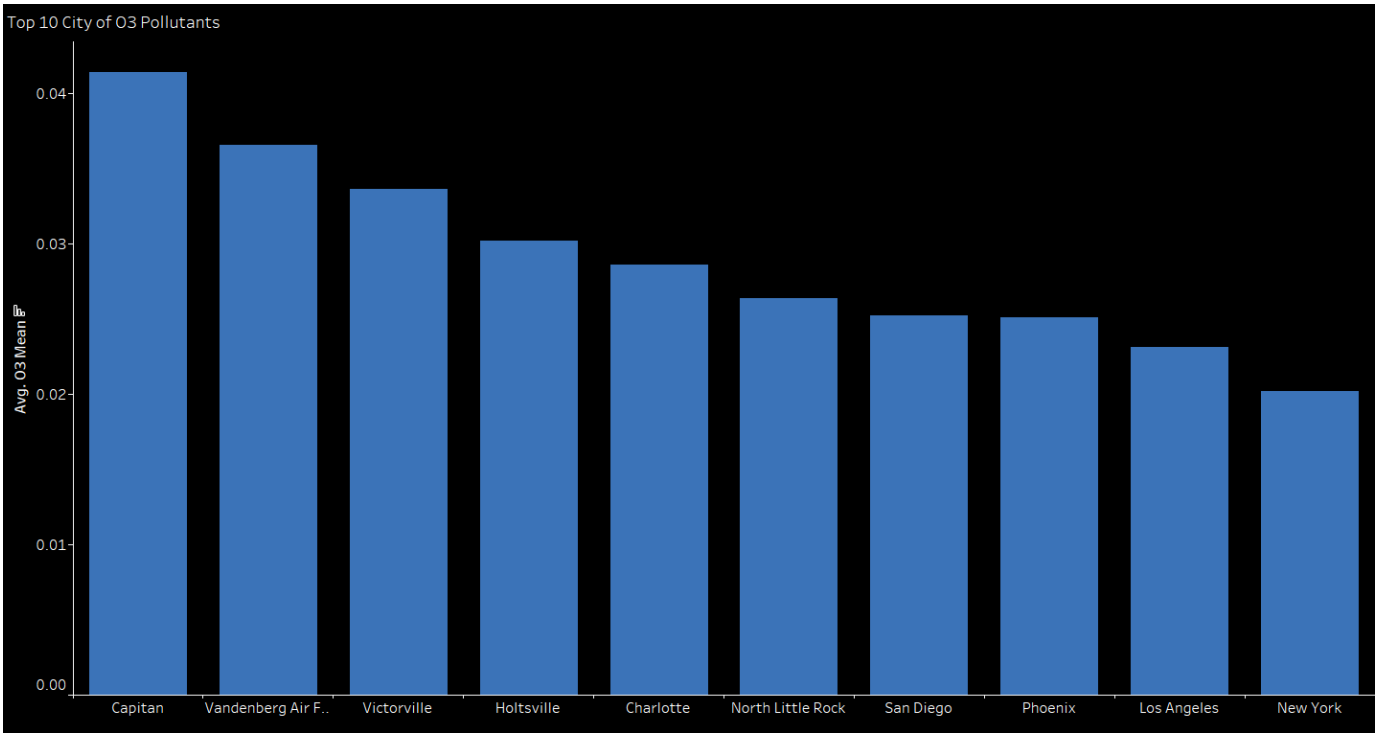
	2006	2007	2008	2009	2010
Avg. O3 Aqi	36.20	36.39	35.26	33.02	34.33
Avg. O3 Mean	0.03	0.03	0.03	0.03	0.03
Max. O3 Aqi	206	211	207	206	200
Max. O3 Mean	0.07	0.07	0.08	0.07	0.07
Min. O3 Aqi	0.00	0.00	0.00	0.00	0.00
Min. O3 Mean	0.00	0.00	0.00	0.00	0.00

- Highest O3 levels were recorded in 2008 (max 0.08 ppm)
- There's a general Constant trend in average O3 levels from 2006 to 2010
- The highest AQI value of 211 ppm was recorded in 2007
- Recent years show lower maximum values, suggesting improved air quality.

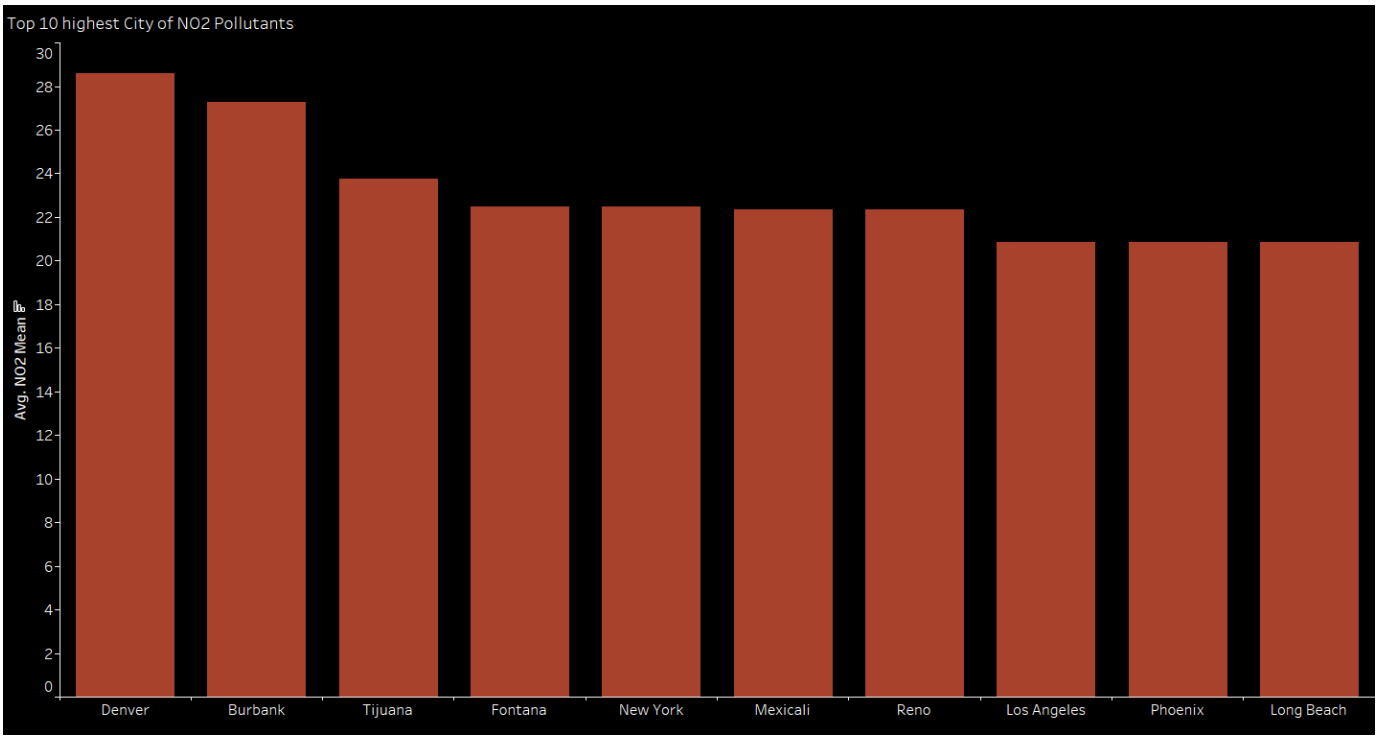
4.Which are the top 10 highest cities for CO, NO2, O3 and SO2 pollutants?



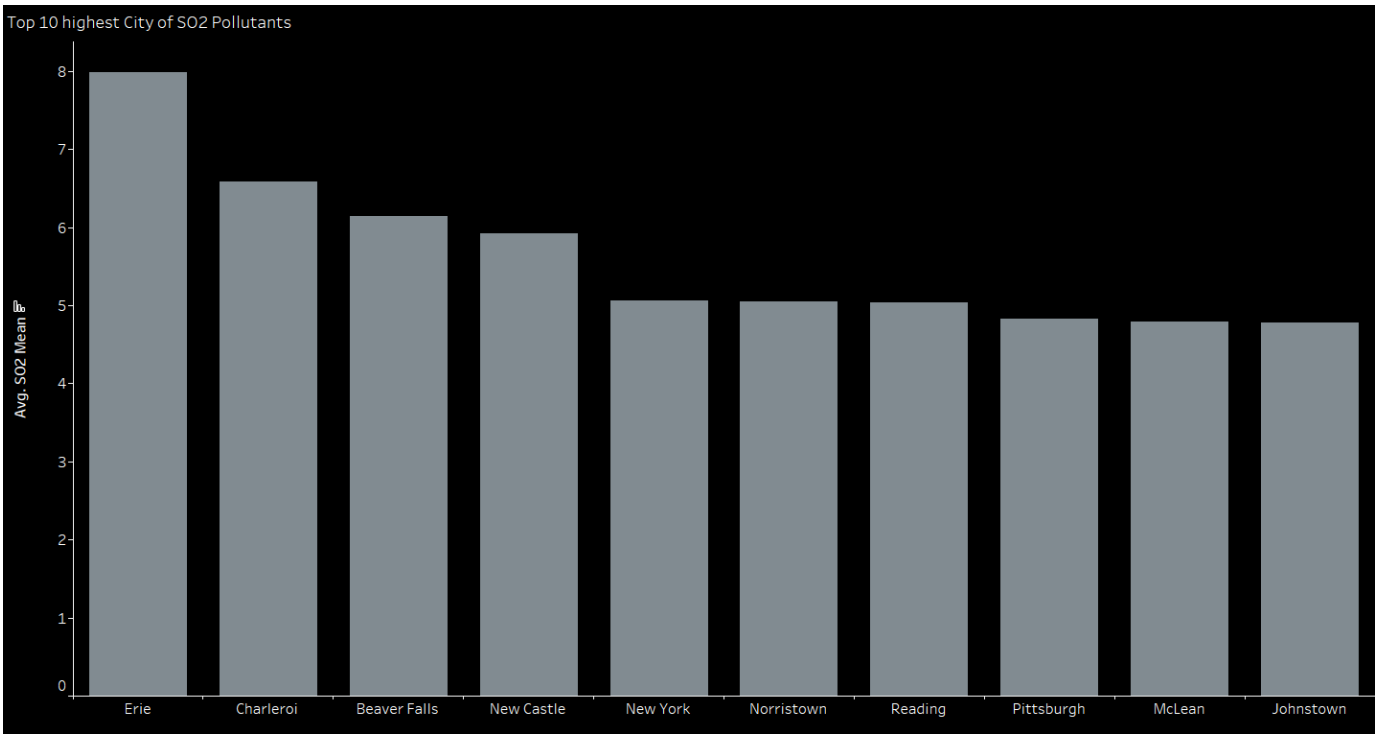
- Mexicali, Tijuana, Calexico, Washington, San Diego, Burbank, Long Beach, Arden Arcade, Victorville, Houston is the highest CO pollutant



- Captain, Vandenberg, Victorville, Holtsville, Charlotte, North Little Rock, San Diego,Phoenix,Los Angeles, New York highest city of O3 pollutant

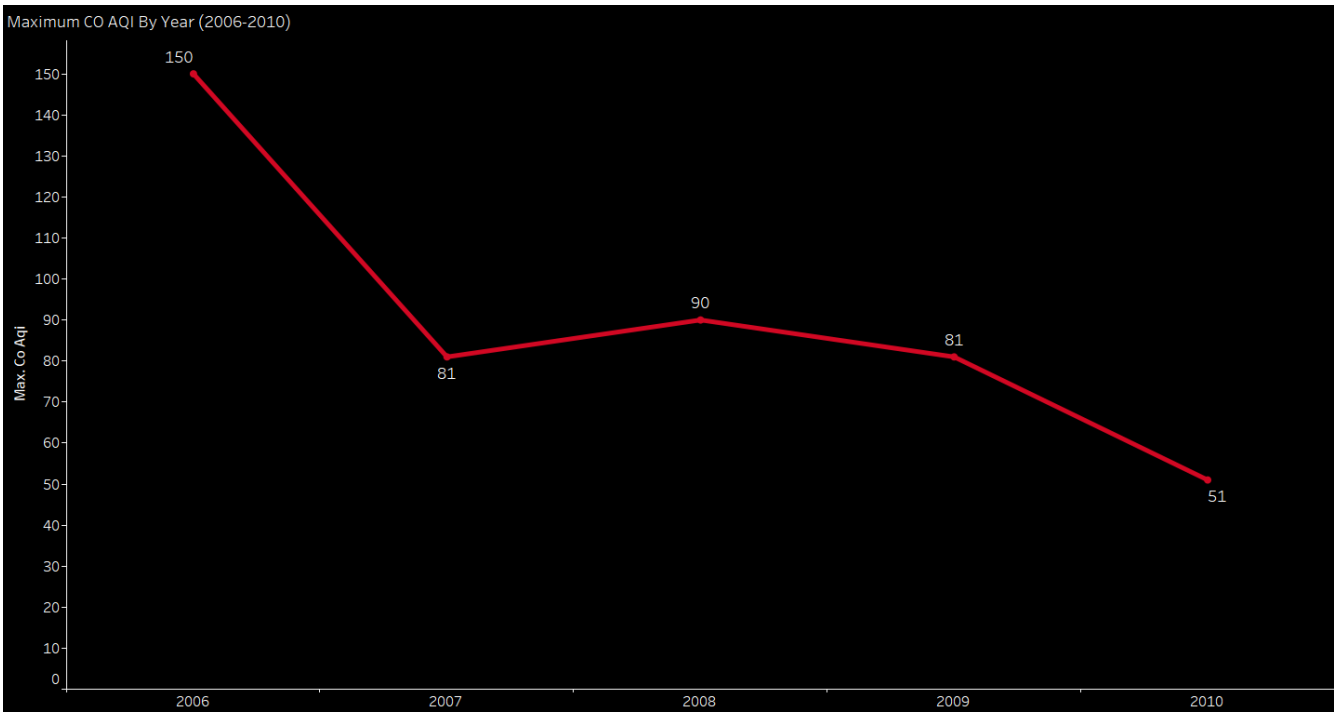


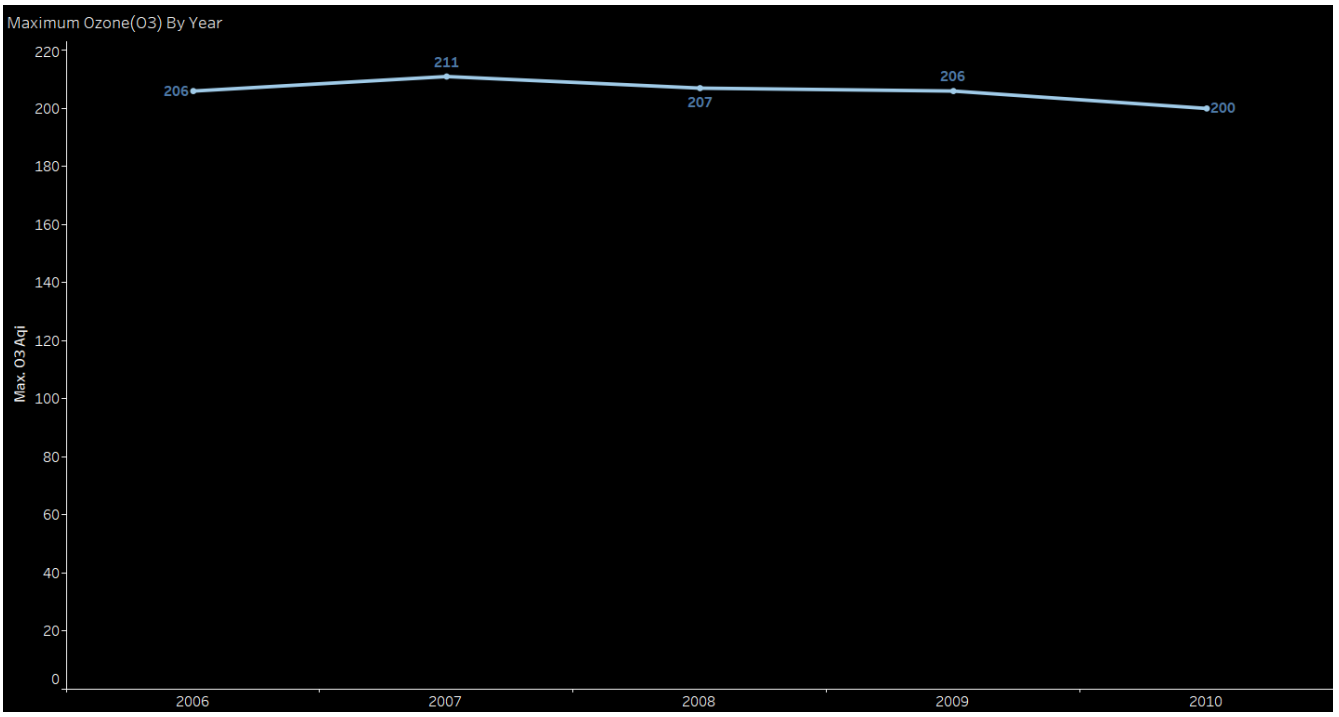
- Denver, Mexicali, Tijuana, Burbank, Phoenix, Fontana, Remo, Los Angeles, Phoenix, Long Beach highest city of NO2 Pollutant.

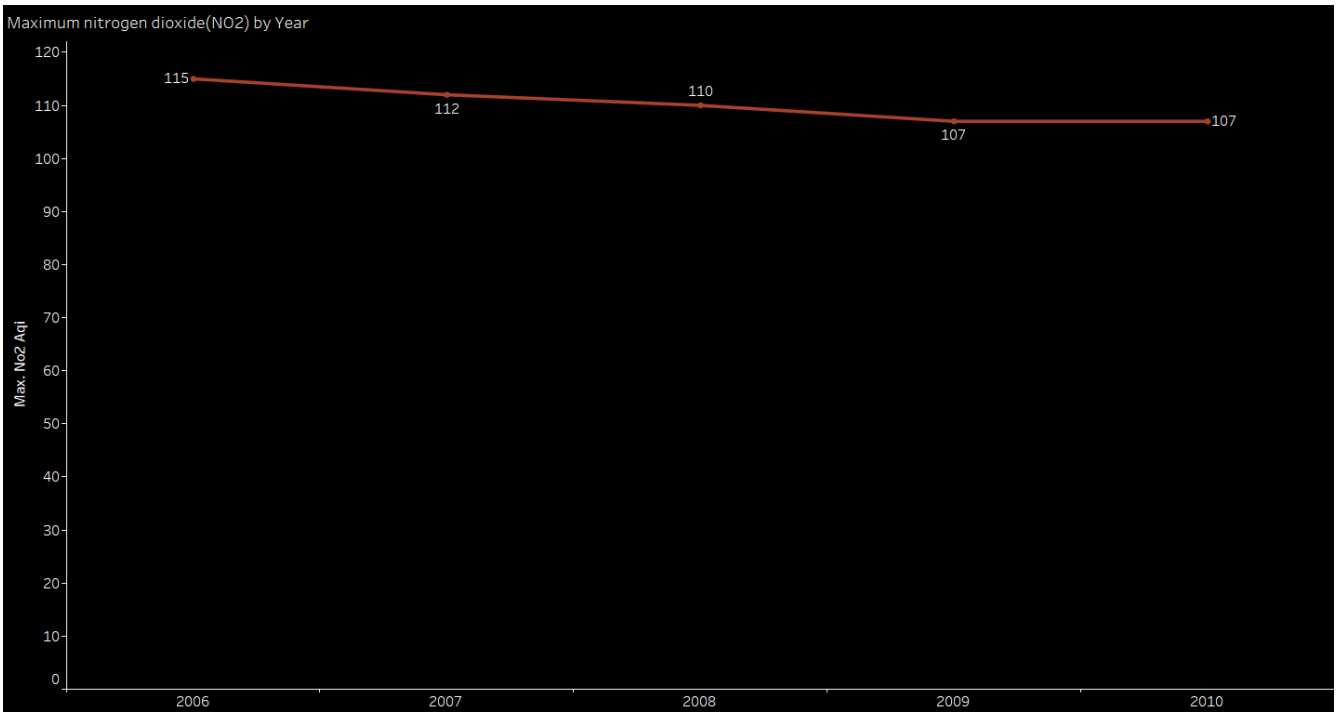


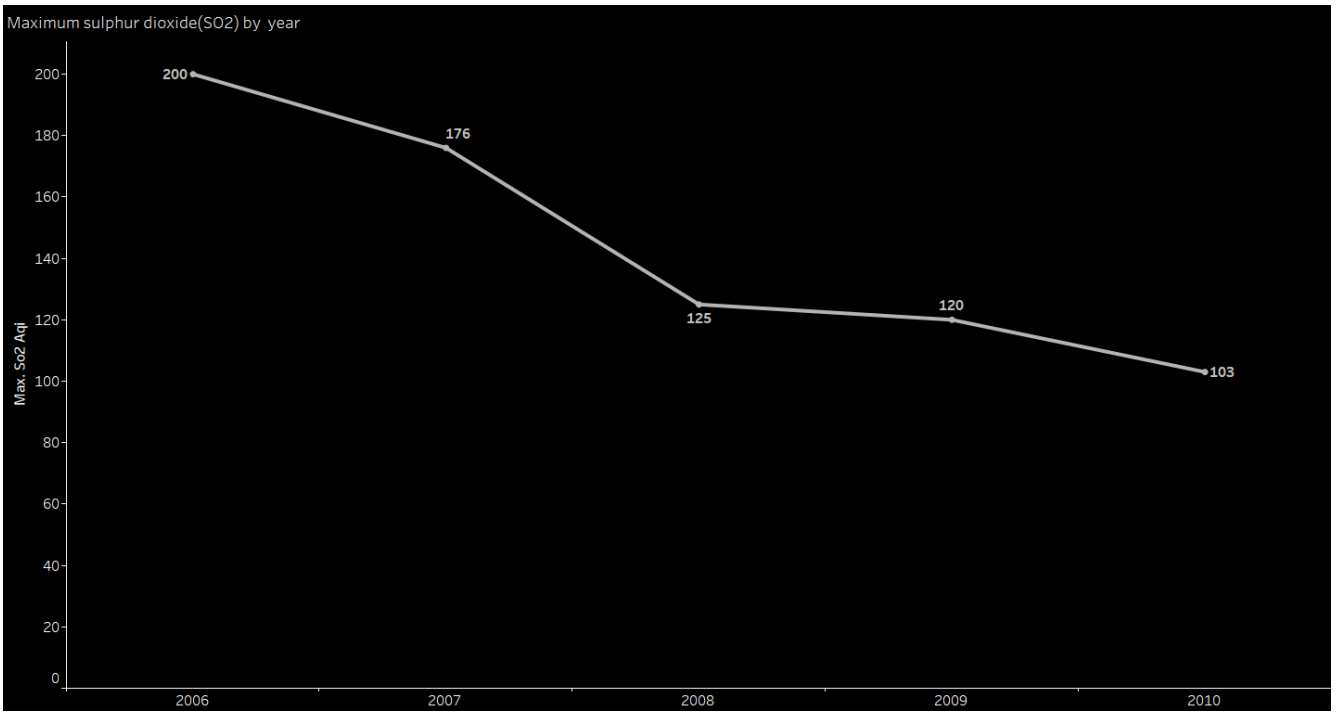
- Erie, Charleroi, Beaver Falls, New Castle, New York, Norristown, Reading, Pittsburgh, Mclean, Johnstown are the Highest City of SO2 Pollutant.

5.What is the Maximum CO, NO2, SO3 and O3 AQI by year (2006-2010)?



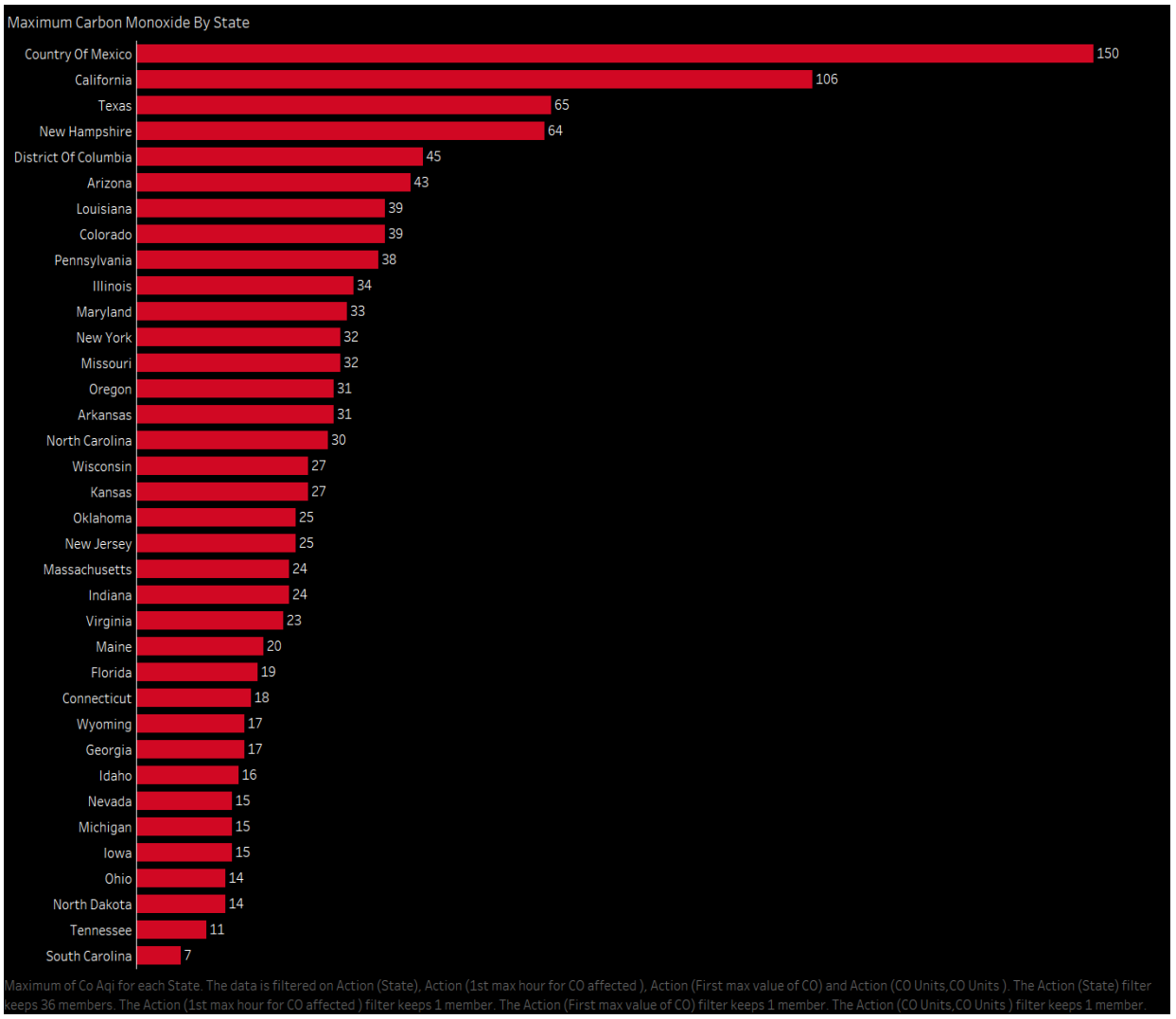


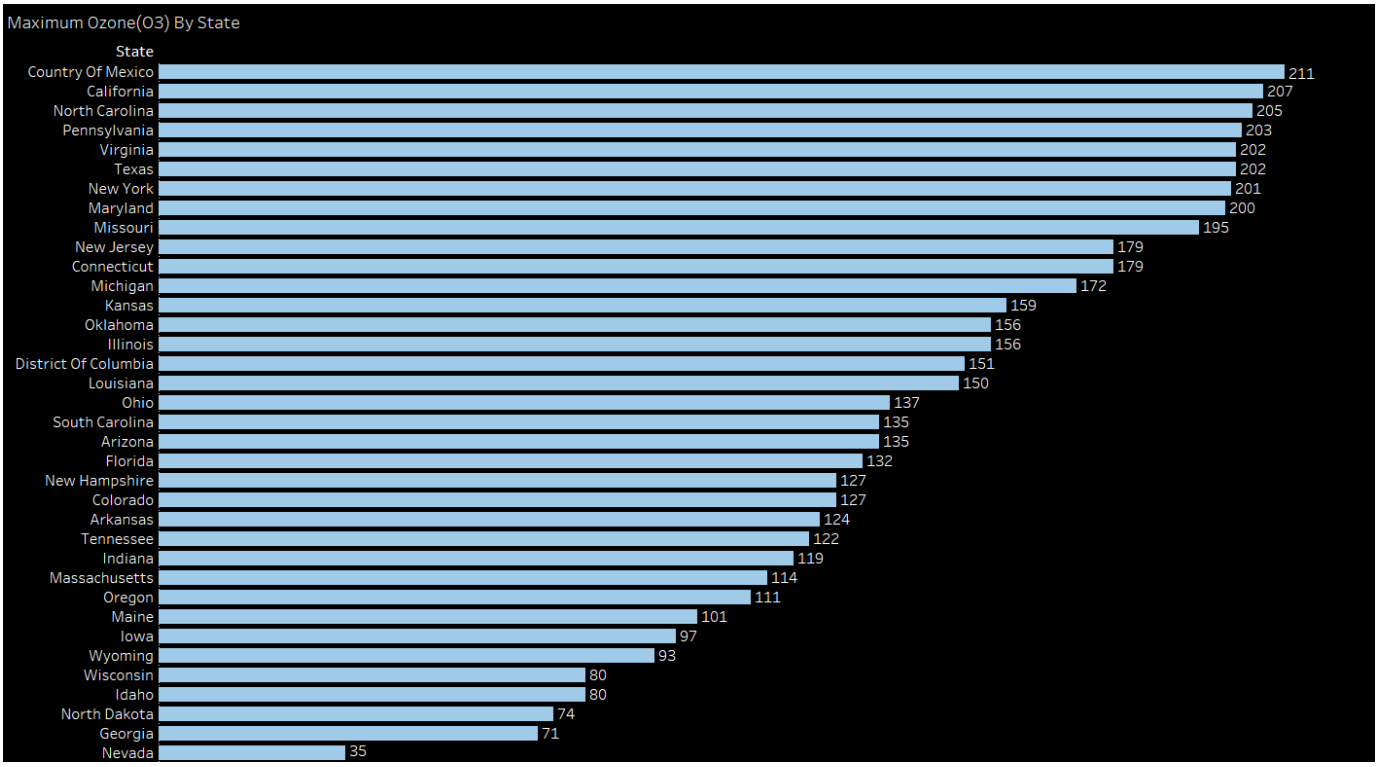

Maximum nitrogen dioxide(NO2) by Year
Max. No2 Aqi
120
110
100
90
80
70
60
50
40
30
20
10
0
115
112
110
107
107
2006
2007
2008
2009
2010

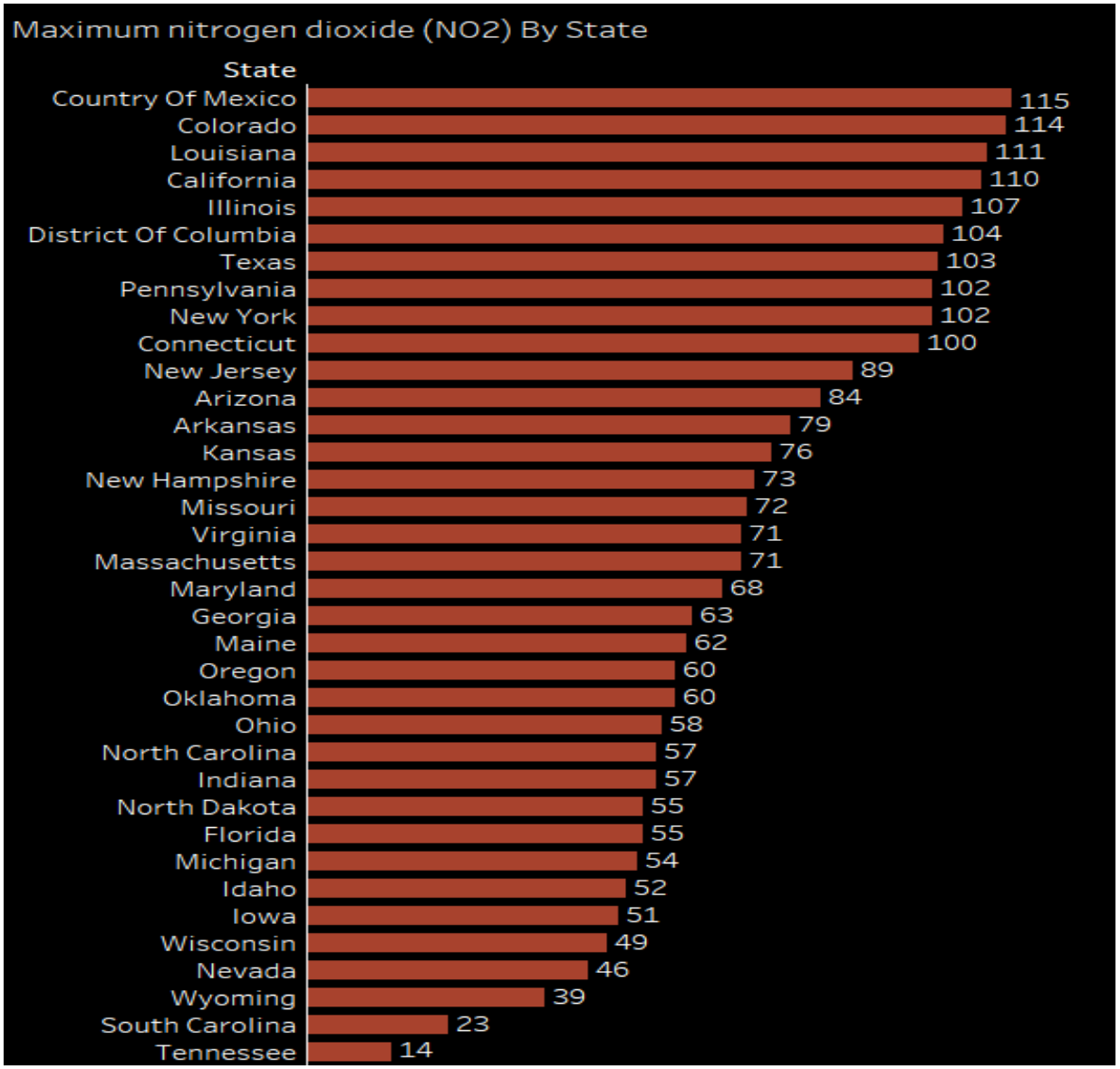

Maximum sulphur dioxide(SO2) by year
Max. So2 Aqi
200
180
160
140
120
100
80
60
40
20
0
200
176
125
120
103
2006
2007
2008
2009
2010

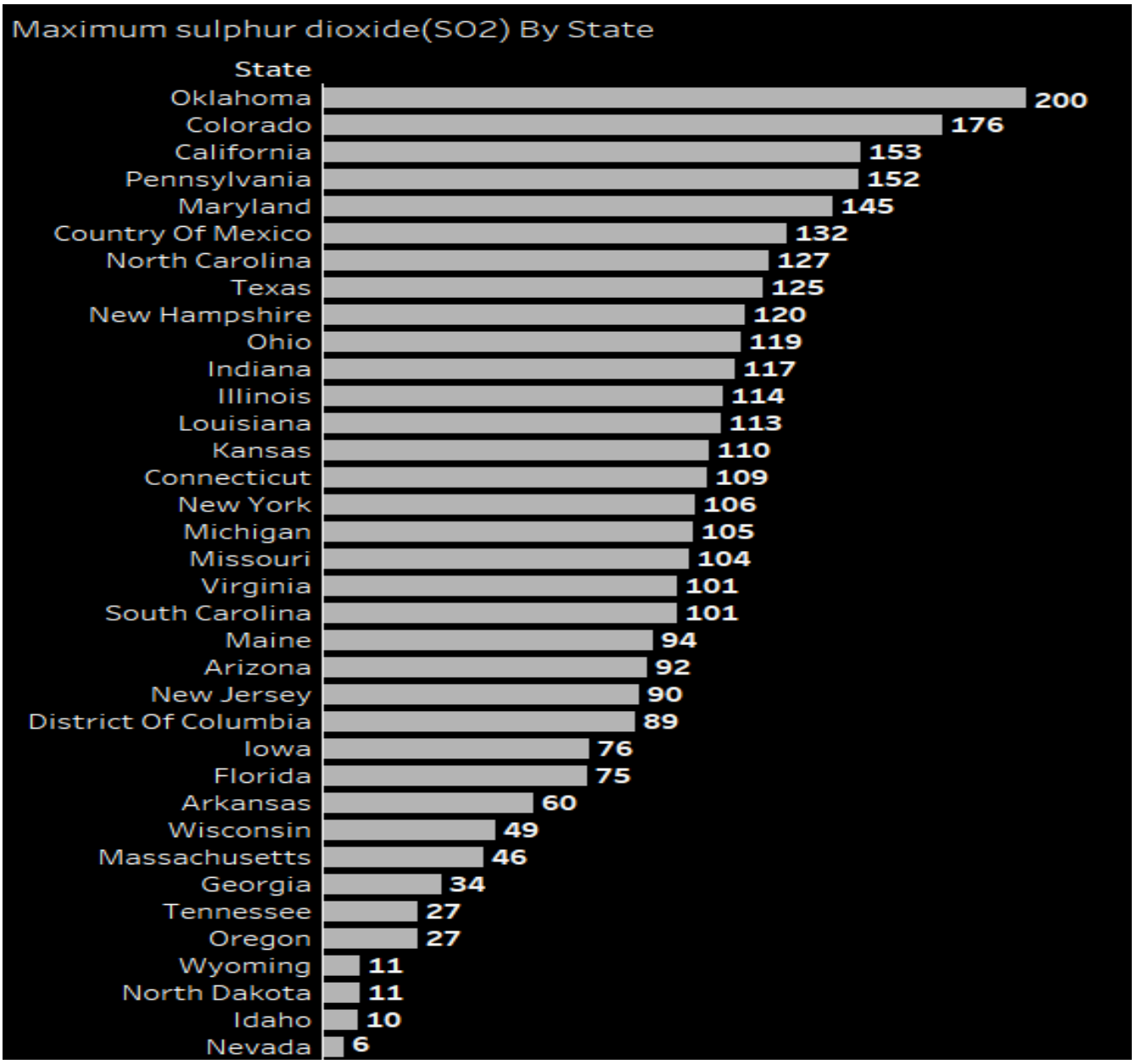
- Over the year from 2006 to 2010 CO AQI gradually depleting and it came close to 80 ppm in 2009 and slightly Decreased in 2010.Overall change in air quality.
- Over the year from 2006 to 2010 O3 AQI gradually depleting and it came to 206 in 2009 and in 2010 decrease to 200.Overall change in air quality.
- Over the year from 2006 to 2009 NO2 AQI gradually depleting and it's came to 107 in 2009 and from 2019 it remains constant. Overall change in air quality**.**
- Over the year from 2006 to 2010 SO2 AQI gradually depleting and it came close to 120 in 2009 and above 100 in 2010. Overall change in air quality

6.What is the maximum CO, NO2, SO2 and O3 AQI in each state?




Maximum Ozone(O3) By State
State
Country Of Mexico 211
California 207
North Carolina 205
Pennsylvania 203
Virginia 202
Texas 202
New York 201
Maryland 200
Missouri 195
New Jersey 179
Connecticut 179
Michigan 172
Kansas 159
Oklahoma 156
Illinois 156
District Of Columbia 151
Louisiana 150
Ohio 137
South Carolina 135
Arizona 135
Florida 132
New Hampshire 127
Colorado 127
Arkansas 124
Tennessee 122
Indiana 119
Massachusetts 114
Oregon 111
Maine 101
Iowa 97
Wyoming 93
Wisconsin 80
Idaho 80
North Dakota 74
Georgia 71
Nevada 35


Maximum nitrogen dioxide (NO2) By State
State
Country Of Mexico 115
Colorado 114
Louisiana 111
California 110
Illinois 107
District Of Columbia 104
Texas 103
Pennsylvania 102
New York 102
Connecticut 100
New Jersey 89
Arizona 84
Arkansas 79
Kansas 76
New Hampshire 73
Missouri 72
Virginia 71
Massachusetts 71
Maryland 68
Georgia 63
Maine 62
Oregon 60
Oklahoma 60
Ohio 58
North Carolina 57
Indiana 57
North Dakota 55
Florida 55
Michigan 54
Idaho 52
Iowa 51
Wisconsin 49
Nevada 46
Wyoming 39
South Carolina 23
Tennessee 14



- Country of Mexico, California, Texas, New Hampshire are the states with maximum CO AQI present and highly polluted with CO.
- South Carolina, North Dakota, Tennessee are the states with minimum CO AQI present and least polluted with CO.
- The Country of Mexico, California, North California, Pennsylvania and Virginia have the maximum O3 AQI present and highly polluted with O3.
- Nevada, Georgia, North Dakota, Wisconsin are the minimum O3 AQI present and least polluted with O3.

- Country Of Mexico, Colorado, Louisiana, California have the maximum NO2 AQI present and Wyoming, South Carolina, Tennessee with least NO2 AQI present.
- The Oklahoma, Colorado, California, Pennsylvania have the maximum SO2 AQI present and Idaho, Nevada, North Dakota are with minimum SO2 AQI present.